Working Women and Their Human Capital: A Review of Policy and Literature

by

Kamin Peyrow

An essay submitted to the Department of Economics
in partial fulfillment of the requirements for
the degree of Master of Arts

Queen's University
Kingston, Ontario, Canada

August, 2011

Copyright ©Kamin Peyrow

Acknowledgements

I would like to thank Susumu Imai for his supervision, my second reader for their time, my family for their patience, and finally the Dream Team.

Contents

1 Introduction **1**

2 The Female Labour Force and Its Issues **3**
2.1 The Female Labour Force in Canada 3
2.2 Issues in the Canadian Female Labour Force 7

3 Literature Review **7**
3.1 Human Capital 7
3.1.1 Investment Decisions and Gender 8
3.1.2 Fertility and Human Capital 9
3.2 Real Business Cycles and Labour 11
3.3 Labour Supply 12
3.3.1 Elasticities 14
3.3.2 Economics of the family 16
3.3.3 Divorce 17
3.4 Gender wage gap 19

4 Critique **20**
4.1 Policy and the Female Labour Force 20
4.2 How Resources Are Wasted 21

5 Conclusion **23**

A Figures **28**

List of Figures

1 Labour force participation rates 28
2 Average earnings 29
3 Post-secondary enrollment 30
4 Undergrad Enrollment 31
5 Graduate Enrollment 32

Abstract

This paper surveys the literature on female labour market decisions, with particular focus on human capital accumulation decisions. Related subjects, such as fertility, divorce, home production in macroeconomic models, and the gender wage gap, are also reviewed in the context of female labour market decisions. Finally, the policy problem of over–educated and under–employed women is analyzed in conjunction with the literature.

1 Introduction

Labour markets work fundamentally differently from markets for ordinary goods, as they suffer from complications such as matching frictions and asymmetric information, yet they are perhaps the most important determinant to a country's economic performance. In addition, the composition of the labour market has changed drastically over the last century as women have entered into paid work in ever-increasing numbers. Along with this change have come new laws and policies to try to achieve equality, and yet there is still no country in the world to reach equality between men and women in the labour force. The goal of this paper is to scrutinize the literature explaining the decision making of the female labour force and offer criticisms where the theory is found lacking.

Women's labour supply decisions have significant ramifications for many other phenomena we see in western economies; such as trends in marriage, fertility, divorce rates, and the male-female wage gap. Women's labour supply decision making is, of course, affected by women's human capital decisions. The literature on female decision making with regards to own human capital accumulation and supply of labour is extensive, although it is wrought with many technical issues such as corner solutions and censored data. While aspects such as the optimal amount of capital to accumulate and the effect of higher educational attainment on child rearing have been extensively researched, the topic of education timing with respect to child rearing and

how this affects the optimal investment in human capital has largely been ignored. There is also very little consistency between empirical estimates of parameters such as labour supply elasticity, even from studies employing very similar methods. The fact of the matter is that women are faced with the added option of bearing and rearing children, as well as lowered wages for market work. Given these different incentives, their behavior is affected, and this is further complicated by government intervention in the labour market. In this paper, I discuss the significance of deciding when a woman accumulates their own human capital, how the intent to have children affects this decision, what the affects are on subsequent labour supply, and what implications are given in the literature for this timing decision.

Literature on female labour supply and human capital accumulation will of course be discussed. Moreover, since female labour market decisions are intertwined with many other subjects, such as fertility, role in the family, divorce, and discrimination, the literature on these topics will also be reviewed in the context of the female labour force. While most of the theoretical analysis is concerned with microeconomic models, the major topic of concern is obviously the aggregate movements in time-series such as labour force participation, human capital attainment, fertility, and so on. As such, some macroeconomic models will also be touched on, specifically those dealing with home production. While literature on all these subjects is extensive and varied, the focus will remain on the female labour force and how these different subjects affect and are affected by women's decision making.

In Section 2, I will describe the policy problem and give an overview of the state of the female labour force in Canada. In Section 3, I will extensively review the literature in fields related to women's labour supply and human capital. In Section 4, I will offer some observations on the state of the literature and the facts, and finally in I will provide some concluding remarks in Section 5.

2 The Female Labour Force and Its Issues

2.1 The Female Labour Force in Canada

In comparison to other countries, Canada is by no means unique in these issues affecting the female labour force. The below statistics are specific to Canada, but the overall trends are prevalent in most western economies. One aspect that does make the Canadian economy striking is the relative severity of the problem. Among the OECD countries, Canada ranks worse than average with regard to gender wage gaps [23], which is often used as a measure of the level of equality in the work force. Also, since Canada is a welfare state, we will see there is considerable public expenditure at stake. The following data, unless otherwise cited, has been drawn from CANSIM from Statistics Canada[1].

