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A Life-course Perspective on Retirement Trajectories of Colombia's Older Workers

The roles of family composition and work-related characteristics in explaining
retirement from a gender perspective

by

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Abstract: The purpose of this study is to investigate the influence of family composition and work-related characteristics on retirement and to identify to what extent these factors explain the differences in retirement rates between men and women. This study is conducted under a life-course perspective framework and uses a logistic regression and a Blinder-Oaxaca decomposition analysis as methodological approaches. Using the Survey on Health, Well-Being, and Ageing (SABE), this study finds that having fewer children does not explain retirement decisions of Colombians. However, women with no children are less likely to retire than women with at least three children because they are more likely to have stable working careers. Regarding work-related factors, this study finds that people working in informal activities are less prone to be retired than formal workers because of their limited access to retirement benefits. Lastly, none of these factors appear to explain the differences in retirement between gender. In fact, most of the difference is accounted by non-compositional factors that may be well explained by the gender inequality in the country.

Key words: Colombia, retirement, population ageing, informality, fertility, demographic transition.

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Table of Contents

1	Introduction	4
2	Theory	7
2.1	Theoretical Approach	7
2.1.1	The Life Course Perspective Theoretical Approach	8
2.1.2	Alternative Theoretical Approaches	8
2.2	Previous Research	11
2.2.1	Family-related Findings	12
2.2.2	Work-related Findings	12
2.2.3	Gender Differences in Retirement	13
2.2.4	Alternative Empirical Findings	14
3	Study Context	15
3.1	Demographic Context	15
3.2	Labor Market Context	16
4	Data	18
4.1	Source Material	18
4.1.1	Data Limitations	19
4.2	Sample Selection	19
4.3	Variables Description	19
5	Methods	23
5.1	The Approach	23
5.1.1	The Logistic Regression	24
5.1.2	The Blinder-Oaxaca Decomposition	25
6	Empirical Analysis	27
6.1	Descriptive Statistics	27
6.2	Results	30
6.3	Robustness Tests	36
6.4	Discussion	37
7	Conclusions	39
	References	41
	Appendix A	50
	Appendix B	51
	Appendix C	52
	Appendix D	53
	Appendix E	54
	Appendix F	55

List of Tables

Table 4.1: Description of variables included in the empirical analysis.....	21
Table 6.1: Descriptive Statistics.....	28
Table 6.2: Odds Ratios from Logistic Model of Transition from Full-time employment.....	33
Table 6.3: Odds Ratios from Logistic Model using different sources of income as dependent variable	34
Table 6.4: Results of the Blinder-Oaxaca decomposition	35

List of Figures

Figure 3.1: Fertility and Mortality Rates - Colombia 1800-2020	15
Figure 3.2: Life Expectancy - Colombia 1800-2020	15
Figure 3.3: Dependency Ratio - Colombia 1950-2100	16
Figure 6.1: Retirement rates by age and gender	29
Figure 6.2: Retirement rates by age, sector and gender	29
Figure 6.3: Retirement rates by age and number of children	29
Figure 6.4: Retirement by age, gender and Head HH status	29
Figure 6.5: Retirement rates by educational attainment.....	29
Figure 6.6: Retirement rates by gender and health in childhood.....	29
Figure 6.7: Retirement rates by pre-retirement job.	29
Figure 6.8: Retirement rates by gender and pre-retirement job	29
Figure 6.9: Effect of Covariates on Total Compositional Change (dZ).....	36

1 Introduction

Population ageing, or the shift in the age structure towards older ages, is taking place all over the world as a consequence of low fertility and an increased longevity (Bengtsson & Scott, 2010). The worldwide percentage of population aged 65 and above is expected to increase from 8.5 percent in 2015 to 16.7 percent in 2050 (He, Goodkind & Kowal, 2016). Even though population ageing started in industrialized countries, most of the future change in the global population structure is expected to come from the developing world (He, Goodkind & Kowal, 2016). According to Bengtsson and Scott (2010), the shift in the age distribution in developing countries will be faster than it has been in the developed world. For instance, while the average European country took more than 70 years to double the proportion of individuals aged 65 and above from 7 to 14 percent, Colombia is expected to take only 22 years (United Nations, 2015). Consequently, this process will translate into a fast increase of the proportion of economically dependent elderly. According to CELADE (2013), even though young people have dominated Colombia's demographic scene since the last century, the year 2034 will mark the end of the youth society dominance in the country. The ageing process will place growing burdens on the government and working age adults given that the financial sustainability of public security systems greatly depends on taxes and contributions paid by the working population (Lee, 2003).

Even though the effects of population ageing are not straightforward and easy to predict, several challenges are expected to be faced by the entire world. These challenges are mostly associated with the increasing need for additional public and private outlays for old age income support and healthcare, as well as the shrinking of the labor force (Boersch-Supan, 2001; Mason, 2007). In the light of these challenges, governments have opted to find ways with which people might work into older age (Bengtsson & Scott, 2010). In Colombia, population ageing may present similar but more severe policy challenges due to the virtual absence of pension schemes and the high prevalence of informal jobs (Cusson, 2017). For related reasons, the study of the retirement determinants has been a matter of interest not only in developing countries but elsewhere in the world.

Although there is a vast amount of literature studying the retirement determinants and the differences in retirement patterns across countries focusing on institutional, wealth and health factors (e.g. Börsch-Supan, Brugiavini & Croda, 2009; Lumsdaine & Vermeer, 2015; Van Bavel & De Winter, 2013), little has been said about how changes in familial structure and the informality of the labor market may affect the retirement adjustment process of men and women in Colombia. This paper analyzes the influence of children and work-related characteristics on retirement, motivated by the following facts. *First*, Colombians, and in particular women, are highly dependent on family support at old ages (Ministry of Health and Social Protection, 2013). Given the fact that fertility has significantly decreased in Colombia since the twentieth century, the elderly are expected to rely less on financial support from their children in their retirement. *Second*, informal employment represents about half of the

total labor force in the country (Cusson, 2017), which means that workers are likely to be economically and socially vulnerable at old ages because they usually do not have access to pension benefits or they possess less accumulated savings for their retirement. In light of these facts it is important to understand how fertility and different employment forms affect retirement and to what extent these factors explain the differences in retirement rates between men and women. In this regard, this study addresses the following research questions: Do the falling fertility and employment in informal activities motivate individuals to retire? Do these factors explain the difference in retirement between men and women? Bearing in mind that self-employment, domestic, unpaid and unskilled work are the major sources of informal employment in Colombia (Fedesarrollo, 2017), the following hypotheses are tested:

- i. Having fewer children has a negative impact on the likelihood of retirement of elderly Colombians.
- ii. Participating in self-employment, domestic or unskilled activities at age 45 decreases the probability of retirement of elderly Colombians.
- iii. The number of children and the type of job at age 45 are factors that explain the differences in retirement probabilities between men and women.

Based on cross-sectional data from the Survey on Health, Well-Being, and Ageing (SABE), the research questions are addressed by studying the transition towards retirement. Even though SABE contains complete information of elderly individuals and their well-being, the fact that it is a cross-section study limits the scope of this analysis. The retirement adjustment process develops in the course of the lifecycle, therefore specific circumstances that could happen earlier in life may not be captured by SABE. However, one particular advantage of the survey is that it contains specific questions about health and working careers earlier in life that will be exploited to study the transition into retirement.

The main findings of this paper could be summarized as follows. First, while the falling fertility is not an important factor explaining retirement, the type of job at age 45 appears to be the factor with the highest explanatory power explaining the transition towards retirement. These findings suggest that although the falling fertility restricts the access to family support at old ages, working in the informal sector is the aspect that motivates people to work until old ages. To be specific, the self-employed, domestic, unskilled or unpaid workers decrease the probability of retirement at old ages compared to wage and salary workers in the public and private sectors. Second, although having fewer children is not significantly associated with the transition to retirement, women that do not have any children significantly decrease the likelihood of retirement compared to women with 3 or more children. Lastly, the Blinder-Oaxaca decomposition shows that disparities in retirement probabilities between men and women are found to be a consequence of non-observable factors. Even though the identification of non-compositional features is outside the scope of this research, one could argue that this may be explained by the great gender inequalities in the country. Furthermore, among the compositional or observable characteristics, the fact that most men are heads of household explain most of differences in retirement probabilities between men and women.

This thesis is organized as follows. After this introduction, chapter two provides a revision and discussion of the theories and previous research that serve as a base for the empirical analysis. Chapter three presents the demographic and labor market contexts of Colombia.

Chapter four presents the data used to explore the research questions. Chapter five introduces the methodological approaches used in this study. This chapter is divided in two sections, one of them presents the logistic regression approach that is performed to test the first two hypotheses; whereas the second section introduces the Blinder-Oaxaca decomposition method that is executed to test the third hypothesis. Chapter six presents the empirical results of this thesis. Finally, chapter seven concludes with suggestions for future research.

2 Theory

Chapter two presents and discusses the conceptual framework and theories mostly related to the retirement process and provides an overview of the existing literature in this field, emphasizing the factors related to the scope of this research.

2.1 Theoretical Approach

The worldwide trend of a growing elderly population, as a result of declining fertility rates and increasing life expectancy, has been a matter of interest in different areas such as gerontology, economics, demography and psychology. As a consequence, a number of theoretical conceptualizations have shaped the retirement literature (von Bonsdorff et al., 2009). However, the conceptualizations that have been traditionally used since the late twentieth century are the retirement as a decision-making process and the adjustment of the retirement process (Wang & Shultz, 2010). The *decision-making* conceptualization suggests that retirement is a freely chosen action in which people consciously decrease their commitment to work and begin to cease working activities to pursue leisure time (Feldman, 1994; Smith & Moen, 2004). However, retirement is not always perceived as freely chosen since decisions may be forced or restricted under certain conditions (Wang, 2012). This conception refers to the degree to which individuals consider their retirement decision to be voluntary or involuntary (Beehr, 1986; Wang, 2012). Bearing in mind these conditions, Wang (2012) suggests that the perception of forced retirement decisions can be a result of external factors (such as family obligations), internal factors (e.g. physical or mental health limitations) or structural forces (such as pension benefits). Essentially, the decision-making theoretical conceptualization hypothesizes that after making the decision to retire, independently if it is a freely chosen or forced decision, individuals' working activities should progressively decrease whereas family and social activities would increase (Feldman, 1994; Smith & Moen, 2004; Wang & Shultz, 2010).

Contrary to the decision-making conceptualization of retirement, Wang et al. (2009) argue that studying this phenomenon as an *adjustment process* is a more comprehensive approach to understand the transition towards retirement. The authors suggest that factors and characteristics of the retirement transition process attached to the decision to retire are of most importance rather than the decision itself. In other words, an individual may make the decision to retire, yet the resources and factors associated with the decision may lead the person to a different course of action. Therefore, by emphasizing the longitudinal process of retirement, rather than the simple decision, this conceptualization provides a more realistic representation of retirement outcomes. For this reason, this thesis studies the transition to retirement of elderly Colombians under the adjustment process theoretical conceptualization.

Next subsections will present the theoretical framework used in this study in order to explain the importance of individual and work characteristics in motivating retirement.

2.1.1 The Life Course Perspective Theoretical Approach

The *life course perspective* (Elder, 1998) studies the retirement transition in the course of the lifecycle and contends that life transitions, e.g. the transition from work to retirement, are dependent on the contexts in which retirement occurs (Mortimer & Shanahan, 2003). These contexts include previous workforce patterns, preferences, job characteristics, health and leisure habits as well as social and institutional contexts (Appold, 2004; Morrow-Howell & Leon, 1988; Orel, Ford & Brock, 2004). In other words, the life course perspective highlights that retirement may be influenced by previous events of life (Elder, 1998). According to Wang (2012), under this perspective, the social context plays a significant role in the retirement transition because different generational cohorts or social groups are likely to experience different trajectories in their transitions towards retirement. A key societal consideration is gender, since the process of retirement of women may be different from men due to work histories and overall life experiences (Kim & Moen, 2002). Given the relevance of the life course perspective theory in shaping retirement trajectories, this study uses this perspective as a framework to understand whether the number of children and work-related factors influence retirement, and to what extent these factors explain the differences in retirement between men and women.

The life course principles considered in this study are the *human agency* and *linked lives*. The *human agency* principle indicates that individuals can make their own choices and that these choices are constrained to factors of people's life histories and environments, such as work motivations and motives, health, job characteristics and financial factors (de Wind et al., 2016). The *linked lives* principle implies interdependency in people's lives. That is, that transitions from work to retirement are dependent on social relations at work or within the family, e.g. marriage, family composition, spouse's working conditions (de Wind et al., 2016).

2.1.2 Alternative Theoretical Approaches

Supplementary theoretical frameworks such as the *continuity theory*, the *role theory*, the *image theory*, the *expectancy theory* and the *rational choice theory* might be of relevance in the retirement transition process, however they are not directly applied in this research. The *continuity theory* frames the retirement process with the idea that psychological characteristics such as preferences, ideas, attitudes, self-esteem and behaviors maintain consistent patterns over the lifecycle and that persons accommodate transitions without experiencing disruptions in their life patterns (Atchley, 1989; Lytle et al., 2015). In this context, retirement is viewed as an opportunity to maintain lifestyle patterns and social interactions.