Canada has a working age (15 years or older) population of over 27 million with a labour force of just over 18 million people in 2008. Women comprise slightly more than half of the working age population, roughly 51%, but they make up less than half of the labour force at only 47% of all workers and only one third of full-time workers. Still, this represents a more than doubling in size of the female labour force since the 1970s and characterizes a major change in social trends over this time period. However, women still have more than double the incidence of part time work and a drastically lower participation rate than men. Women's participation rates have remained relatively steady over the last decade at roughly 62%, up significantly from the 1970s when it was 41%. This growth has primarily come from married women's

[1]Data was obtained from the following tables: Labour force survey estimates (LFS), by sex and detailed age group, Table 282-0002; Labour force survey estimates (LFS), by educational attainment, sex and age group, Table 282-0004; Income of individuals, by sex, age group and income source, 2009 constant dollars, annual Table 202-0407; University enrolments, by registration status, program level, Classification of Instructional Programs, Primary Grouping (CIP_PG) and sex, annual (number) Table 477-0013; Consolidated federal, provincial, territorial and local government revenue and expenditures, annual (in millions of dollars) Table 385-0001. Unless otherwise stated, statistics will be for 2009.

participation in the labour force, particularly those with small children. The large scale entry of married women into the labour force has resulted in an increase of dual earning families; however there has been little change over the last decade of wives' share of total family earnings [6]. In contrast, during the same time period the male participation rates have been dropping, from 81% in the 1970s down to 73.1% in 2010. These participation rates are shown in Figure 1. The overall Canadian participation rate is up over this time period, from 60.8% to the current 67.5%, as women moving into the labour market have outpaced men exiting the labour market.

Along with these trends in participation rate, there are concurrent changes in earnings, both absolute and relative. The average income in Canada is $37,800, with the average male income being $44,400 and the average female income being $29,200. This is an unconditional earnings ratio of .65, and this only rises to .72% [23] when we only consider full time workers. Figure 2 shows the changes in average earnings for all workers over time. Earnings for men are more volatile over time, as male employment rates are more sensitive to the business cycle as compared to female employment rates. Interestingly, weekly hours worked by men and women have both been falling over time, this is despite female labour force participation rising and male labour force participation falling over the same time period. As a result, the difference in hours worked between men and women still moves in parallel. This also means women are entering the labour force in part time positions while men are moving from full time to part time or leaving the labour force entirely. Women are also more likely than men to lose time due to family obligations: on average women in full time employment lost roughly 10 days of work during 2004 for personal and family reasons, as opposed to men who only lost 1.5 days [43]. Again, the incidence of part time work for women is more than double that for men; this is true for all age groups.

As mentioned, most of the expansion in the female labour force has come from the increase in participation of married women. This fact is intertwined

with other differences among cohorts. Trends for participation rates by age have nearly reversed themselves since the 1970s, which accounts for a large portion of married women in the labour force as they tend to be older. In 1970, women aged 15-24 were actually slightly more likely to be employed than women over 25; while the likelihood of employment for women aged 15-24 has actually changed very little over the past three decades, women over 25 are now considerably more likely to be employed [43]. Despite this reversal of trend, there is still a lower likelihood of a woman over 25 being employed when compared to man. This, however, does not correspond to a higher unemployment rate for women: female unemployment is 7.2% as opposed to the 8% average for the Canadian economy, which is still well below that of men's unemployment of 8.7%. This is, of course, because of women's lower overall participation in the labour force and their relative willingness to leave the labour force.

Along with the rise in the employment of married women, there has been an even more dramatic growth in the employment rate of women with children. While women with children are less likely to be employed than women without children, there has been particularly high growth in the employment rate of women with very young children. We are also seeing a lessening of the decline in women's labour supply directly after childbirth as the vast majority of women, 96%, return to work within 18 months of birth. Additionally, there have been significant increases in the number of licensed child care spaces available, and the age of a woman's child does not affect the likelihood that she works full time [43].

Not surprisingly, the likelihood of a woman being employed increases drastically with higher levels of educational attainment. Raw averages of the Canadian economy show that women currently outnumber men in post-secondary institution and, on average, females in younger cohorts currently attain more education than the men in those cohorts. This is the case in many developed nations, and is a significant change from the 1970s when

women attained very little education, or even just one decade ago when men vastly outnumbered women in graduate work. This obviously leads to drastic differences between cohorts: in the overall population the percentage of men with a university degree is higher than the percentage of women with a university degree, but a larger percentage of women aged 20-24 hold a university degree than men in the same age range. Figure 3 shows enrollment in all post secondary education, while Figures 4 and 5 show enrollment at the undergraduate and graduate levels respectively. These changes in enrollment are interesting but also of consideration are the underlying fields of study, which is important as choice of specialization affects career paths and women consistently choose fields of study that lead to lower paying careers. Teaching, nursing, clerical positions, and sales positions are all traditionally viewed as 'pink collar work', occupations in which women have historically concentrated. There has also been very little change in the proportion of women in these occupations, meaning that the expansion of the female labour force has largely been through increased representation in other fields, although women tend to remain a minority among professionals. Still, earnings rise significantly with rising education levels, and the male to female earnings ratio is lower when conditioned on higher educational attainments.