Similarly, the *image theory* is used to incorporate the way people perceive themselves with regards to their self-images or belief structures (Wang & Shultz, 2010). In general, this theory

holds that individuals' desires to maintain positive and stable self-images influence their choice to either keep on working or retire (Beach & Mitchell, 1987). The *expectancy theory* relates to workers' expectations, in terms of productivity, work characteristics and health status, and their influences on retirement (Karpansalo et al., 2004; Kim & Moen, 2002). That is, low expectations of productivity or health are related to a higher likelihood of retirement. The *role theory* emphasizes the roles of people's occupations and transitions between roles. According to Baugh and Sullivan (2009), the role theory implies that people that are comfortable with their work-related activities and have strong attachments with their work roles are more likely to delay retirement. On the contrary, when individuals are not comfortable with their work roles, they are more likely to exit such roles through retirement (Wang, 2007).

Lastly, the *rational choice theory* frames the retirement process in terms of a trade-off between work and leisure, and incorporates a life-cycle model of savings (Ando & Modigliani, 1963; Quinn, Burkhauser & Myers, 1990). Expressed in other words, individuals' retirement trajectories take place over time and depend on when individuals are capable to stop accumulating financial resources from paid-work to start consuming them on leisure (Gustman & Steinmeier, 1986). This theory has typically been used to understand retirement by studying workers' financial resources (e.g. pension plan features) and their macroeconomic environments (Adams, 2003; Quinn et al., 1990). By this means, accumulated wealth and economic conditions are among the factors that explain retirement.

According to the adjustment process conceptualization, empirical studies have used and identified some potential factors that could impact retirement and their expected signs. Following Wang and Shultz (2010), explanatory variables of retirement can be gathered in two broad categories: microlevel and mesolevel. The former includes explanatory variables at an individual level, whereas the mesolevel includes work-related predictors of retirement (Wang, 2007). Moreover, de Preter, van Looy and Mortelmans (2013) argue that institutional factors, such as social security and financial measures, could make retirement attractive or unattractive for the elderly. The next subsections will summarize some of the important variables that could explain retirement and that relate to the scope of this research.

Microlevel or Individual Factors

Most of the individual explanatory variables for retirement are found to be at the socio-demographic level; that is the case of *age*, *education*, *health* and the *role of family*. *Age* indicates where in the life cycle individuals are. According to the life course perspective, it intrinsically indicates how much individuals might have saved to optimize retirement consumption. For instance, retiring at prime earning ages may risk outliving retirement savings. Analogously, a vast body of evidence suggests that old individuals face a decline in physical and cognitive skills which eventually lead them to pursue retirement (e.g. Meng, Nexø & Borg, 2017; Verhaeghen & Salthouse, 1997). Even though there is a commonly mistaken view that the elderly are less productive, productivity has not been found to be diminished with age, at least not up to age 65 (e.g. Börsch-Supan & Weiss, 2016; Mahlberg et al., 2013). Börsch-Supan and Weiss (2016) argue that the decline in physical strength at old ages is compensated by other characteristics that appear to increase with age, such as

experience and the ability to cooperate in teams. Overall, one may expect that the older individuals get, the more likely they are to retire.

Education has also been regarded to influence retirement trajectories, since more educated individuals may have more opportunities to remain in the labor market due to their professional knowledge and skills compared to their less educated counterparts (von Bonsdorff et al., 2009; Wang & Shultz, 2010). The postponement of retirement in more educated individuals could be also explained by the later career onset due to longer years of schooling (Peiró, Tordera & Potočnik, 2012). *Health* is another major factor that has been stated to influence the decision to retire (Fisher, Ryan & Wang, 2017; Mutchler et al., 1997). According to Wang (2007), due to the inability to perform work-related tasks, workers that face severe health problems are more likely to retire than their healthy counterparts. Kim and Feldman (2000) argue that even if the ability to perform work-related tasks is not disturbed, individuals with serious health problems may want to spend time with family rather than at work.

Consistent with the life course perspective, the *role of family* is an important life characteristic that influences retirement trajectories at old ages (Shultz & Adams, 2012). According to Svensson et al. (2015), “taking care of elderly parents, assisting adult children with babysitting, or enjoying the company of the younger or older generations could be reasons for labor market exit” (Svensson et al., 2015, p.859). Consequently, having dependent younger or older generations may extend paid work at old ages. Additionally, marital status and spouses’ working and non-working conditions could be factors that motivate retirement (van Solinge & Henkens, 2008).

Mesolevel or Work-related Factors

Some of the current literature on retirement pays particular attention to the type of employment carried by people. According to Andersson Joona (2008) and Zissimopoulos and Karoly (2007), self-employment may be an important factor for delayed retirement. The literature has remarked two main reasons for this statement (e.g. Hundley, 2001; Karoly & Zissimopoulos, 2004; van Solinge & Henkens, 2008). The first one is that people in self-employment, may be less likely to be covered by a pension plan or by a private health insurance compared to their salary and wage counterparts (Karoly & Zissimopoulos, 2004). The second one, argued by Hundley (2001), is that self-employed workers, due to their greater autonomy and flexibility, may be more likely to be more satisfied with their work than their wage counterparts.

Both the retirement literature (e.g. Kautonen et al., 2012; Mein et al., 2000; Topa et al., 2009) and the turnover literature (e.g. Davies, Van der Heijden & Flynn, 2017; Hayes et al., 2012) inform about the theoretical association between job satisfaction and the intended retirement age. People that are highly satisfied with their jobs are less likely to move away from their working activities and to relinquish through earlier retirement (Davies et al., 2017). This mechanism is also consistent with the continuity theory given that workers that are highly satisfied tend to place a higher value on their work, therefore they are more likely to prolong work and to delay retirement.

Institutional Factors

A basic institutional factor is the *legal retirement age*. According to Hofäcker et al. (2016), the retirement likelihood increases when a person reaches the legal retirement age. The statutory age threshold, e.g. Normal (or standard) retirement age (NRA hereafter), is imperative for pension schemes because it defines when a certain pension benefit can be claimed. In most countries, retirement -and in particular eligibility for a pension income- requires a retirement age and occasionally a minimum contribution period. Colombia's pension system is composed by a privately-managed fully funded system and a pay-as-you-go (PAYG hereon) public scheme. Insured individuals have the opportunity to choose between the two schemes once they enter the labor market and switch between them every five years up until ten years before reaching the NRA (OECD, 2015; Schmidt-Hebbel, 1995). Conditions for pension eligibility depend on the pension scheme individuals contribute to. On the one hand, to access pension benefits under the public PAYG scheme, individuals must reach an age of at least 57 for women and 62 for men and must have contributed to the pension system for at least 1,300 weeks. On the other hand, a privately-managed fully funded pension scheme is based on contributions to individual accounts in pension funds, which are managed by private management companies. Under this system a person is eligible for a pension if the accumulated capital is sufficient to finance a pension equal to 110 percent of the minimum wage over the person's expected lifespan. Consequently, neither a minimum specific age nor a number of contributions are necessary for pension eligibility under this framework (Kleinjans, 2003; Schmidt-Hebbel, 1995). According to OECD (2015), the system, independently on the scheme, tends not to benefit informal or low-income workers since they are typically not covered.

Furthermore, numerous lines of evidence suggest that the *labor market opportunities* for older workers and *the incentive structure* offered by social security schemes are also important features at the institutional level (van Oorschot & Jensen, 2009). Regarding the former, de Preter et al. (2013) argue that restrictive labor market opportunities may increase the average tenure of workers, but may reduce the share of older employees after the age of 50. Relatedly, strict protection employment legislations (EPL) may push older workers out of the labor market because retirement, as an institutional feature, allows companies to avoid firing taxes (Chéron, Hairault & Langot, 2008). Furthermore, generous social security measures provide the elderly with the opportunity to retire under economically acceptable conditions, which may promote retirement (de Preter et al., 2013).

2.2 Previous Research

Since an increasing number of elderly implies more people receiving pensions and costly health services, a great deal of previous research on population ageing has investigated the elderly's labor supply decisions for policy analysis (Bongaarts, 2003). In line with the theoretical approach, this section aims to present the relevant findings that explain retirement trajectories and that will be the backbone of the empirical chapter of this thesis. A number of researchers have attempted to explain differences in retirement patterns by categorizing the

contextual background in two categories: pull and push factors (Börsch-Supan, Brugiavini & Croda, 2009; Hofäcker et al., 2016). The former refers to (economic) incentives in welfare state systems or in people's life-cycles that provide individuals attractive opportunities for retirement. Whereas the latter includes factors that force workers from employment against their own preferences.

2.2.1 Family-Related Findings

Some lines of literature have remarked the role of grandparents in childcare provision to young parents, especially if other forms of childcare are scarce. In this context, childcare may be a motivation for grandparents to retire earlier (Jappens & Van Bavel, 2012; Saraceno, 2011). Particularly, one would expect that the effect of becoming a grandparent is stronger for women than for men since more of the burden of caring for grandchildren has fallen on women (Hank & Buber, 2009). Van Bavel and de Winter (2013) are one of the few authors assessing the intergenerational ties that may play a role in retirement transitions. Based on the hypothesis that parenthood and grandparenthood accelerate exit from the labor force through retirement, the authors use a logit specification of the rate of entry into retirement in 22 European countries using the European Social Survey (ESS3) and reveal that parenthood and grandparenthood tend to stimulate earlier retirement especially for women, whose effects are found to be stronger than for men.

Similarly, Lumsdaine and Vermeer (2015) investigate the role of care responsibilities for grandchildren and the effect of retirement timing of women in the United States. The authors go beyond the direct relationship between grandparenthood and retirement, and study whether caring for grandchildren and birth of grandchildren influence the likelihood of women's retirement and vice versa, and how these effects vary according to grandmothers' characteristics. In the context of a life-cycle framework, the authors document the relationship of the variables of interest by using Cox proportional hazard models. They find that having additional grandchildren increases the likelihood of retirement; though, having care responsibilities do not seem to significantly affect the probability of quitting the labor force. Even though the majority of the literature has focused on health and wealth characteristics as important determinants for retirement, Lumsdaine and Vermeer (2015) show that even controlling for these factors, the addition of new family members (children or grandchildren) and the presence of children in the same household significantly increase the probability of retirement.

2.2.2 Work-related Findings

Research on the labor market shows that retirement patterns differ in diverse important areas. According to Beehr et al. (2000), there are two set of pull factors in people's jobs that may induce retirement: motivating task and social factors at work (e.g. more autonomy or skill variety). Regarding the former, although early examples of research have led to the conclusion that job satisfaction is not a significant determinant of retirement (e.g. Adams & Beehr, 1998; Beehr, 1986), recent evidence suggests that job satisfaction is strongly

correlated to the intention to retire (Schnalzenberger et al., 2014). Concerning the study of social factors in the workplace, Lee and Lee (2013) using the Korean Longitudinal Study of Ageing find that self-employed workers are less likely to retire than their wage and salary counterparts, and that these differences are entirely explained by job flexibility and the ability to adjust hours of work. The authors argue that other characteristics such as health, retirement incomes, job satisfaction and productivity levels do not explain the differences in retirement between these two groups.

Similarly, but in light of a cross-sectional dataset, Vodopivec and Arunatilake (2011), using the 2006 Sri Lanka Ageing Survey (SLAS), trace the retirement patterns of workers with different working careers and identify the factors that influence workers to withdraw from labor activities. In order to evidence a transition in the elderly's working positions, the authors exploit the information regarding people's pre-retirement employment status at age 54. The authors believe that this method is one of the most practical ways of identifying a transition in the working status of individuals when using a cross-sectional dataset. By running a multinomial logit, Vodopivec and Arunatilake (2011) find that employment status at age 54 is the most significant factor explaining retirement decisions for elderly individuals in Sri Lanka. On the contrary, individual factors such as gender, marital status or being the head of the household do not show statistically significant relation to retirement decisions.

2.2.3 Gender Differences in Retirement

Gender differences in retirement have been widely addressed in the literature (e.g. Axelrad & Mcnamara, 2017; Finch, 2014; Hanson & Wapner, 1994; Sundén & Surette, 1998) given the acknowledgment that men and women often have different background and work experiences that are likely to be relevant in the retirement adjustment process. Some lines of evidence suggest that the experience of adaptation to retirement varies depending on gender (Cahill, Giandrea & Quinn, 2015; Calasanti, 1996; DeViney & Solomon, 1995). Publications in this context have found clear patterns disparities in retirement timing between men and women. According to Schils (2005), women usually have different working careers characterized by more interruptions and more prevalence of part-time jobs, both as a result of childbearing and childrearing, which usually result into less earnings and less accumulated savings for retirement. In this context, Finch (2014) finds that women are likely to extend paid work to make up for the opportunity costs of their discontinuous work histories and their histories of part-time employment. However, von Bonsdorff et al. (2009) argue that caregiving, childbearing and childrearing responsibilities mostly lead women to have lower attachments to work, promoting more positive attitudes towards retirement compared to men (von Bonsdorff et al., 2009).

Dentinger and Clarkberg (2002) indicate that caregiving responsibilities may increase the gender gap in the employment behavior, suggesting that men usually postpone retirement due to financial reasons, while women usually increase the hazard of retirement due to children or parental caregiving. Moreover, de Preter et al. (2013) argue that old employees are not only pulled into retirement because of financial reasons but also because many elderly consider retirement as an opportunity to spend quality time with children and grandchildren. Besides the role that caregiving and working histories seems to play in explaining differences in

retirement rates among gender, the literature also investigates the roles of health, wealth and asset allocation, as well as pension coverage rates as sources for retirement gender disparities (e.g. Even & Macpherson, 2004; Gustman & Steinmeier, 2000; Neelakantan & Chang, 2010). Cahill et al. (2015) explore whether the presence of children, having parents in need of caregiving assistance and self-employment are drivers of retirement differentials between American men and women. The authors find that these variables do not lead to significant gender differences in retirement patterns, and that most of the gender gap may be explained by institutional factors (Dahl, 2003).