Equally dramatic changes to marriage and fertility have been keeping apace with the dramatic changes to the female labour force. Generally speaking, successive cohorts of women have been steadily supplying increasing amounts of labour. At the same time, the marriage rate is down and the divorce rate is up, which altogether leads to fewer women in husband-wife families. Cohort differences do play a part in this phenomenon, as delaying marriage to an older age will lower total marriages while the lifetime marriage rate per cohort does remain steadier. Fertility rates are also on the decline; however, a similar issue of delayed child-bearing makes the total fertility rate more volatile than the cohort fertility rate. However it is measured, though, Canada's birth rate is at a record low with only 10.5 live births per 1000

people. Along with demographics this leads to a national fertility rate of 1.50 [1], well below replacement.

2.2 Issues in the Canadian Female Labour Force

If the goal is simply to get women into the labour force, then the last few decades have certainly seen a lot of success. However, one problem that has resulted from the existing environment is that of wasted resources. Women in the Canadian labour force, on average, currently seek more education than men but work fewer hours than men and are paid less. Moreover, Canada subsidizes post–secondary education with public funds raised through distortionary taxes. In 2009 total public expenditure on post–secondary education was more than $39 billion with an additional $4 billion in need–based transfers to individuals. This means the lower participation rate and higher incidence of part–time work in women represents a dampening of the return on Canada's investment in public education. Below–replacement fertility rates can then be seen as a symptom of this problem, as women delay child bearing until after accumulating this unnecessarily high level of human capital. These women are merely making their decisions as best they can given the uncertainty and the discrimination they face. That is why it is up to policy makers to improve upon this outcome, but they cannot hope to accomplish this task while there is still no clear understanding of women's decision making with regards to labour supply and human capital accumulation.

3 Literature Review

3.1 Human Capital

According to human capital theory, an individual's stock of knowledge is one of the main determinants of their productivity in the market sector, and their earnings are tied to their productivity [8, 36, 12]. The Mincer equation

[36] relates earnings to education, although it is not considered a structural equation, and focuses on the rate of return to investments in schooling. The Ben-Porath model is considered a structural model where individuals have an incentive to invest in higher productivity through higher educational attainment or on–the–job training; however, these investments are costly and subject to a human capital production function. Both of these theories agree that earnings are a function of human capital. Individuals choose the optimal quantity of investment in human capital to maximize lifetime utility. This decision has also been rigorously studied empirically [37, 40]. This literature is focused on the amount of human capital attained, but not the timing of its attainment. If one assumes human capital depreciates when not in use, the timing of human capital attainment must be closely related to the amount of human capital attained. None of this is specific to women, although there has been empirical research specific to women on choice of specialization of human capital with regards to gender [42, 15]. However, these theories are an important precursor to the following discussions because wages as a function of human capital will often be critical to the arguments to come.

3.1.1 Investment Decisions and Gender

Fundamentally, human capital accumulation is simply an investment that gives a stream of future returns. With this in mind, the financial literature on gender differences in investment strategies becomes relevant. Empirical evidence has consistently found that female investors are less risk tolerant and have less confidence in their investment decisions as compared to male investors in similar circumstances [5]. Many empirical studies also find that giving household subsidies to a woman rather than a man results in different outcomes in allocation of resources [46, 31, 25].

Gender is the third largest determinant of investment, after age and income; female investors not only show more risk aversion by devoting a larger portion of their portfolios to lower–return risk free funds but also keep funds

for longer periods of time [5]. If we apply these same preferences toward investment in human capital it may account for why women tend to choose lower than average paying fields, as these fields tend to suffer less from skills depreciation during career disruptions [28]. Since family related career disruptions should be relatively predictable by women from the outset of their decision making, such careers would offer a more stable and desirable income stream. Essentially, these lower paying jobs are the equivalent of low–return risk free funds and women use them to insure against uncertainty of skills depreciation during future career interruptions. The question then becomes whether we can apply these results to why women tend to over–invest in human capital. These women face more than just career uncertainty, but also marital uncertainty. In a married couple with pooled income, a woman would face a drastic change in income and consumption if she were to get a divorce. Accumulating an unnecessarily high level of human capital could be self-insurance against marital separation, as a newly single woman with higher education would suddenly find need for her previously unnecessary earning potential in order to compensate for the loss in her spouse's income.

3.1.2 Fertility and Human Capital

As female educational attainment increases, we see both an increase in incomes and a decrease in fertility rates. These trends have been empirically studied in both developed and developing economies [32]. Theoretically, this can simply be seen as an increase in opportunity cost, as the opportunity cost of a mother rearing her children is the female wage rate. As a more educated woman could command a better wage, she would also have a higher opportunity cost. This line of reasoning implies that the correlation between fertility and incomes is simply a lowered demand for children in response to a price increase. Of course, if education raises incomes and decreases demand for children, then in this line of reasoning children are simply 'inferior goods' since it appears they were demanded less as incomes rose. Becker (1965)

countered this argument with a theory of children as durable goods which parents choose both quantity and quality when making fertility decisions. This suggests this response is a merely a substitution away from 'quantity children' toward 'quality children', meaning as family resources increase there is a preference towards fewer children who each are given a larger share of family resources [7]. Further evidence of Becker's point is the empirical literature on the positive relationship between the education of mothers and the health and achievements of their children [46]. While the overall negative correlation between fertility and education is regarded positively in the developing world where birth rates are high and family resources are low, in the developed world they have resulted in under-replacement fertility rates that lead to fears of future labour shortages.

However, cohort differences play a part in this negative correlation between education and fertility, as mentioned earlier. Women's total lifetime fertility decreases as educational attainment rises, but fertility is also delayed until later in life which affects annual measurements. As a result, cohort fertility is much more stable than total fertility, although cohort fertility is also on a downward trend. Indeed, as women continue to postpone their childbearing towards the end of their reproductive years, more and more women ultimately end up childless. Age–related patterns also lend conceptual intuition toward understanding female labour supply, not only through fertility timing but also through the after-fertility period. Young children require more time and care than older children, so delays to child bearing also means delays in child rearing. As a large portion of human capital is attained through work experience, this dynamic is important to understand since many women delay child bearing to a point where child rearing occurs after they have made significant productivity gains in their employment through on–the–job human capital accumulation. Having a child during this period increases family demands on a woman's time in subsequent periods. Initially, this increase is very high when children are young and lessens as

they grow older. When a woman has a child in this period, she has some initial decline in her market work commitments in subsequent periods; with every year she delays child birth, the greater the loss but the higher the absolute level of productivity she can maintain. If a woman delayed human capital accumulation instead of child bearing her productivity would remain low until after she was done child rearing and entered the labour force. This implies some optimal control problem, as several decades ago the majority of women found the latter optimal but in recent years a larger and larger proportion prefer the former. This kind of formulation could lead to a better understanding of why we see this trend in delayed child bearing as incomes rise.

It is important to make the distinction that the relationship that female labour supply and human capital accumulation has with fertility is not inherently bad, nor is it inherently good; it just is. Many developed countries have exploited this relationship to their own benefit, using women's education in particular to raise standards of living and control high birth rates. The problem at hand arises when, in conjunction with labour force disparity, a country publicly funds education and then women over–educate themselves for the employment level they ultimately pursue. This is a wasted resource paid for by distortionary taxes.

3.2 Real Business Cycles and Labour

Real business cycle models have had difficulties meeting many labour market facts. In particular, the volatility in hours worked is too small compared to observed aggregate fluctuations. Hansen introduced indivisible labour into the representative agent setup in an attempt to deal with this [29]. Cho and Rogerson proposed a two person household, which is in line with the contemporary move in microeconomic labour theory towards collective utility maximization [44]. Benhabib et al. argued that the home production sector is quite large when measured in time devoted to home production, although

this is a difficult thing to measure [13]. An important observation made in this line of research is that results from models with home production are observationally equivalent with models that only have market sectors but with different preferences [13]. This is because the home production model can be solved to a reduced form expressed in market quantities but, similar to the Lucas critique [34], we cannot get accurate policy prescriptions using reduced form solutions. This is because preferences must be different for the models to be observationally equivalent, and this can lead to agents acting as if they had preferences that are quite different from their true preferences, and reduced form preferences defined over an underlying utility function will not be stationary. In fact, several important features of an agent's true utility function would not carry over to their reduced form utility function, such as wealth effects or leisure being a normal good.

It seems natural that these two additions to the basic RBC model, home production and two-person households, should be merged and research on this is currently underway [18], although no study has yet been done with the addition of physical or human capital to a merged model. Despite the measurement difficulty in these models, they warrant more careful consideration as their results for relative volatilities of output and hours are a considerable improvement from the RBC models without home production [14, 26, 18].

3.3 Labour Supply

There is no specific theory for women's labour supply, nor should there be. Any theory to explain women's labour supply should be able to explain men's labour supply as well, but since women are the special case (since they have the added option of bearing and rearing children) and men the general case this statement does not necessarily reverse. General labour supply theory and women's labour supply theory should go hand in hand: the only reason they would not coincide would be that earlier models were developed at a time

when men were the predominant suppliers of labour and perhaps suffered from oversimplification. There are many labour supply theories, only some of which are useful in explaining women's labour supply.