2.2.4 Alternative Empirical Findings

Even though this study focuses on the roles that gender, family and work-related factors play in retirement, one should not neglect the importance of other characteristics emphasized in the literature, such as institutional factors, wealth and health. Economists have found that economic incentives (e.g. earnings and wealth) are of relevance for retirement independently from the way of modelling retirement (e.g. Gustman & Steinmeier, 1986, 2002). According to Bender et al. (2014), current income levels only explain part the retirement patterns, whereas future income expectations and wealth appear to have a more significant impact on retirement. The most common forms of wealth considered in the literature are those related to social security benefits (e.g. Bender et al., 2014; Gustman & Steinmeier, 2002).

At the institutional level, studies based on discrete-time and structural models (e.g. Börsch-Supan, Brugiavini & Croda, 2009; Coile, 2015; Fischer & Sousa-Poza, 2006; Schils, 2008) suggest that incentives in the pension system or pull factors, specifically the generosity of the retirement benefits and the flexibility of the pathways towards retirement, strongly stimulate people to withdraw from labor activities and opt for retirement. However, although de Preter et al. (2013) reveal that financial incentives in the pension scheme make retirement more attractive, they find that institutional push variables such as strict protection employment legislations do not have a significant effect on retirement. In other words, while economic incentives (pull variables) play an essential role in retirement, labor market constraints (push variables) appear to do so to a lesser extent.

Moreover, a considerable amount of literature has suggested that health is one of the most significant factors explaining retirement within countries (e.g. Börsch-Supan, Brugiavini & Croda, 2009; Charles, 2002; Coe & Zamarro, 2011; Schirle, 2010). Since health may be a source of endogeneity, several systematic reviews of the effect of health on retirement have been undertaken under the instrumental variables approach (e.g. Charles, 2002; Coe & Zamarro, 2011; Horner & Cullen, 2016). Charles (2002) and Horner and Cullen (2016) find that being healthy reduces the likelihood of being retired and vice versa. This relationship is confirmed even by neglecting endogeneity problems. For instance, Schirle (2010) estimates a simple probit model for the decision to enter into retirement and finds that having poor health increases the probability of being retired.

3 Study Context

In the light of the literature review, Colombia’s demographic and labor market contexts will be presented in this chapter in order to provide the reader a more comprehensive idea of the relevance of this research.

3.1 Demographic Context

The demographic transition from high to low levels of fertility and mortality has been one of the most significant changes in Colombia throughout the second half of the twentieth century. As shown in Figure 3.1, mortality rates have declined continuously since the 1930s from about 23.7 deaths per thousand inhabitants in the 1918-1938 period to 5.8 throughout the years 2010-2015. Similarly, fertility rates declined from roughly 6.8 births for every woman in reproductive age during the 1951-1964 period to 2.35 through the years 2010-2015. This rate is expected to decrease and maintain at around replacement levels (2.1 children per woman) in the following years. The increase in life expectancy (Figure 3.2), associated with the demographic transition and improvements in nutrition and sanitation, has been accompanied by with a change in the age structure of the population. That is, the increase in the share of persons aged 60 years or older. However, Colombia is currently in a stage of the demographic transition, known as the demographic dividend, in which the proportion of people in age of high labor productivity relative to their consumption is larger than the non-working age share of the population. This situation has contributed favorably to Colombia’s fiscal outlook since the ratio of taxpayers to beneficiaries has been increasing ever since the end of the twentieth century (CELADE, 2013). According to CELADE (2013), even though young people have dominated Colombia’s demographic scene since the last century, the year 2034 will mark the end of the youth society dominance in the country.

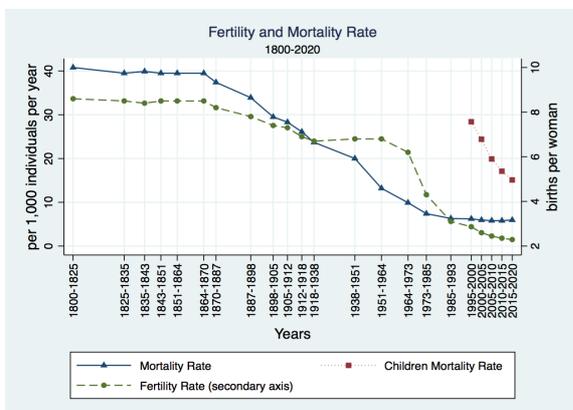


Figure 3.1: Fertility and Mortality Rates - Colombia 1800-2020 (DANE, 2017a; Flórez, 2011)

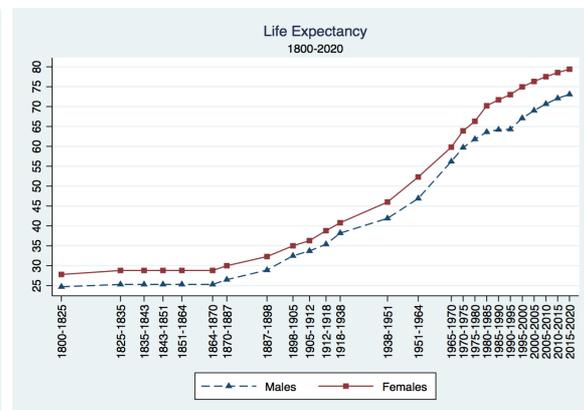


Figure 3.2: Life Expectancy - Colombia 1800-2020 (DANE, 2017a; Flórez, 2011)

According to Bengtsson and Scott (2010), the shift in the age distribution in developing countries will be faster than it has been in the developed world. For instance, while the average European country took more than 70 years to double the share of individuals aged 65 and above, Colombia is expected to do it in only 22 years (United Nations, 2015). As a consequence, this process will translate into a raising proportion of economically dependent individuals in a society, or the so-called dependency ratio. As displayed in Figure 3.3, the decline in the dependency ratio that started in the 1960s, is expected to last until 2024 and it will progressively increase ever since.

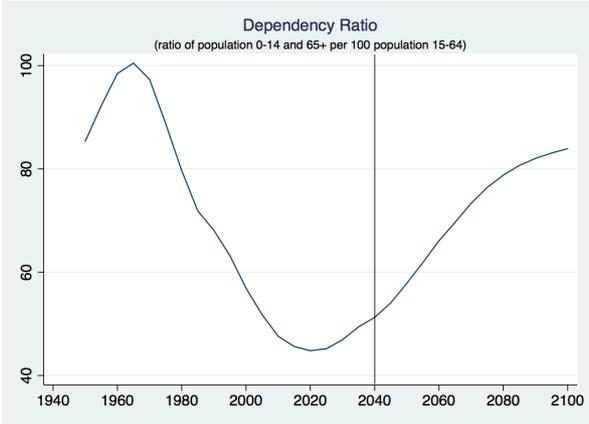


Figure 3.3: *Dependency Ratio - Colombia 1950-2100*
(United Nations, 2015)

Overall, even though Colombia’s demography has contributed positively to its fiscal outlook (demographic dividend), the situation is changing due to modifications in the age structure. Population ageing will eventually generate a sustained increase in the number of beneficiaries of public programs relative to the number of taxpayers, which will notably contribute to the fiscal challenges that the country will face in the near future. Furthermore, these effects are expected to strengthen given the large informal sector in the country that will limit even more the resources for public provision and the overall retirement benefits.

3.2 Labor Market Context

In line with the demographic transition, Colombian’s labor market has experienced many changes as a consequence to economic, institutional and demographic transformations. Think of more accumulation in human capital, a significant increase of the tertiary sector, a higher rate of urbanization and a higher participation of women in the labor force (Ministry of Health and Social Protection, 2013). However, Colombia is characterized by its high levels of employment in the informal sector. According to the department of statistics, the informal employment represents about half of the total labor force in the country (DANE, 2017b). Conditions of informal workers usually relate to low salaries, sometimes below minimum legal standards, and no contributions to pension and health plans. These conditions may constrain life-cycle savings and may limit the financial resources available of these workers when they reach older ages. For these limitations, informal workers are expected to extend working activities until old ages to finance their daily needs and doings. Indeed, as displayed

in Appendix A, labor income is found to be one of the most important sources of income among the elderly in Colombia, followed by family transfers that appear to be more important for women than for men.

Despite the increasing female labor participation in the past few decades, there are still marked gender inequalities in the labor market. Women's unemployment rates are higher, their average wages are lower and there is an increasing proportion of women engaged in informal activities with respect to men (Cusson, 2017). According to Cusson (2017), participation in the informal sector is superior for women than for men, especially in domestic or unpaid positions; occupations that are highly related to informality. For this reason, elderly women, are likely to be economically and socially vulnerable since they typically do not have access to pension benefits or they usually possess less accumulated savings for their retirement (Ministry of Health and Social Protection, 2013). As stated before, women largely rely on family transfers at old ages (Appendix A). Even though Colombia has committed to strengthen gender equality policies and reduce female unemployment, the country still evidences gaps in employment patterns between men and women that may well translate into differences in retirement patterns. However, according to DANE (2017b), women's participation in the formal sector has been increasing in the past years, suggesting that in the future they may be better financially prepared for retirement.

4 Data

Having established a more profound understanding of the retirement literature, previous findings and the demographic context of Colombia, it shall now be ascertained that the data used in this thesis is suitable to analyze and test the research hypotheses. This chapter argues the data that is required to test the hypotheses, the sample selected, and the specific variables used in this research.

4.1 Source Material

The primary and only dataset used in this thesis was obtained from the Survey on Health, Well-Being, and Ageing (SABE hereon) conducted in 2015 in Colombia by the Ministry of Health and Social protection, who kindly provided the dataset for this research. The SABE is a comprehensive, multidisciplinary population-based cross-sectional study of community-dwelling elderly individuals aged 60 and above who reside in households in rural and urban areas of 244 municipalities in Colombia (Gomez et al., 2016). The sample size of the survey is 23,694 elderly Colombians representative of the total population. SABE offers a variety of different variables related to health, working conditions, family composition and well-being of the elderly in Colombia, including self-assessed health in childhood, and working career characteristics. These features make the SABE dataset unique for the questions related to population ageing and retirement pathways.

Despite the fact that a longitudinal dataset would make it possible to address more complex issues related to the retirement process, SABE contains information of the working sector and employment status of the elderly in their most productive ages, which allows to study the transition away from employment. Relying on information from the early life of the respondent might be questionable due to measurement errors, specifically the recall bias, because participants could erroneously provide answers depending on their abilities to recall events (Althubaiti, 2016). However, one may assume reliability in the information since SABE only includes participants that are able to communicate and that get a score of above 13 in the Folstein Mini-Mental State Examination test (MMSE hereon) (Gomez et al., 2016). A low score in the MMSE implies that the respondent has trouble remembering, concentrating, learning new things or living independently, a condition that is known as severe impairment (Monroe & Carter, 2012). Moreover, information about last occupation can be regarded as memorable since occupation usually does not vary in the late working years of individuals (Vodopivec & Arunatilake, 2011).

Lastly, one should mention that the only previous published work that has used SABE is a descriptive-correlation study of quality of life, health and sociodemographic factors of elderly

Colombians by Vinaccia Alpi et al. (2018). To our knowledge, no supplementary sources have used the dataset in mention, especially to study retirement patterns and determinants in Colombia. Overall, this section shows that the dataset allows for the study of retirement and provides the necessary information to test the research hypotheses. Additionally, it successfully satisfies the aspects of reliability, representativity and validity.

4.1.1 Data Limitations

A particular limitation of the dataset is that it only includes individuals aged 60 and above, when the regular retirement age for female Colombians is 57. Although many women aged 57-59 may still not be retired, the study may lose potentially important characteristics attached to those birth cohorts that could affect their retirement decisions. A second limitation in the dataset is that it does not include information about other factors earlier in life (e.g. number of contributions to the pension system, periods of maternity leave and/or work interruptions) and factors related to labor demand, which may significantly explain differences in retirement among gender.

4.2 Sample Selection

Since the interest of the research lies in the retirement transitions of elderly individuals, the sample is restricted to male and female Colombians aged between 60 and 75 years old, who reported to have a job at age 45. A common issue with individual-based survey data is item nonresponse. There are diverse reasons why respondents do not answer certain questions, for instance lack of knowledge or privacy concerns. There are different methods to deal with missing data (Kang, 2013). A straightforward method, that is by default used in software such as STATA, is to simply drop observations containing missing values. One of the main drawbacks of this method is the loss of data that could result in less efficient estimates. In SABE the prevalence of missing information is typically below 1 percent for all variables of interest. Dropping incomplete records, based on the missing completely at random (MCAR) assumption, results into a final sample of 13,331 individuals, of whom 6,455 are men and 6,876 are women.

4.3 Variables Description

The dependent variable in this study is dichotomous and indicates whether a person had a job by the time of the survey. The variable in mention is constructed using two questions from the employment history and occupation section of the SABE questionnaire. The first one is the self-reported employment status and the second one the reason why the person is not working. The latter is a categorical question in which the respondent needs to choose among seven options; one of them is currently working. If the elder reports not to have a job in both

questions, the dummy takes the value of one and zero otherwise. Although self-reported retirement is a very straightforward way to identify retired and working individuals, it does not distinguish between those individuals that are unemployed or partly retired. For instance, individuals that receive pension incomes but are still actively working either in full-time or part-time jobs. It is important to mention that the concept of retirement applied in this research is the complete withdrawal from the labor market, which not necessarily means that the person receives a pension income. For this reason, this study includes all forms of labor force withdrawal (e.g. unemployed, partly retired or sick/disabled).