Neoclassical microeconomic labour supply theory analyzes individuals maximizing their own utility by choosing between consumption and leisure while facing a budget constraint and a time constraint. Results include the well–known notion of equating the marginal rate of substitution between consumption and leisure with the slope of the budget constraint, which is the wage rate. This is a static framework that allows for non-work income as well as taxation. This supports the concept of a reservation wage strategy through the mechanism of corner solutions, wherein individuals have a personal wage threshold below which they will not work regardless of prevailing market wages. In this framework, individuals leave the labour force if their reservation wage is above the prevailing wage in the market, but their reservation wage will not be affected by factors such as the costs to replace household work. Efforts to include this feature in the model led to the development of the "fixed costs of working" concept, which leads to a concurrent reservation hours strategy; i.e., an individual will not be willing to work below a certain number of hours [22]. The only mechanism in this type of model for a woman and man to make different decisions based on the same offered wage is through preferences, specifically through the wage elasticity of supplying labour. Proponents of this theory make use of the Le Chatelier principle, wherein an individual with more options will have more elastic labour supply, arguing that women find market work and work in the home more substitutable than men do. The individual supply curves resulting from this utility maximization can be aggregated and analyzed much like industry supply curves.

A more dynamic approach that has been recently tailored to labour market applications is search theory, a framework in which labour market outcomes are governed by a matching function and a stochastic job destruction

rate. While this framework is flexible enough to incorporate institutions unique to the labour market, such as unemployment benefits and wage bargaining, it must also make strong assumptions on labour supply elasticity. This theory also supports a reservation wage strategy, but in a search theory framework the reservation wage is affected by the utility attainable while unemployed, which can include quantitative values such as the cost of services to replace the tasks they perform in the home (such as daycare and housecleaners) as well as other qualitative values affecting their decision whether or not to work. This framework has been able to match female labour supply outcomes as well as neoclassical microeconomic theory [2], while still being consistent with intertemporal optimization under uncertainty.

3.3.1 Elasticities

The neoclassical theory has undergone fine tuning since the model was first introduced. There is a move towards using 'household' or 'collective' utility as the objective function instead of individual utility [11, 6, 19], but generally, it can explain women's labour market decision making as well as it describes that of men's, so long as one assumes that women's own-wage labour supply elasticity is positive and relatively high while that of men's is small and possibly negative. However, some empirical studies suggest female labour supply elasticities have been overestimated in the past [22, 38], for instance due to the omission of fixed costs of labour from the models estimated or of family demands on time. Little theory is offered to model this difference in elasticity as it relies heavily on home production, which is notoriously difficult to measure. This theory should also predict higher reservation hours for women, but Canadian labour market outcomes show women often choose part time employment, suggesting perhaps a maximum number of hours willing to work as well as a minimum. Search theory makes little attempt to describe individual outcomes and focuses on overall labour market movements. Women currently outnumber men in post-secondary education, as I have mentioned

in an earlier section, but not in the labour force. The only explanation search theory would offer for individual idiosyncrasies such as those between men and women stems from the differences in unemployment utility. Since the value of unemployment is higher for women in this framework because of the non-market work they do, this results in fewer women receiving job offers they accept as compared to men. This is simply an added adjustment cost to women's labour, so it is not surprising that it dampens the response of women's labour supply. Search theory has also been extended to the idea of 'joint search' to account for the pooling of resources in married couples, much like with collective utility, which results in higher reservation wages which further dampen factor responses [27]. Empirical analysis of women's own wage elasticity has been thorough and conclusions can best be described as 'diverse' and at worst 'inconsistent'. Heckman and Killingsworth report on a detailed review of empirical estimates of labour supply elasticity along with methodologies used and show that published estimates range from as high as 14.47 to as low as -.89 [30, Table 2.26]. Regardless of the actual magnitude of women's labour supply elasticity, no one has yet produced a structural explanation as to why it is so different from that of men's. They have simply observed that it is different.

Empirically, we see that as family needs on a woman's time increase, hours at work decrease [37, 38] and this is especially true when those family needs involve children. Nakamura & Nakamura offer an interesting empirical consideration about previous estimations, describing the presence–of–children variable as a proxy for household demands on a woman's time, instead of an explicit explanatory variable. Time use surveys by Statistics Canada show that even when women and men work the same number of hours of for-pay work, women spend almost two hours more in unpaid work. It is then this higher demand for a woman's time which is the cause of women's higher propensity toward part-time work, which can be well explained using children as an instrumental variable [38].

If a woman chooses to devote this much more time to unpaid work it must be assumed that there is some utility derived from it, either directly or indirectly, but there is the obvious cost of forgone wages.

3.3.2 Economics of the family

As has been briefly mentioned, theories aiming to explain women's labour supply decision making have shifted towards the maximization of collective utility or household utility, instead of individual utility. Using collective utility gives flexibility for models to explain both women as main earners, non–earners, and partial earners. Moreover, it can provide a tangible framework for intuitive concepts involved with female labour supply, such as female labour force participation being used as 'insurance' against idiosyncratic risk in the economy, which affects earnings [3].

Criticisms of this framework scrutinize where the collective utility function comes from, whether it is some agglomeration of the individual preferences of the family or whether it represents the 'head of the household' who cares about the family and makes transfers to them. The difficulty with the latter is that it is not generally true that a family member maximizing their head's utility also maximizes their own, or vice versa. The difficulty with the former is that it must assume the social choice conditions [45] for a well behaved social utility function, in this case the collective utility function, must be satisfied [30].

Despite the restrictions necessary for collective utility to be valid, it can still be very useful when applied to general equilibrium analyses of labour supply decisions and life-cycle approaches. The reason that women's labour supply is better explained this way but men's labour supply is no better explained (although no worse explained) is likely due to issues of power dynamics and headship in the family [19]. As women work more, they contribute more to family income and increase their power and say in decision making, often represented as their proportion of collective utility. As their power in

the relationship increases they can do more of what they WANT, work OR non-work [6]. Empirical studies have been done to determine whether this increase in income and independence through work is a predictor for marital failure. Although some studies report this to be the case, many studies using cointegration methods find that the causality runs the other way [21].

3.3.3 Divorce

Divorce rates have been on the rise for the last several decades, moving closely with female labour force participation rates and incomes. The main question surrounds which way the causality goes in this relationship. Previous empirical work tested two theories that relate divorce and women's labour supply decisions.

The first main theory is the 'insurance' theory, which is basically that women respond to increasing divorce rates by working more, thus insuring themselves from drastic income changes in the event that they themselves get divorced. Johnson and Skinner find that women respond to increases in the divorce rate by working more hours [33]. Michael and Bremmer & Kesselring find that divorce Granger-causes women's labour force participation [35, 20]. These results imply something similar to expected utility maximization. It also makes sense why the behavior of men in the labour force can be described adequately without the consideration of divorce. Since men tend to be the primary earners in families, the margins they use for decision making remain unchanged even if the magnitude of total utility is affected.

The second main theory is one of 'specialization'. This theory is centered around the idea of the 'value of the marriage'. Structured more like a trade theory, it is based on 'production complementarities' wherein a husband and wife can maximize the value of their union by each specializing in one sphere: market or domestic [9, 10]. When both partners work, the couple does not take advantage of any competitive advantage. Failing to exploit gains from specialization decreases the value of the marriage and thus makes it more

vulnerable to shocks [11]. This framework has similar advantages and pitfalls as collective utility. The decreasing prevalence of 'specialized' couples makes it clear that if lack of specialization is the reason behind divorce, then when these employment decisions are being made the value of the marriage is not the objective function being maximized. If a woman works once married, it must be optimal to work despite putting the marriage in jeopardy. This is inconsistent with maximizing the value of the marriage or with the value of the marriage entering into the utility function being maximized, but perhaps the value of the marriage must still stay above a lower bound. This describes the value of the marriage as a constraint, not the objective. Bremmer and Kesselring also test a similar theory to specialization, one of 'independence' where female labour force participation increases income, and the newfound financial independence increases the probability of divorce however they find that the extra income from working strengthens familial relationships [21].

Of course, we have to assume that women have no intent on divorcing when they enter a marriage. Knowing the possibility of divorce exists, they can choose to shield their marriage from it by working less, or insure themselves against it by working more. There is also the question as to whether women take the probability of their own divorce as given based on the divorce rate prevalent in society, or if they see it as a function of their own decisions on labour supply. This question is further complicated by the fact that the majority of women attain their education before marriage, thereby tying their own hands with the amount and specialization of human capital. Parkman finds that types of women who lose significant returns to their human capital by not working will increase their labour force participation in response to divorce laws that are not in their favour [41]. Bremmer and Kesselring's empirical analysis also finds evidence that risk averse women, when faced with a higher divorce rate, are enticed to invest in types of human capital that are more valued in the labour market [21]. This further strengthens the argument of forward-looking behavior on the part of women at the time of

human capital accumulation when it comes to choice of specialization.

3.4 Gender wage gap

Despite decades of affirmative action policies, women still face a gender-based wage gap. Many empirical papers have attempted to decompose this gap into explainable component parts following techniques introduced by Blinder and Oaxaca [17, 39]. One such component of the wage gap is the effect of occupational choice differences between the genders. Women tend to segregate themselves in lower–than–average paying occupations, thereby consciously choosing lower lifetime expected earnings. This has been explained partly by differing rates of human capital depreciation between occupations [28]. When women choose these lower paying careers, they are already aware of their intent to have children. Having children requires at least short–term career interruptions, so they naturally choose the careers where these interruptions will have a lower effect on the value of their human capital. This implicitly incorporates the inter–temporal nature of this decision making, as women constrain themselves in career choice by choosing their level and field of education before entering the labour market while knowing their own intent to have children as well as the wage gap they will face if they do enter the labour market. However, this implies that women are not looking to maximize wages but are in some respects looking to minimize loss of the value of their skills.