The key covariates in the analysis are family composition and work-related factors, in particular current number of children and type of employment when individuals were in their mid-forties. This study distinguishes three types of workers: public and private, self-employed and a last category comprising workers in domestic, unskilled and unpaid activities. The corresponding variables are taken from the employment section in SABE, in which respondents were asked to select their sector of employment when they were 45 years old. Each dummy takes the value of one if the respondent selected that sector as choice of employment and zero otherwise. Even though recent literature has remarked the role that job-satisfaction may play in retirement decisions, the SABE does not include any question related to the subjective perception of people's jobs; therefore, this variable is not included in the study.

Information concerning the number of children is included in the family information and social support segment of the SABE. Children is a continuous variable that counts the number of children reported by the respondents. This study creates binary variables clustering the number of children in four categories: no children, one child, two children and three or more children. That is, if the person reports to have two children, the dichotomous variable for two children takes the value of one, whereas the rest take the value of zero. Categorical variables are preferred over continuous variables since they facilitate the interpretation of odds ratios and outcomes from logistic regressions. Furthermore, since the literature has remarked the important roles that health and wealth play in predicting retirement, measures of health and wealth were also included as additional control covariates.

Furthermore, in order to control for further aspects influencing retirement, a set of control covariates was chosen following the findings of previous research. This includes the usual socio-demographic variables such as gender, age, marital status, being the head of the household, education and sector. Gender is defined by a binary variable taking the value of one for women and zero for men. Three birth cohorts are included in the analysis and constructed by gathering individuals born in 1955-1951, 1950-1946, 1945-1940 in cohorts 1, 2 and 3 respectively. Individuals from the same birth cohort are supposed to encounter the same historical and social conditions at the same ages. Each cohort group takes the value of one if the person was born in those years and zero otherwise. Information regarding respondents' marital status was taken from the identification section of the SABE questionnaire, where individuals were asked to indicate their current marital status. The generated variable is provided as a dummy that takes the value of one if the respondent reports to be married or in a civil union, and zero if the person reports to be divorced, widowed or single.

Table 4.1: Description of variables included in the empirical analysis

Variable	Description
Dependent Variable	
Employment Status (Retired)	Value 1 if respondents reported to be retired or not working by the time of the survey; 0 if employed.
Key Covariates	
No Children	Value 1 if respondents have no children; 0 if they have at least one.
One Child	Value 1 if respondents have one child; 0 if not.
Two Children	Value 1 if respondents have two children; 0 if not.
Three or more children	Value 1 if respondents have three or more children; 0 if not.
Public Sector	Value 1 if respondents reported to have a job in the public sector when they were 45; 0 if the job was in other sectors.
Private sector	Value 1 if respondents reported to have a job in the private sector when they were 45; 0 if the job was in other sectors.
Self-employment	Value 1 if respondents reported to be self-employed when they were 45; 0 if the job was in other sectors.
Domestic/unskilled/ unpaid	Value 1 if respondents reported to work in domestic, unskilled or unpaid jobs when they were 45; 0 if the job was in other sectors.
Control Covariates	
Individual and Demographic	
Gender (Female)	Value 1 if the respondent is a woman; 0 if a man.
Birth Cohort 1 [1955-1951]	Value 1 if respondents were born between 1955 and 1951; 0 if older.
Birth Cohort 2 [1950-1946]	Value 1 if respondents were born between 1950 and 1946; 0 if older.
Birth Cohort 3 [1945-1940]	Value 1 if respondents were born between 1945 and 1940; 0 if not.
Marital Status (Married)	Value 1 if respondents are married; 0 if divorced, widowed or never married.
Head of the HH	Value 1 if respondents reported to be heads of household; 0 if not.
Education (Tertiary Education)	Value 1 if respondents have tertiary education; 0 for lower levels of education.
Health	
Health Status (Bad health childhood)	Value 1 if respondents reported to have a bad or regular health before the age 15; 0 for good or very good health.
Household Wealth proxy	
House Ownership	Value 1 if respondents own a house/department; 0 if not.
Rural	Value 1 if respondents live in rural areas; 0 for urban areas.

The use of self-assessed health is one of the most frequently employed measures of health in studies since people's health is not easily measurable or directly observable (Au & Johnston, 2014). In this study, health is measured as the self-assessed health in childhood in order to avoid the potential endogeneity that could arise by using current health status. The variable included in the model is a dummy that takes the value of one if the person reported to have a bad or very bad health before the age 15, and zero otherwise. Moreover, one must bear in mind that any measure of self-assessed health could be subject to justification bias. That is, individuals may claim they are not healthy in order to justify that they are not employed. Even though some authors argue that self-assessed health measures are reliable, estimates from this variable should be treated carefully (Piggott & Woodland, 2016). Since health is not a variable of interest in this research, no further treatment is made to correct for such matters.

Similarly, since the ability to retire not only depends on pension access but also on whether the household's accumulated wealth allows for it, wealth has been regarded as an imperative factor explaining retirement patterns. The model controls for house ownership as a measure of household wealth. Unlike liquid components of wealth, such as labor or pension income, household wealth is less sensitive to shocks in health or current income that simultaneously determine labor supply (Giles, 2011). Giles (2011) argues that educational attainment could work as an additional proxy for household wealth since it is likely to be associated to life-time earnings and accumulated household wealth. For more detailed information, Table 4.1 summarizes the description of the variables used in this research.

On the whole, this study makes sure that the complete set of covariates brought into the model can be considered fixed prior to retirement. That is, covariates should not be an outcome of retirement itself in order to not run the risk of reverse causality. For this reason, some relevant variables of wealth, such as pension income, state subsidies, remittances and family transfers, are not included in the model. However, because of their relevance, income-related variables are used as outcomes in complementary regressions in order to discuss whether specific characteristics affect the probability of receiving incomes. This part will be clarified in the subsequent chapter.

5 Methods

This chapter presents a review of the methods commonly applied in the literature and the approaches that will be carried out to answer the research questions and to test the research hypotheses.

5.1 The Approach

Traditionally, the study of retirement and its determinants has been carried out using two different approaches: structural and reduced-form models. Structural models of retirement are frequently carried out on a life course model perspective of retirement, assuming that rational, looking-forward individuals maximize their lifetime utilities subject to a budget constraint (Gustman & Steinmeier, 2002). These models comprise all possible relations and variables in a meaningful way for the study of a particular outcome. One of the methods commonly used in the retirement literature is the instrumental variables approach, that is used when the variable of interest is suspected to be endogenous (e.g. Charles, 2002; Coe & Zamorro, 2011; Horner & Cullen, 2016). Not controlling for endogeneity may only derive a correlation between retirement and the (endogenous) variable of interest and not a causal inference. In general, a major advantage of structural models is that estimated parameters can be used to simulate the effect of policies that have not been implemented or that are outside the scope of real life experiences (Coile, 2015). However, structural models require many distributional assumptions about structural errors and a full parametrization of individual preferences and stochastic processes, making its application particularly complex, although not impossible (Banks, Blundell & Rivas, 2010). According to Banks et al. (2010), any failure to capture the latter would imply an under or an overestimation of the retirement behavior.

While structural models capture all channels through which explanatory variables affect retirement patterns, reduced-form approaches look at the direct relationship between the control variables and the probability of retirement, implying that some channels that could impact retirement decisions may not be taken into consideration (Coile, 2015). However, as argued by Banks et al. (2010), these models are less complex and still allow for the analysis of retirement behavior. According to Gustman and Steinmeier (2001), this approach is a useful tool to explain the retirement process without restraining the analysis by the need to impose numerous restrictions in the empirical model.

The approach that better fits the purpose of this thesis is the reduced-form. Given that the dependent variable is dichotomous, a logistic regression is applied in order to test the first two hypotheses of this study. The decision of preferring a logistic regression over a linear probability model (LPM) is that the latter may predict probabilities outside the [0-1] interval.

According to Greene (2008), LPM may predict nonsense probabilities and standard errors. In addition, a Blinder-Oaxaca decomposition is applied in order to identify whether the observable characteristics explain the differences in retirement probabilities between men and women. The following subsections will present a detailed description of both approaches.

5.1.1 The Logistic Regression

As a framework for understanding the retirement and labor supply decisions of the elderly, this study assumes that old workers' retirement trajectories are based on the information they have about their personal characteristics and their work environments. Individuals are supposed to weight these factors and evaluate the overall utility of retirement before taking any decision. From the life course perspective framework, this study conceptualizes a general model of retirement as follows:

$$y_i = F(W_i, H_i, F_i, X_i, J_i, V_j) \quad \text{Equation 1}$$

$$y_i = \begin{cases} 1, & \text{If the individual is retired} \\ 0, & \text{If the individual is working} \end{cases}$$

Where retirement (y_i) is a function of household wealth (W_i), individual's health (H_i), a vector of dummies for the number of children (F_i), a vector of individual and demographic characteristics (X_i) and a vector of dummies for type of employment at age 45 (J_i). In addition, in order to control for potential unobserved regional-level features affecting retirement, a vector of region-level indicators is taken into consideration (V_j). In this context, and considering that the dependent variable is dichotomous, a limited dependent variable model is applied to investigate the role of family and work-related characteristics on retirement. This study specifies a logit model of the probability to transit from employment at age 45 to retirement after the age of 60.

Let y_i be a linear function of the variables previously defined:

$$y_i = \beta_0 + \beta_1 F_i + \beta_2 J_i + \beta_3 C_i + V_j + \varepsilon_i \quad \text{Equation 2}$$

The vector of control variables C_i includes the variables aforesaid: household wealth proxied by the dummy for house/apartment ownership (W_i), individual's health in childhood (H_i) and individual and demographic characteristics (X_i). As mentioned in Chapter 4, this study only uses variables that can be considered fixed prior to retirement in order to avoid reverse causality. Each variable is assigned a coefficient that will measure the individual contribution of that variable to the probability of retirement. The estimated sign will indicate the relationship between the probability of retirement and a change in the explanatory variable. Before proceeding to the estimation, the probability of retirement is denoted by the following equation.

$$P(y_i) = P(\beta_0 + \beta_1 F_i + \beta_2 J_i + \beta_3 C_i + V_j) \quad \text{Equation 3}$$

Unlike LPM, the logistic distribution restricts the estimated probabilities to be in the [0-1] interval. The logistic distribution used in this study is shown in Equation 4 and it is estimated by the maximum likelihood estimation procedure.

$$P(y_i = 1|F_i, J_i, C_i, V_j) = \frac{e^{\beta_0 + \beta_1 F_i + \beta_2 J_i + \beta_3 C_i + V_j}}{1 + e^{\beta_0 + \beta_1 F_i + \beta_2 J_i + \beta_3 C_i + V_j}} \quad \text{Equation 4}$$

Robust standard errors are used to account for heteroskedasticity and the model is estimated for the pooled sample, as well as for males and females. Models for men and women use the same specifications as in Equation 4, excluding the gender dummy. The detail of the covariates included in the model are presented in Table 4.1, and the justification for their use is stated in Chapter 4.

Additionally, considering that the set of covariates or observable characteristics, may affect the probability of retirement because they enable the access to additional incomes (e.g. family transfers, pensions, etc.), four complementary regressions are run following the model specified in Equation 4, using access to pension income, state subsidies, remittances and family transfers as dependent variables.

Given the fact that individuals for the SABE were selected following a “multistage cluster-sampling technique with stratification of the units at the highest levels of aggregation” (Gomez et al., 2016, p.2), the sample may not exactly refer to the population. For this reason, this study uses the sample weights provided in the SABE itself, in order to correct for systematic differences in sample selection. According to Pfeffermann (1996), “probability weighting of the sample observations yields consistent estimators of the model parameters and protects against model misspecification” (Pfeffermann, 1996, p.239). In other words, ignoring the sample design of the survey could retrieve misleading results.