Part of the wage gap can also be attributed to cohort differences, as not only the composition of the labour force, but also the characteristics of the women in the labour force have changed drastically over the last century. As has been previously mentioned, women outnumber men in post-secondary education and women in younger age ranges currently attain higher levels of education than men, but that is a relatively recent phenomenon. Educational attainment has been increasing with every generation for both genders; only recently have women been outpacing men. Older women actually face a

higher raw wage gap than younger women as a result, since the wage gap decreases with higher educational attainment [4], but often it is the average raw wage gap that is reported in mainstream media. Given the evidence already presented that women are forward looking in their decisions, perhaps younger women upon hearing this average raw wage gap when they make their educational attainment choices are over–investing in education to offset what they believe to be the wage gap they will face. The average woman wanting to do as well as the average man, knowing they face a wage gap but that that wage is still partly a function of their human capital, would then purposefully attain a more–than–average amount of education.

However successful wage decompositions are, they still leave a sizable portion of the gender wage gap unexplained [16, 4, 24]. As differences in productivity–related characteristics between the genders decrease with women's higher educational attainment, the wage gap is responding in less than a one to one decrease; as a result, the unexplained portion of the wage gap has recently been growing [24]. Canada is one of the worst offenders in the OECD countries when it comes to the gender wage gap and is well below average [23]. In reality, women make choices to allocate their time between one unpaid job at home and one low paying job in the labour force. We cannot ignore the effect a prevalent, unexplained portion of the wage gap has on women's decision making; it is likely dampening women's participation rates and average hours. Until we truly understand what the mechanism is that creates this persistence in the gender wage gap, we cannot hope to affect it with labour policy.

4 Critique

4.1 Policy and the Female Labour Force

The Canadian Employment Equity Act requires employers in federally regulated industries to give preference to women, among other groups. Pay

equality is legislated federally as well as in each of the provinces, which requires that men and women be paid the same if performing the same job in the same organization. Pay equity is legislated in some but not all jurisdictions, (British Columbia, Alberta, and Saskatchewan have no pay equity legislated) and requires that occupations deemed of comparable value within an organization must be paid the same.

Policy makers have tried to deal with the wage gap by mandating a final outcome, but by ignoring the mechanism that bring about that outcome in the first place this simply forces an out–of–equilibrium result. If we assume, which we should, that women make rational decisions, then this out of equilibrium result is followed by a best response on the part of women given the new incentives, which bring us to a new equilibrium based on underlying decision making parameters. More than half a decade of mandating equality between men and women in the workforce has left us with undesirable responses, such as below replacement fertility rates, and yet we are still far from equal. It is also important to note that, while women are still worse off in the labour force than men, men have also been made worse of by women entering the labour force and the policies that followed. Rather than mandating labour market standards, policy makers could have attempted to affect the underlying reasons for the decisions. Ultimately this is an issue arising from women's decisions under uncertainty as well as inequity, but policy makers have only focused on the inequity. Not only has this been ineffective, it also does not address the issue of the wasted resources from women over–educating to self–insure against this uncertainty.

4.2 How Resources Are Wasted

Begin with the assumptions that increasing human capital increases productivity and that human capital depreciates if not in use. For the purposes of this argument, we will only consider women who plan to marry and raise children from the outset of their decision making, as we have seen that it

these women's decisions that have so drastically changed in recent years. Given that it is culturally acceptable for a woman to stay home to rear her children while relying on her husband's income, this means that women have the choice between accumulating human capital after child–rearing is finished or accumulating human capital before child-rearing and then waiting until after child rearing to use it. Given the assumption that human capital depreciates, it is obvious that if a woman wishes to maintain a certain level of productivity then she must attain more human capital in the second scenario than in the first, to allow for the depreciation while she raises children. Even if a woman does not stay home for her child's entire childhood, this remains relevant as Canada supports a full year of parental leave, only a minority of which is taken by men. Clearly resources are wasted in this second scenario where women attain all their human capital before raising children; however this is the order of events that is currently most prevalent in current day society.

Through most of the literature, we have seen evidence of forward–looking behavior in women. Since career interruptions due to child rearing can be reasonably predicted by women ex ante, and knowing that human capital will depreciate when not in use, the question remains: why would women choose to waste resources? From the outset of their human capital accumulation and career decision making, women have knowledge of their own preferences on child bearing, and must be able to predict some level of career interruptions based on these preferences and therefore some amount of human capital loss as a result. If women plan to maintain the wages they commanded from pre-childbearing market work, they would have to initially over–accumulate capital then under–employ themselves at some lower level of productivity than their initial level, so that when they return to work with their depreciated capital they are still at the original wage. If rational women are choosing to time their child bearing and human capital accumulation in this way it must be because it is optimal for them as individuals to

over–invest in human capital rather than simply accumulate the appropriate amount of capital after child-bearing.