5.1.2 The Blinder-Oaxaca Decomposition

The Blinder-Oaxaca decomposition has been commonly used in the literature to study gender or race differentials in labor-market outcomes (Oaxaca & Ransom, 1994; Weichselbaumer & Winter- Ebmer, 2005). However, the decomposition procedure is suitable for the study of any mean outcome difference between groups. This technique was promoted by Blinder (1973) and Oaxaca (1973) and it has been one of the most common approaches in the past decades to identify and quantify the contribution that endowments (or observable characteristics) and coefficients (or the effects of these characteristics) have on inter-group differences of mean outcomes (Jann, 2008). Originally the decomposition technique was based on linear regression models; nevertheless, with the passage of time the procedure has been extended to non-linear probability models (Bauer & Sinning, 2008; Fairlie, 2006). The Blinder-Oaxaca decomposition will allow us to infer how much of the mean difference in retirement probabilities between men and women (dy) is due to observed characteristics. The two-fold Blinder-Oaxaca decomposition is based on the observed characteristics and estimates from the gender-specific regressions stated in Equation 4. The decomposition is expressed as:

$$\underbrace{\bar{y}^m - \bar{y}^w}_{dy} = \underbrace{\left[\sum_{i=1}^{N^m} \frac{\Lambda(z_i^m \hat{\beta}^w)}{N^m} - \sum_{i=1}^{N^w} \frac{\Lambda(z_i^w \hat{\beta}^w)}{N^w} \right]}_{dZ} + \underbrace{\left[\sum_{i=1}^{N^m} \frac{\Lambda(z_i^m \hat{\beta}^m)}{N^m} - \sum_{i=1}^{N^w} \frac{\Lambda(z_i^w \hat{\beta}^w)}{N^w} \right]}_{dB} \quad \text{Equation 5}$$

Where Λ is the cumulative density function of the logistic regression in Equation 4. N^m is the sample size for men, N^w the sample size for women; Z_i^m and Z_i^w are the endowments or observed characteristics for men and women respectively (note: Z_i is a vector that includes the observed variables F_i, J_i, C_i, V_j). The first term in brackets represents the gap in retirement probabilities between men and women that is due to differences in endowments (dZ). The second term denotes the part of the difference that is due to variances in coefficients (dB). In the decomposition specified in Equation 5, women coefficient estimates are used as weights in the first term (dZ), while men endowments are used as weights in the second term (dB). Blinder-Oaxaca decomposition results are sensitive to the choice of coefficients or weights for the first component since the decomposition can be weighted using either men or women estimates (Fairlie, 2006). In this regard, Jann (2008) argues that the choice of the group that will serve for the weighting (comparison group) is ambiguous and not necessarily straightforward, therefore a better approach is to use the coefficient estimates from the pooled sample as weights for the first term (Oaxaca & Ransom, 1994). Equation 5 will transform into:

$$\bar{y}^m - \bar{y}^w = \left[\sum_{i=1}^{N^m} \frac{\Lambda(Z_i^m \hat{\beta}^*)}{N^m} - \sum_{i=1}^{N^w} \frac{\Lambda(Z_i^w \hat{\beta}^*)}{N^w} \right] + \left[\sum_{i=1}^{N^m} \frac{\Lambda(Z_i \hat{\beta}^m)}{N^m} - \sum_{i=1}^{N^w} \frac{\Lambda(Z_i \hat{\beta}^w)}{N^w} \right] \quad \text{Equation 6}$$

Where $\hat{\beta}^*$ is a vector of estimates from the pooled regression specified in Equation 4 and Z_i is a vector of endowments which does not discriminate by gender. The formula can be simplified as follows:

$$dy = dZ + dB \quad \text{Equation 7}$$

Overall, the explained part of the two-fold decomposition (dZ) can be interpreted as the effect of population composition (endowments) to the overall mean difference in retirement probabilities across gender; whereas the unexplained (dB) part reflects the influence of non-compositional changes. According to Jann (2008), the unexplained part incorporates the effects of group differences in unobserved predictors. In the context of this study, the latter could refer to inequalities in gender, pension contribution patterns in the life-cycle, among other reasons. In other words, a limitation of this method is that dB may include a vast number of aspects that cannot be distinguished from each other. For this reason, the analysis will focus on gender differences triggered by endowments.

To sum up, this study conceptualizes retirement under a life course perspective framework and uses a logistic regression approach to determine whether the number of children and work-related characteristics influence the probability of retirement of Colombians aged 60-75. The model is estimated for the pooled sample as well as for men and women separately, and controls for relevant variables that have been referred in the literature and that can be considered fixed prior to retirement. Additionally, the two-fold Blinder-Oaxaca decomposition analysis is applied to identify whether family and work-related characteristics are important sources for the mean differences in retirement probabilities between men and women. Lastly, the aforementioned approaches are developed using the statistical software Stata 14.0.

6 Empirical Analysis

This chapter covers the empirical analysis of this thesis. That is, the description of the data, the analysis and discussion of the results from the logistic regression and the decomposition analysis in relation to the theoretical background. The first part will be a descriptive analysis, in which retirement patterns will be presented with reference to the explanatory variables. The second part will carry out a regression analysis to identify retirement determinants and test the first two hypotheses of this thesis. The third part of this chapter aims to test the third hypothesis through a Blinder-Oaxaca decomposition.

6.1 Descriptive Statistics

Table 6.1 presents the descriptive statistics of the variables used in the empirical analysis. The sample consist of 13,331 Colombians aged between 60 and 75 that reported to have a job at age 45. The average person of the selected sample is approximately 66 years old. The sample is evenly distributed among gender; precisely, 48 and 52 percent of the selected individuals are men and women respectively. Concerning the composition of the household, 58 percent of the elderly are married, the majority of individuals have five or more children (36 percent) and around 66 percent are heads of household. Almost all male respondents stated to be heads of household (85 percent), whereas this percentage reduces to less than half for females (48 percent). Regarding the educational background, only 8.5 percent individuals have obtained tertiary education.

On average, individuals stated they had a good health in childhood. Only 10.4 percent of respondents assed their health before the age 15 as regular or bad; this percentage persist when the sample is disaggregated by gender. Regarding people's type of job at age 45, 36 percent of the sample worked in domestic, unskilled or unpaid jobs when they were 45 years old, 27 percent were in self-employment, 25 percent worked in the private sector and only 11 percent in the public sector. The numbers are rather similar when the sample is divided by gender. However, one must clarify that disentangling the domestic, unskilled and unpaid group, one can see that most female individuals were in domestic jobs (29 percent), while most male individuals were in unskilled jobs (34 percent). From the total sample, 54 percent are currently retired from the labor market; that is, not engaged in any working activity neither paid nor unpaid. This percentage substantially differs among gender; while only 38 percent men are retired, 69 percent of women have stated not to be engaged in any working activity. As aforementioned, retirement does not necessarily mean that the person has or is eligible for a pension income. Lastly, 26 percent of the elderly live in rural areas and most of the sample is located in the Atlántico and Central regions.

Table 6.1: Descriptive Statistics

Variables	Pooled		Men		Women	
	(1) Mean	(2) SD	(3) Mean	(4) SD	(5) Mean	(6) SD
Men	0.479	0.500	-	-	-	-
Women	0.521	0.500	-	-	-	-
Birth Cohort						
1955-1951	0.390	0.488	0.372	0.483	0.406	0.491
1950-1946	0.318	0.466	0.322	0.467	0.315	0.465
1945-1940	0.292	0.455	0.306	0.461	0.279	0.449
Married	0.586	0.493	0.736	0.441	0.448	0.497
Head Household	0.659	0.474	0.851	0.356	0.482	0.500
Number of Children						
None	0.069	0.253	0.079	0.269	0.060	0.237
One	0.082	0.274	0.071	0.257	0.092	0.289
Two	0.138	0.345	0.135	0.341	0.141	0.348
Three	0.186	0.390	0.188	0.391	0.185	0.388
Four	0.162	0.369	0.164	0.370	0.160	0.367
Five+	0.363	0.481	0.364	0.481	0.363	0.481
Tertiary Education	0.085	0.279	0.088	0.284	0.082	0.275
Bad health in Childhood	0.104	0.306	0.104	0.305	0.105	0.307
House Ownership	0.700	0.458	0.700	0.458	0.699	0.459
Retired from the labor market	0.543	0.498	0.380	0.485	0.694	0.461
Type of job when 45:						
Public	0.114	0.318	0.112	0.316	0.116	0.320
Private	0.247	0.431	0.254	0.435	0.240	0.427
Self-Employed	0.272	0.445	0.282	0.450	0.263	0.441
Domestic/unskilled/unpaid	0.364	0.481	0.350	0.477	0.376	0.485
Rural	0.262	0.440	0.321	0.467	0.208	0.406
Region:						
Atlántico	0.265	0.441	0.282	0.450	0.249	0.433
Oriental	0.146	0.353	0.146	0.353	0.146	0.353
Orinoquia and Amazonia	0.067	0.250	0.068	0.252	0.066	0.248
Bogota	0.092	0.289	0.078	0.267	0.105	0.307
Central	0.254	0.435	0.259	0.438	0.250	0.433
Pacífico	0.176	0.381	0.167	0.373	0.184	0.388

Furthermore, in order to provide a better overview of the data described above, Figures 6.1 to 6.8 show the patterns of retirement rates by age, as well as other features such as gender, sector, educational background, self-perceived health in childhood and job career characteristics. As expected, Figure 6.1 shows that the proportion of retired people increases with age for both men and women, although the proportion of retired women surpasses the fraction of their male counterparts by about 40 percentage points. According to Fisher, Chaffee and Sonnega (2016), the increasing proportion of retired population may be a consequence of the declining health that commonly develops at old ages, which may deteriorate people's work abilities. In line with the life course perspective theory, old individuals seek retirement due to declining physical and cognitive skills (Meng et al., 2017; Verhaeghen & Salthouse, 1997).

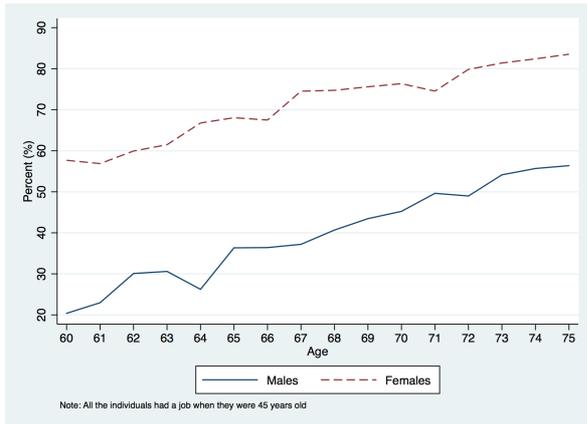


Figure 6.1: Retirement rates by age and gender

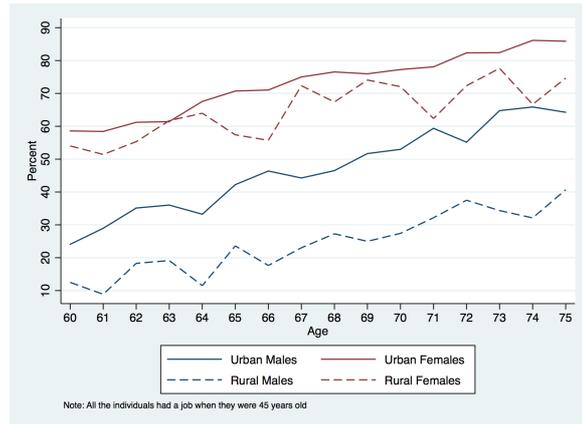


Figure 6.2: Retirement rates by age, sector and gender

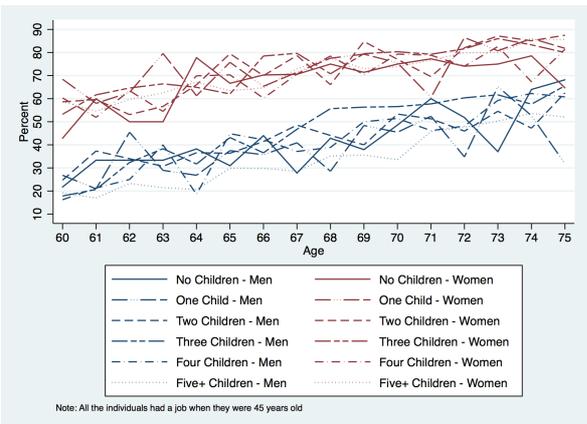


Figure 6.3: Retirement rates by age and number of children

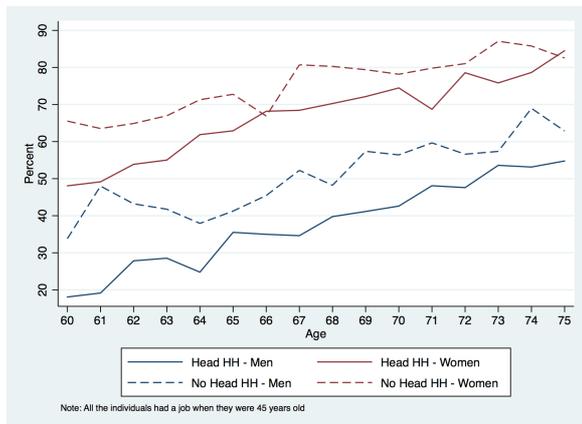


Figure 6.4: Retirement by age, gender and Head HH status

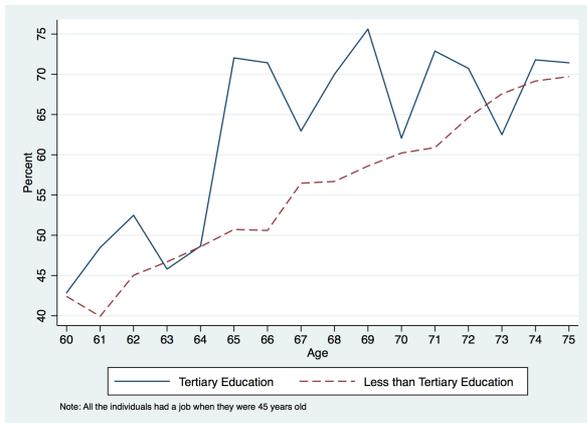


Figure 6.5: Retirement rates by educational attainment

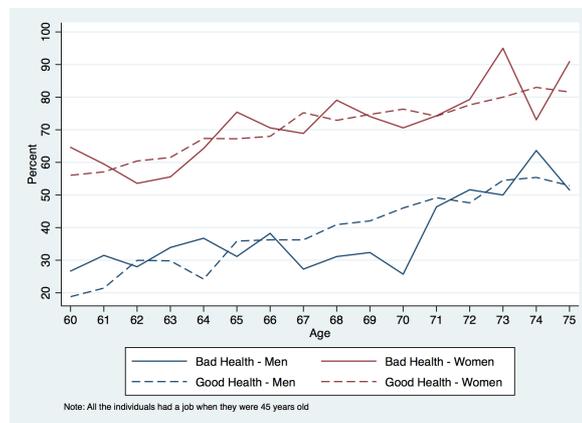


Figure 6.6: Retirement rates by gender and health in childhood

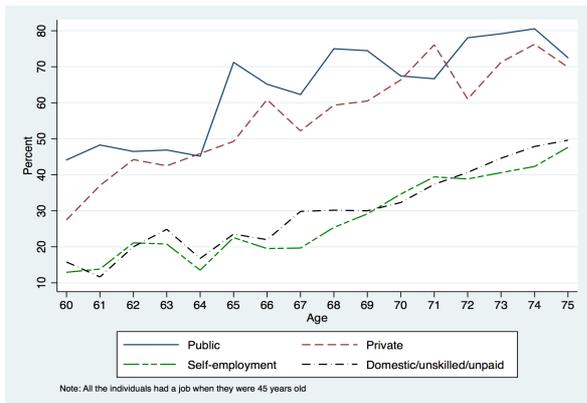


Figure 6.7: Retirement rates by pre-retirement job

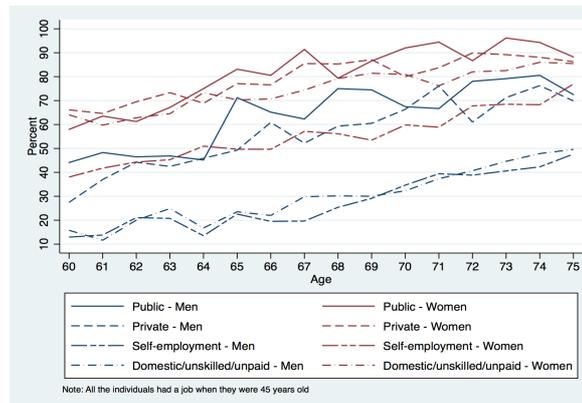


Figure 6.8: Retirement rates by gender and pre-retirement job

It is apparent that differences in retirement rates are higher for people residing in urban areas, though the difference seems more pronounced for men than for women (Figure 6.2). Regarding the number of children, Figure 6.3 evidences that men with four or more children have the lowest retirement rates compared to men with fewer children. On the contrary, women with four or more children appear to have the highest retirement rates compared to women with fewer children. Moreover, individuals that are heads of household have higher retirement rates than their counterparts, although this gap seems to be stronger for men than for women (Figure 6.4).

Moving forward to Figure 6.5, one can see that the share of respondents who have obtained tertiary education considerably varies among ages. This pattern seems to be particularly strong given that only 8.5 percent of the sample has obtained tertiary education. This is not something to be surprised of because college education has expanded dramatically over successive cohorts. Concerning the elderly's working careers (Figure 6.8 and Figure 6.9), those that were engaged in self-employment or in domestic, unskilled or unpaid jobs at age 45 appear to have lower retirement rates compared to those who were engaged in the public and private sectors. This goes hand-in-hand with the fact that self-employment, domestic and unskilled work are the major sources of informal employment in Colombia (Fedesarrollo, 2017), and that workers in these sectors are usually left out of structured pension arrangements, earn lower salaries and are vulnerable to economic shocks (Hu & Stewart, 2009).

6.2 Results

The preceding analysis is predominantly descriptive, examining retirement from active working life through single aspects at the time. In this section the analysis is extended to regression analysis; that is, to the identification of individual variables to retirement decisions. Given the nature of the dependent variable, the regression is based on the logit model stated in Equation 4, where the probability of retirement is a function of the covariates formerly specified. The logit model is conducted for the pooled sample, as well as for men and women separately. Moreover, results from the logistic regression are compared to the estimates obtained in a LPM in Appendix B. Despite the apparent limitation in the use of LPM, results in Appendix B show that the estimated marginal effects from both logit and LPM are rather similar, although the logit model estimates slightly higher marginal effects for the covariates included in the study. Table 6.2 exhibits the odds ratios from the logistic regressions.

It should be noted that odds ratios could be interpreted as the odds of retirement given a particular exposure or characteristic, compared to the odds of retirement in the absence of such exposure (Szumilas, 2010). In other words, an odds ratio greater (smaller) than 1 means that retirement is more (less) likely in the first group, whereas an odds ratio of 1 indicates that retirement is equally likely in both groups. As portrayed below, control covariates show the expected signs based on previous literature.

- Birth cohorts: Older cohorts are more likely to be retired than earlier ones (odds ratio 1.72 and 2.95 for cohort 2 and 3 respectively).
- Gender: Women that had a full-time job at age 45 are more likely to be retired than men when they reach an age of 60-75, with an odds ratio equal to 3.48.
- Marital Status: With an odds ratio of 0.81 (specification 3), married women are less likely to retire than their unmarried counterparts; whereas the likelihood of retirement of men does not seem to be explained by marital status.
- Head of the Household: Being the head of the household decreases the likelihood of retirement with an odds ratio of 0.62.
- Education: Respondents that have obtained tertiary education are less likely to retire than their less or non-educated counterparts.
- Health: The probability of retirement increases if the person has had health problems in his/her childhood. Results in Table 6.2, show that health has a stronger influence for men that reported to have a job at age 45 than for their women counterparts.
- Household Wealth: Estimates suggest that owning a house or an apartment increases the likelihood of retirement with an odds ratio of 1.12, although this effect appears to be significant only for men (specification 2: odds ratio 1.17).

The accuracy of the predictions made by the logit model is measured by the area under the ROC curve (AUC hereon). The ROC curve plots the false alarm rate (1- specificity) compared to the sensitivity or the percentage of correct predictions. The AUC quantifies the marginal contribution of the model in anticipating the probability of realization of the event (in this paper, the probability of retirement). According to the theory, an AUC equal to 1 represents a perfect test, whereas an area of 0.5 denotes a worthless test (Greene, 2000). In relation to the models specified in this paper, the AUC for the pooled, men and women regressions is 0.76, 0.71 and 0.72 respectively (Appendix C). According to Greene (2000), an area under the curve of above 0.70 indicates a fair accuracy of predictions.

i. Having fewer children has a negative impact on the likelihood of retirement of elderly Colombians.

Regarding family composition, specification 1 in Table 6.2 shows that, keeping everything else constant, having no children decreases the probability of retirement. However, this result changes when the sample is disaggregated by gender. Specification 2 shows that having none or less than two children does not affect the probability of retirement for men. On the contrary, women significantly decrease the likelihood of retirement when they do not have offspring compared to women with 3 or more children (odds ratio 0.65). The difference in the significance of the estimates for men and women may be a consequence of the roles that both of them play in the household. In other words, given the fact that most of men are heads of household, more of the financial burden lies on them. This may motivate men to work at old ages independently of the number of children they have. However, in the case of women, who have most of the childcare burden, having no children may allow them to attain more education and to develop professional careers, and at the same time to extend working activities at old ages. Overall, the hypothesis that having fewer children has a negative impact on the likelihood of retirement is rejected for men and women.

ii. Participating in self-employment, domestic or unskilled activities at age 45 decreases the probability of retirement of elderly Colombians.

Moving forward to work-related factors, Table 6.2 shows that the type of employment at age 45 is the most important factor determining retirement for old workers in Colombia. Keeping other things constant, private, self-employed, domestic, unskilled and unpaid workers are less likely to retire during ages 60-75 compared to workers in the public and private sectors (specification 1). This relationship remains in the view of gender-specific outcomes (specifications 2-3), although it appears to have a greater influence for men than for women. In particular, men and women that worked in self-employment at age 45 are less likely to retire from the labor market than their wage counterparts, with odds ratios equal to 0.17 and 0.27 respectively. Similarly, individuals that worked in domestic, unskilled or unpaid activities at age 45 are less likely to retire compared to individuals in the public and private sectors, although the effect is relatively small for women (odds ratio 0.69). One should note that the effect of type of employment at age 45 is significant to explain retirement even when controlling for relevant factors that have been emphasized in the literature, e.g. health and wealth. Overall, the hypothesis that being in self-employment, domestic or unskilled activities at age 45 decreases the probability of retirement cannot be rejected for both men and women.

Furthermore, the observable characteristics, in particular family and work-related factors, may affect the probability of retirement because they enable the access to additional incomes (e.g. family transfers, pensions, etc.). In order to determine whether this statement holds for elderly Colombians, complementary regressions were run using access to pension income, state subsidies, remittances and family transfers as dependent variables. Regression estimates are presented in Table 6.3 and show that having less than three children is not significantly associated with the likelihood of receiving state subsidies or remittances. However, it is associated with the probability of receiving pensions and family transfers. Specifications 1-3 show that women with none or less than two children are more likely of getting pension incomes compared to individuals with three or more children. This relates to the fact that having fewer children may allow women to have more stable working careers and to seek for formal jobs. Specifications 10-12 indicate that having fewer children is associated with a lower likelihood of receiving family transfers, effect that seems to be stronger for men than for women. This result is as expected given the fact that having fewer children decreases the likelihood of getting any financial assistance from them.

Concerning people's type of job at age 45, the self-employed and domestic, unskilled and unpaid workers are less likely to receive pension incomes compared to workers in the wage sector; effect that appears to be much stronger for men than for women. However, these workers are more likely to receive state subsidies, remittances and family transfers compared to individuals that worked in the public and private sectors at age 45. These findings relate to the fact that domestic, unskilled, unpaid and self-employment are important sources of informal employment in Colombia (Fedesarrollo, 2017), which may cause individuals to be more vulnerable at older ages and to require additional financial assistance to sustain themselves.

Table 6.2: Odds Ratios from Logistic Model of Transition from Full-time employment.

Covariates	Odds Ratios		
	(1) Pooled	(2) Men	(3) Women
Gender (Omitted: male)			
Female	3.476*** (0.163)	-	-
Birth Cohort (Omitted: 1955-1951)			
[1950-1946]	1.718*** (0.0796)	1.791*** (0.125)	1.704*** (0.108)
[1945-1940]	2.954*** (0.150)	3.464*** (0.250)	2.597*** (0.192)
Head of the HH	0.622*** (0.0298)	0.638*** (0.0560)	0.590*** (0.0394)
Number of Children (Omitted: Three or more children)			
None	0.814** (0.0682)	1.186 (0.143)	0.647*** (0.0745)
One	0.887 (0.0649)	0.921 (0.104)	0.901 (0.0876)
Two	0.947 (0.0546)	1.053 (0.0881)	0.900 (0.0717)
Married	0.944 (0.043)	1.103 (0.081)	0.801*** (0.055)
Tertiary Education	0.865* (0.065)	0.777** (0.079)	1.021 (0.112)
Bad health childhood	1.253*** (0.050)	1.416*** (0.083)	1.165*** (0.065)
House Ownership	1.116** (0.049)	1.173** (0.075)	1.052 (0.065)
Pre-retirement job (Omitted: public and private)			
Self-employment	0.213*** (0.016)	0.175*** (0.018)	0.274*** (0.029)
Domestic/unskilled/unpaid	0.405*** (0.030)	0.243*** (0.026)	0.687*** (0.072)
Rural	0.500*** (0.0248)	0.398*** (0.0292)	0.694*** (0.0500)
Observations	13,331	6,455	6,876
Pseudo R2/R-squared	0.1681	0.1424	0.0820

Note: Robust standard errors in parentheses. The dependent variable is a dummy indicating whether a person is retired from the labor market. The sample is restricted to the elderly between 60 and 75 years old who had a full-time job when 45 years old. Specification (1) includes the pooled sample, whereas specifications (2) and (3) restricts the sample to only men and women respectively. The controls omitted from the regression table: dummies for the Atlántico, Oriental, Orinoquia and Amazon, Bogota, Central and Pacifico regions. *** p<0.01, ** p<0.05, * p<0.1.

Table 6.3: Odds Ratios from Logistic Model using different sources of income as dependent variable

Covariates	Pension Income			State Subsidies			Remittances			Family Transfers		
	(1) Pooled	(2) Men	(3) Women	(4) Pooled	(5) Men	(6) Women	(7) Pooled	(8) Men	(9) Women	(10) Pooled	(11) Men	(12) Women
Gender (Omitted: male)												
Female	1.145** (0.071)			1.056 (0.055)			2.085*** (0.280)			2.202*** (0.109)		
Birth Cohort: (Omitted: 1955-1951)												
[1950-1946]	1.674*** (0.102)	2.105*** (0.195)	1.374*** (0.114)	1.816*** (0.098)	2.121*** (0.173)	1.618*** (0.117)	1.085 (0.138)	1.259 (0.303)	1.067 (0.161)	1.054 (0.050)	1.089 (0.084)	1.041 (0.064)
[1945-1940]	2.070*** (0.134)	2.737*** (0.266)	1.590*** (0.142)	2.686*** (0.147)	3.430*** (0.278)	2.194*** (0.165)	1.300** (0.169)	2.167*** (0.483)	1.007 (0.168)	1.192*** (0.060)	1.388*** (0.107)	1.062 (0.071)
Head of the HH	2.420*** (0.159)	2.065*** (0.268)	1.932*** (0.162)	0.953 (0.051)	0.864 (0.085)	1.065 (0.077)	1.055 (0.133)	1.412 (0.442)	1.033 (0.159)	1.009 (0.049)	0.845* (0.084)	1.061 (0.067)
Number of Children (Omitted: Three or more children)												
None	1.090 (0.119)	0.931 (0.170)	1.415** (0.197)	1.192** (0.107)	1.251* (0.157)	1.113 (0.145)	0.672 (0.168)	1.013 (0.388)	0.530* (0.180)	0.369*** (0.0382)	0.326*** (0.0569)	0.400*** (0.0522)
One	1.208** (0.107)	0.812 (0.122)	1.632*** (0.181)	0.908 (0.0767)	0.991 (0.129)	0.847 (0.0947)	0.773 (0.151)	0.379* (0.197)	0.933 (0.201)	0.593*** (0.0464)	0.582*** (0.0805)	0.595*** (0.0570)
Two	1.293*** (0.0895)	0.947 (0.100)	1.720*** (0.160)	0.874* (0.0607)	0.941 (0.0962)	0.813** (0.0774)	0.924 (0.134)	0.795 (0.217)	1.008 (0.175)	0.751*** (0.0448)	0.784** (0.0749)	0.730*** (0.0562)
Married	1.027 (0.062)	1.630*** (0.167)	0.695*** (0.061)	0.768*** (0.039)	0.729*** (0.057)	0.842** (0.063)	1.085 (0.135)	0.972 (0.228)	1.092 (0.172)	1.002 (0.047)	1.083 (0.087)	1.005 (0.065)
Tertiary Education	2.931*** (0.226)	2.528*** (0.283)	3.555*** (0.389)	0.237*** (0.038)	0.249*** (0.057)	0.225*** (0.051)	1.887*** (0.306)	2.555*** (0.636)	1.561** (0.337)	0.713*** (0.059)	0.715*** (0.091)	0.721*** (0.079)
Bad health childhood	0.707*** (0.037)	0.711*** (0.055)	0.713*** (0.050)	1.172*** (0.052)	1.163** (0.075)	1.178*** (0.072)	0.792** (0.085)	0.794 (0.152)	0.786* (0.103)	0.914** (0.037)	0.953 (0.061)	0.893** (0.047)
House Ownership	1.672*** (0.0975)	1.705*** (0.149)	1.655*** (0.132)	0.898** (0.044)	0.936 (0.068)	0.858** (0.057)	0.963 (0.111)	0.814 (0.159)	1.051 (0.150)	0.916** (0.041)	0.858** (0.060)	0.956 (0.056)
Pre-retirement job (Omitted: public and private)												
Self-employment	0.067*** (0.005)	0.041*** (0.005)	0.103*** (0.012)	2.900*** (0.295)	3.981*** (0.636)	2.253*** (0.301)	2.077*** (0.452)	3.597*** (1.472)	1.594* (0.417)	1.367*** (0.104)	1.338** (0.158)	1.414*** (0.141)
Domestic/unskilled/unpaid	0.072*** (0.006)	0.036*** (0.005)	0.119*** (0.013)	4.023*** (0.404)	4.946*** (0.794)	3.493*** (0.454)	1.437 (0.329)	2.103* (0.947)	1.217 (0.325)	1.287*** (0.0977)	1.202 (0.147)	1.365*** (0.133)
Rural	0.430*** (0.034)	0.452*** (0.048)	0.449*** (0.054)	1.640*** (0.085)	1.574*** (0.117)	1.737*** (0.128)	0.411*** (0.073)	0.290*** (0.091)	0.502*** (0.109)	0.844*** (0.044)	0.870* (0.067)	0.817*** (0.058)

Note: Robust standard errors in parentheses. The dependent variable in regressions (1)-(3) is a dummy indicating whether a person receives pension income. The dependent variable in regressions (4)-(6) is a dummy indicating whether a person receives state subsidies. The dependent variable in regressions (7)-(9) is a dummy indicating whether a person receives remittances. The dependent variable in regressions (10)-(12) is a dummy indicating whether a person receives family transfers. The sample is restricted to Colombians between 60 and 75 years old who had a full-time job when 45 years old. The controls omitted from the regression table: regional dummies. *** p<0.01, ** p<0.05, * p<0.1.

iii. The number of children and the type of job at age 45 are factors that explain the differences in retirement probabilities between men and women.

Lastly, in order to identify whether the observable characteristics explain the differences in retirement rates among gender, a Blinder-Oaxaca decomposition analysis was applied using the estimated marginal effects from the logistic regression (refer to Appendix B). The difference in retirement probabilities by gender (Δy) is decomposed into an endowment effect (ΔZ) and a coefficient or unobserved effect (ΔB) as presented in Equation 6. This decomposition shows the extent to which differences in retirement probabilities can be explained by dissimilarities in population characteristics (ΔZ) or factors that are not included in the model (ΔB). Table 6.4 shows that the mean predicted probability of retirement for men is 36.8 percent, whereas the mean probability of retirement for women is 68.6 percent. The raw difference (Δy) between these probabilities is equal to 31.8 percentage points.

Table 6.4: Results of the Blinder-Oaxaca decomposition

Differential	Coefficient	P-value
Mean Prediction Men (\bar{y}^m)	0.368	0.000
Mean Prediction Women (\bar{y}^w)	0.686	0.000
Raw Differential (Δy)	-0.318	0.000
Decomposition		
ΔZ	-0.061	0.000
ΔB	-0.257	0.000

Note: Using coefficient estimates from the pooled sample as weights.

As noted in Table 6.4, the contribution of observables (ΔZ) in the difference of retirement probabilities between men and women is 6.1 percentage points. This means that adjusting women to the observable characteristics of men would imply a reduction of 6.1 percentage points in the mean predicted probability of retirement of women. Among the elements that contribute the most to the explained part of the differences in retirement between gender, Figure 6.9 shows that being the head of the household appears to be the covariate with the highest explanatory power in the results, followed by the dummy for rural sector. As highlighted in the data analysis (Section 6.1), around 85 percent of men in the sample are heads of household, while this percentage reduces to only 48 percent for women. This suggests that men are more likely to act as the primary breadwinners in their families, which may influence them to work longer. By the means of these results, one can reject the hypothesis that number of children and type of job at age 45 are factors that explain the difference in retirement probabilities between men and women.

Furthermore, one can see in Table 6.4 that most of the difference in retirement probabilities is driven by non-compositional factors, to be precise 25.7 percentage points of the difference is explained by factors that have not been controlled for in the model. Colombia still faces great gender inequalities in the labor market that may well explain most of the difference in retirement probabilities between men and women. However, as mentioned in Chapter 5, ΔB may include a vast number of aspects that cannot be distinguished from each other. Therefore, with the information provided by the Blinder-Oaxaca decomposition it is not possible to identify the factors that explain this difference. Moreover, the identification of factors that comprise ΔB is outside the scope of this research.

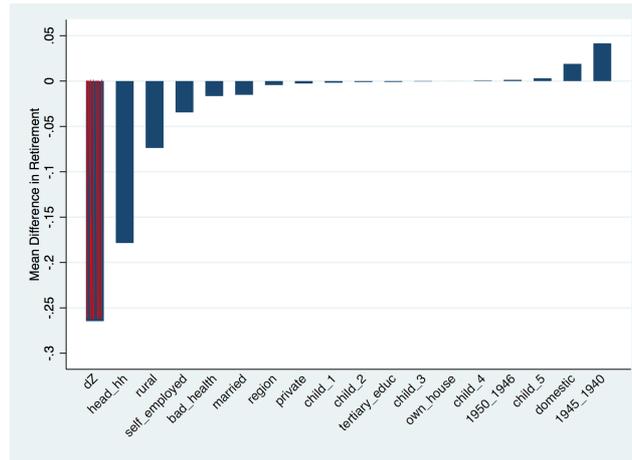


Figure 6.9: Effect of Covariates on Total Compositional Change (dZ)

6.3 Robustness Tests

The robustness and relevance of the estimates by any statistical model are frequently validated using an additional out-of-sample test. According to Angrist and Pischke (2008), statistical models that pass the test for validation of predictive power shed lights on external validity. As mentioned earlier, the analysis is restricted to individuals aged 60-75 that had a job when they were 45 years old. This means that estimates may not be directly representative of the entire elderly population given the potential cohort heterogeneity in the effect on retirement. For this reason, the logistic regression presented in Equation 4 was run for the entire sample encompassed in SABE. Appendix D shows the logistic estimates of type of employment, as well as demographic, health and wealth controls for the entire sample. Estimates for the complete set of covariates are almost identical to the baseline results presented in Table 6.2.

Additionally, to examine the robustness of the effects of the number of children and the type of employment in people’s mid-forties, regressions only including these variables as predictors for retirement are run for the pooled, men and women samples (Appendix E). Results from Appendix E are found to be very similar to the ones in Table 6.2, although the effects for the types of employment are stronger in the model with no additional controls. For instance, while the odds ratio of self-employment is 0.213 for the pooled sample in the baseline results, it slightly increases to 0.273 when no controls are added in the model. A possible reason for the increased estimates is that these estimators are capturing the effects of the covariates that have been omitted.

Finally, as discussed earlier, there may be a cohort heterogeneity. That is, a between-cohort variation in retirement rates in the sample. To examine the robustness of the main results to this variation, the sample is restricted to individuals that belong to cohorts 1-3 and regressions are run for each of these specifications. Appendix F shows the logit estimates for the coefficient on retirement from the restricted sample. The model estimates are relatively similar to the baseline results, especially for work-related characteristics. To sum up, the

analyses confirm the consistency and robustness of family composition and work-related characteristics and the overall covariates included as predictors for retirement.

6.4 Discussion

Recapitulating, the logistic regression shows significant results for the entire set of covariates included in the model. The direction and the significance of the results obtained correspond to expectations and findings of previous research. This study set out with the aim of assessing the importance of Colombia's falling fertility and its large informal sector. With respect to the first issue, somewhat surprising, this study found that having fewer children does not directly affect the probability of retirement of elderly Colombians. However, it was found that women with no children are less likely to be retired than women with at least 3 children. Comparison of the findings with those of other studies that have considered the presence of grandchildren instead of children (e.g. Hank & Buber, 2009; Van Bavel & De Winter, 2013), confirm that having no progenies (children and grandchildren) decreases the likelihood of retirement for women. Moreover, these outcomes are consistent with the fact that Colombian women still shoulder the overwhelming burden of childcare. It can therefore be assumed that having no children may allow them to attain higher levels of education, to develop more stable and formal working careers, to feel more attached to their working roles and to be less prone to cease labor activities at ages 60-75. Indeed, this study was also able to identify that women with fewer children, and in particular those with no children, are more likely to receive retirement pensions. In other words, these women may have a higher likelihood to be enrolled in formal activities.

This last statement brings us to the second aspect of focus in this study, the labor market. The literature and reports from international organizations have widely emphasized the issues related to the informality in the country given that workers in this sector usually have lower salaries and less access to pension benefits. Indeed, this study identified that workers in self-employment, domestic, unpaid and unskilled activities are less likely to receive pension incomes compared to workers in the formal sector. Consistent with Vodopivec and Arunatilake (2011), this research found that self-employed men and women are less likely to retire compared to workers in the public and private sectors. This effect is similar for individuals working in domestic, unpaid or unskilled activities. An implication of this is the possibility that informal workers are less likely to retire than their formal counterparts because their working circumstances do not allow them to access to pension benefits or to accumulate sufficient savings for their retirement. Even though this implication is contrary to that of Hundley (2001), who suggests that the self-employed delay retirement due to their greater autonomy and flexibility, one has reasons to believe that the issues related to the informality in the country are factors of greater influence in retirement trajectories.

The third and last aspect is the identification of the factors that explain the differences in retirement probabilities among sexes. Confirming the findings of Cahill et al. (2015), this study finds that almost the entire difference in retirement probabilities between men and women are accounted by non-compositional or non-observed factors. Even though the

identification of non-compositional features is outside the scope of this research, one may relate this result to the fact that the country still faces marked gender inequalities in the labor market. However, one should note that one of the most profound changes in the labor market in the country is its secular increase in female labor participation. Furthermore, the study was able to identify that among the observed factors, the fact that most men are breadwinners explain most of the differences in retirement probabilities between men and women. As aforementioned, this result may be a consequence of the roles that both men and women play in the household.

Overall, these findings suggest: First, even though a falling fertility translates into a lower probability of getting financial assistance from children, it is not an important factor in explaining the transition to retirement in Colombia. Second, the type of job is a crucial element to explain retirement decisions of individuals. Third, neither the falling fertility nor the type of job explain the retirement differences between gender. Furthermore, one must consider that different generational cohorts are likely to experience different trajectories in their transitions towards retirement, therefore further research should be undertaken to investigate how this cohort heterogeneity influence retirement. Moreover, accessibility to information related to the demand for labor may be helpful to find more accurate retirement predictions and to identify the specific sources for the differences in retirement among gender.

7 Conclusions

The aim of this paper was to analyze the influence of family composition and work-related characteristics on retirement trajectories for men and women in Colombia, and to identify whether these factors influence the gender disparities in retirement. To our knowledge, this research is the first comprehensive investigation of retirement in Colombia considering changes in fertility and working characteristics under a life-course perspective. This study tested the following research questions:

- i. Having fewer children has a negative impact on the likelihood of retirement of elderly Colombians.
- ii. Participating in self-employment, domestic or unskilled activities at age 45 decreases the probability of retirement of elderly Colombians.
- iii. The number of children and the type of job at age 45 are factors that explain the differences in retirement probabilities between men and women.

With regards to the first hypothesis, this study found that, having fewer children is not significantly related to the likelihood of retirement neither for men nor for women. However, results showed that women with no children are less likely to be retired. Regarding the second hypothesis, and in agreement with the theory and previous research, the type of employment at age 45 is robustly associated with the probability of retirement of elderly Colombians. In particular, individuals that were in self-employment and engaged in domestic, unskilled or unpaid activities at age 45 are less likely to retire compared to persons that worked in the public and private sectors. In other words, while the falling fertility is not an important factor explaining retirement, the type of job appears to significantly influence whether individuals retire or not at old ages.

The third major finding of this study is that, although work-related characteristics are found to be important predictors for retirement trajectories at the individual level, they cannot explain the disparities in retirement among gender. According to the results obtained from the Blinder-Oaxaca decomposition, non-compositional factors are the major drivers of these differences. Recalling earlier discussions, the majority of the non-compositional factors may relate to the fact that the country still faces marked gender inequalities. In addition, even within the observed factors, being the head of the household was detected to explain most of the gender differentials, indicating again influences of gender inequality. This result may be a consequence of the fact that women frequently carry most of the childcare burden, whereas men usually act as the primary breadwinners in their families. This paper contributes to recent economic and demographic debates concerning gender disparities in retirement trajectories in the developing world.

The major limitation of this study is that it only includes individuals born in years (1940-1955) in which fertility was still high and labor participation for women was more restrictive.

Bearing in mind that different generational cohorts are likely to experience different trajectories in their transitions towards retirement, the findings of this research may be less generalizable to younger female cohorts, who face lower fertilities and have higher labor participations. For this reason, further work will need to be undertaken to investigate how this cohort heterogeneity influence retirement. Similarly, accessibility to information related to the demand for labor may be helpful to find more accurate retirement predictions and to identify the specific sources for the differences in retirement among gender.

Notwithstanding these limitations, the study still provides insightful evidence of retirement patterns that may work as a base for potential policies to extend working lives to counter the prospects of labor force reductions. Since women were found to be less engaged in labor activities at old ages compared to men, more family-friendly policies would need to be implemented to make work more attractive for this segment of the population. Moreover, a key policy priority should be to plan for the formalization of the economy and the eradication of the gender gap to increase the overall productivity and maintain the support ratio in the light of an ageing population.

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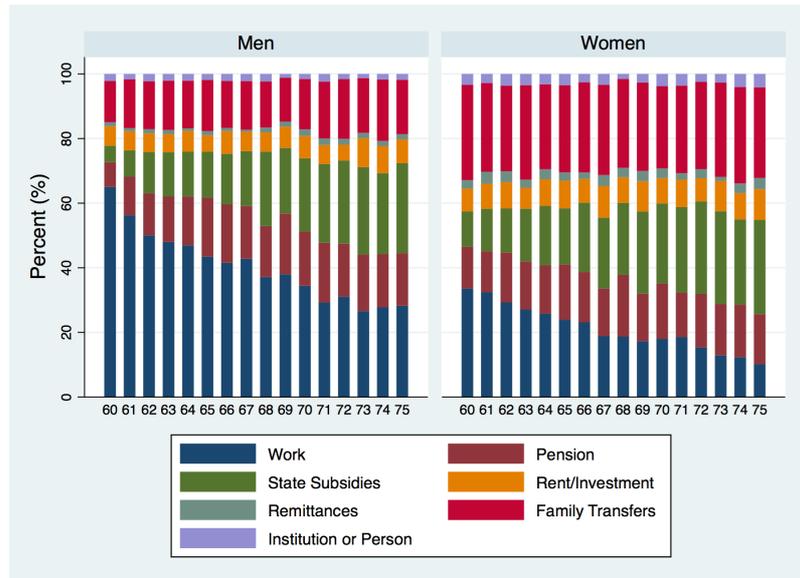
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Appendix A

Sources of Income of the Elderly



(SABE, 2015)

Appendix B

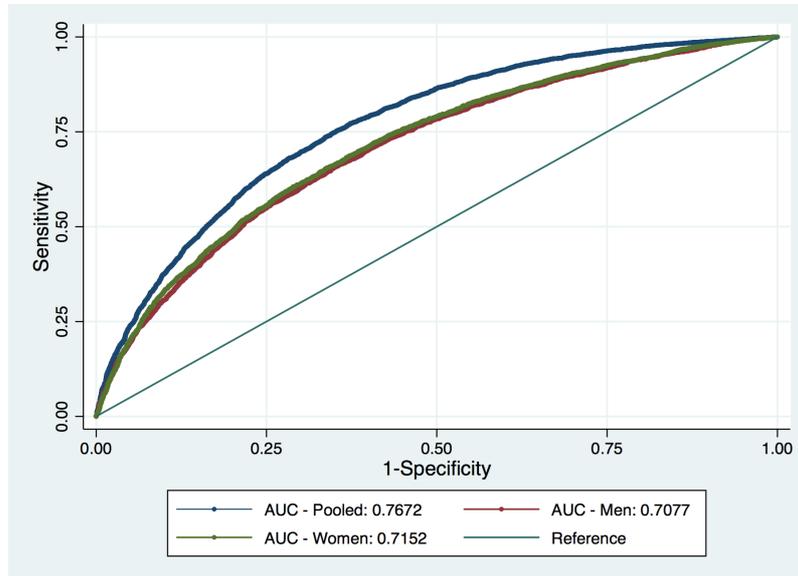
Logit Marginal Effects vs Linear Probability Model Estimates

Covariates	Logit Model			Linear Probability Model		
	(1) Pooled	(2) Men	(3) Women	(4) Pooled	(5) Men	(6) Women
Gender (Omitted: male)	0.310*** (0.012)			0.263*** (0.009)		
Birth Cohort (Omitted: 1955-1951)						
[1950-1946]	0.134*** (0.012)	0.131*** (0.016)	0.111*** (0.013)	0.108*** (0.009)	0.108*** (0.013)	0.110*** (0.013)
[1945-1940]	0.269*** (0.013)	0.280*** (0.016)	0.199*** (0.015)	0.214*** (0.010)	0.245*** (0.014)	0.183*** (0.014)
Head of the HH	-0.118*** (0.012)	-0.101*** (0.020)	-0.110*** (0.014)	-0.095*** (0.009)	-0.090*** (0.017)	-0.103*** (0.013)
Number of Children (Omitted: More than 3 children)						
None	-0.051** (0.021)	0.038 (0.027)	-0.091*** (0.024)	-0.041** (0.016)	-0.084*** (0.023)	0.033 (0.023)
One	-0.030 (0.018)	-0.019 (0.025)	-0.022 (0.020)	-0.024* (0.014)	-0.020 (0.019)	-0.017 (0.022)
Two	-0.013 (0.014)	0.012 (0.019)	-0.022 (0.017)	-0.011 (0.011)	-0.019 (0.016)	0.009 (0.016)
Married	-0.014 (0.011)	0.022 (0.016)	-0.046*** (0.014)	-0.012 (0.009)	0.020 (0.014)	-0.043*** (0.013)
Tertiary Education	-0.036* (0.019)	-0.057** (0.023)	0.004 (0.023)	-0.028* (0.015)	-0.055*** (0.020)	0.006 (0.021)
Bad health childhood	0.056*** (0.010)	0.078*** (0.013)	0.032*** (0.012)	0.045*** (0.008)	0.069*** (0.011)	0.030*** (0.011)
House Ownership	0.027** (0.011)	0.036** (0.014)	0.011 (0.013)	0.021** (0.009)	0.031** (0.012)	0.011 (0.012)
Pre-retirement job (Omitted: public and private)						
Self-employment	-0.385*** (0.019)	-0.392*** (0.024)	-0.270*** (0.022)	-0.312*** (0.014)	-0.365*** (0.020)	-0.269*** (0.020)
Domestic/unskilled/unpaid	-0.224*** (0.018)	-0.319*** (0.024)	-0.078*** (0.022)	-0.180*** (0.014)	-0.307*** (0.021)	-0.069*** (0.019)
Rural	-0.172*** (0.012)	-0.208*** (0.016)	-0.076*** (0.015)	-0.143*** (0.010)	-0.173*** (0.014)	-0.073*** (0.014)
Observations	13,331	6,455	6,876	13,331	6,455	6,876
Pseudo R2/R-squared	0.1681	0.1424	0.0820	0.212	0.176	0.100

Note: Robust standard errors in parentheses. The dependent variable is a dummy indicating whether a person is retired from the labor market. The sample is restricted to the elderly between 60 and 75 years old who had a full-time job when 45 years old. Specifications (1) to (3) present the marginal effects from the Logistic Regression, including the pooled sample, as well as restricting it to men and women respectively. Specifications (4) to (6) presents the coefficients from the Linear Probability Model, including the pooled sample, as well as restricting it to men and women respectively. The controls omitted from the regression table: dummies for the Atlántico, Oriental, Orinoquia and Amazon, Bogota, Central and Pacifico regions. *** p<0.01, ** p<0.05, * p<0.1.

Appendix C

ROC curve for the Logistic Models



Note: ROC and AUC from logistic models specified in Equation 4

Appendix D

Robustness Test I: Logit regression of Transition from Full-time employment including people that did not work when 45 and individuals older than 75.

Covariates	(1) Pooled	(2) Men	(3) Women
Gender (Omitted: male)			
Female	3.392*** (0.146)		
Age	1.142*** (0.058)	1.295 (0.274)	1.407* (0.289)
Age Squared	1.000 (0.001)	0.999 (0.002)	0.998 (0.002)
Head of the HH	0.600*** (0.027)	0.631*** (0.056)	0.587*** (0.039)
Number of Children (Omitted: More than 3 children)			
None	0.755*** (0.0582)	1.195 (0.144)	0.652*** (0.0753)
One	0.903 (0.0618)	0.926 (0.105)	0.909 (0.0886)
Two	0.963 (0.0526)	1.062 (0.0889)	0.903 (0.0720)
Married	0.936 (0.039)	1.110 (0.081)	0.809*** (0.056)
Tertiary Education	0.910 (0.065)	0.803** (0.081)	1.035 (0.113)
Bad health childhood	1.246*** (0.046)	1.409*** (0.083)	1.166*** (0.065)
House Ownership	1.100** (0.045)	1.173** (0.076)	1.049 (0.064)
Pre-retirement job (Omitted: public and private)			
Self-employment	0.223*** (0.016)	0.176*** (0.018)	0.272*** (0.028)
Domestic/unskilled/unpaid	0.420*** (0.029)	0.247*** (0.026)	0.685*** (0.072)
Rural	0.489*** (0.022)	0.399*** (0.029)	0.698*** (0.050)
Constant	0.001*** (0.001)	8.04e-06* (5.71e-05)	1.79e-06* (1.23e-05)

Note: Robust standard errors in parentheses. The dependent variable is a dummy indicating whether a person is retired from the labor market. Specification (1) includes the pooled sample, whereas specifications (2) and (3) restricts the sample to only men and women respectively. The controls omitted from the regression table: dummies for the Atlántico, Oriental, Orinoquia and Amazon, Bogota, Central and Pacifico regions. *** p<0.01, ** p<0.05, * p<0.1.

Appendix E

Robustness Test II: Logit regression of Transition from Full-time employment only including children and work-related dummies as regressors.

Covariates	(1) Pooled	(2) Men	(3) Women
Number of Children (Omitted: Three or more children)			
None	0.683*** (0.0469)	1.128 (0.114)	0.743*** (0.0780)
One	0.941 (0.0594)	0.904 (0.0912)	0.993 (0.0893)
Two	0.902 (0.0451)	0.954 (0.0715)	0.857 (0.0627)
Pre-retirement job (Omitted: public and private)			
Self-employment	0.273*** (0.017)	0.214*** (0.019)	0.331*** (0.030)
Domestic/unskilled/unpaid	0.458*** (0.027)	0.244*** (0.021)	0.772*** (0.068)
Observations	13,331	6,455	6,876

Note: Robust standard errors in parentheses. The dependent variable is a dummy indicating whether a person is retired from the labor market. Specification (1) includes the pooled sample, whereas specifications (2) and (3) restricts the sample to only men and women respectively. *** p<0.01, ** p<0.05, * p<0.1.

Appendix F

Robustness Test III: Logit regression of Transition from Full-time employment restricting the sample to from (1) cohort 1, (2) cohort 2 and (3) cohort 3.

Covariates	(1) Cohort 1	(2) Cohort 2	(3) Cohort 3
Gender (Omitted: male)			
Female	3.250*** (0.234)	4.086*** (0.347)	3.301*** (0.305)
Head of the HH	0.521*** (0.0376)	0.697*** (0.0607)	0.738*** (0.0709)
Number of Children (Omitted: Three or more)			
None	0.590*** (0.103)	0.779 (0.118)	0.841* (0.136)
One	0.832 (0.145)	0.858 (0.114)	0.724** (0.105)
Two	0.845 (0.0897)	1.013 (0.106)	0.801 (0.100)
Married	0.857** (0.0605)	1.025 (0.0845)	0.959 (0.0848)
Tertiary Education	0.821* (0.0884)	1.286* (0.178)	0.621*** (0.106)
Bad health childhood	1.209*** (0.0746)	1.308*** (0.0935)	1.259*** (0.0982)
House Ownership	1.079 (0.0718)	1.167* (0.0929)	1.101 (0.0970)
Pre-retirement job (Omitted: public and private)			
Self-employment	0.287*** (0.0332)	0.160*** (0.0210)	0.175*** (0.0279)
Domestic/unskilled/unpaid	0.533*** (0.0607)	0.340*** (0.0437)	0.311*** (0.0496)
Rural	0.576*** (0.0455)	0.491*** (0.0430)	0.429*** (0.0400)
Observations	5,427	4,285	3,619

Note: Robust standard errors in parentheses. The dependent variable is a dummy indicating whether a person is retired from the labor market. The sample is restricted to the elderly between 60 and 75 years old who had a full-time job when 45 years old. Specifications (1) to (3) includes men and women from cohorts 1, 2, 3 respectively. The controls omitted from the regression table: dummies for the Atlántico, Oriental, Orinoquia and Amazon, Bogota, Central and Pacifico regions. *** p<0.01, ** p<0.05, * p<0.1.