From society's point of the view, the question remains as to whether there exists a way to improve on this outcome. Scholarship has yet to address this question directly. Meanwhile policy prescriptions have focused on the issues of equity, without much success, but not on the wasted resources. Given the fact that Canada partially subsidizes post-secondary education, these wasted resources are paid for through distortionary taxation. Everyone can be made better off if the issues that result in women over–educating themselves were dealt with through policy.

5 Conclusion

Much like the Lucas critique of neoclassical macroeconomics and the policy advice given based on its conclusions, policy conclusions based on current labour models will always be misleading until the deep parameters that govern individual behavior are better modeled. The deep parameters of the female labour force are intertwined with home production because of the role of women in the family, and as such no model of the labour force hoping to make policy prescriptions should be estimated in a reduced form. Female labour supply decisions are also entwined with fertility and divorce, so they can never be dealt with seperately. Furthermore, we cannot be ignorant of the effect a prevalent and non-transitory wage gap has on the decision making of women who perceive themselves as wage-takers. Women face uncertainty in marriage and discrimination in the labour market and must self–insure with excessive capital as a result. This is a situation where everyone can be made better off, but first we need to understand the problem. This requires a complete model of female labour supply in order to make truly effective policy.

References

[1] Profiling canada's families iii. Background Paper C2004–905369–8, Vanier Institue of the Family, 2004.

[2] M. Arellano and C. Meghir. Female labor supply and on-the-job search:an empirical model estimated using complementary data sets. *Review of Economic Studies*, 59:537–557, 1992.

[3] O. Attanasio, H. Low, and V Sanchez-Marcos. Female labour supply as insurance against idiosyncratic risk. *Journal of The European Economic Association*, 3(2):755–764, 2005.

[4] M. Baker, D. Benjamin, A. Desaulniers, and M. Grant. The distribution of the male/female earnings differential, 1970-1990. *Canadian Journal of Economics*, 28(3):479–501, August 1995.

[5] B.M. Barber and T. Odean. Boys will be boys: Gender, overconfidence, and common stock investment. *The Quarterly Journal of Economics*, 116(Febuary):261–292, 2001.

[6] K. Basu. Gender and say:a model of household behavior with endogeneously-determined power. *The Economic Journal*, 115(511):558–580, 2006.

[7] G.S. Becker. A theory of the allocation of time. *The Economic Journal*, 75(299):493–517, 1965.

[8] G.S. Becker. Education and the distribution of earnings. *American Economic Review*, 56(May):358–369, 1966.

[9] G.S. Becker. A theory of marriage: Part i. *Journal of Political Economy*, 81(4):813–846, 1973.

[10] G.S. Becker. A theory of marriage: Part ii. *Journal of Political Economy*, 82(2):11–26, 1974.

[11] G.S. Becker. *A Treatise on the Family*. Harvard University Press, 1981.

[12] Y. Ben-Porath. The production of human capital and the life cycle of earnings. *Journal of Political Economy*, 75(4):352–365, 1967.

[13] J. Benhabib, R. Rogerson, and R. Wright. Homework in macroeconomics i: Basic theory. *Working Papers 90-17: C.V. Starr Center for Applied Economics, New York University*, 1990.

[14] J. Benhabib, R. Rogerson, and R. Wright. Homework in macroeconomics:household production and aggregate fluctuations. *Journal of Political Economy*, 99(6):1166–1187, 1991.

[15] A.E. Blakemore and S.A. Low. Sex differences in occupational selection: The case of college majors. *Review of Economics and Statistics*, 66:157–163, 1984.

[16] F.D. Blau and L.M. Kahn. Swimming upstream: Trends in the gender wage differential in 1980s. *Journal of Labor Economics*, 15(1):1–42, 1997.

[17] A.s. Blinder. Wage discrimination: Reduced form and structural estimates. *Journal of Human Resources*, 8(4):436–455, 1973.

[18] K. Bornukova. *Real Business Cycle in Two Person Households with Home Production*. PhD thesis, Universidad Carlos III de Madrid, 1999.

[19] F. Bourguignon and P. Chiappori. Collective models of household behavior. *European Economic Review*, 36:355–364, 1992.

[20] D. Bremmer and R. Kesselring. The relationship between female labor force participation and divorce: A test using aggregate data. *unpublished mimeo*, 1999.

[21] D. Bremmer and R. Kesselring. Divorce and female labor force participation: Evidence from time-series data and cointegration. *American Economic Journal*, 32(3):175–190, 2004.

[22] J. Cogan. Fixed costs and labor supply. *Econometrica*, 49(4):945–963, 1981.

[23] J. Cool. Wage gap between women and men. Background Paper 2010–30–E, Parliamentary Information and Research Service, 2010.

[24] M. Drolet. The persistent gap: New evidence on the canadian gender wage gap. Working Paper 11F0019MPE, Business and Labour Market Analysis Division Statistics Canada, 2001.

[25] S.R. Gitter and B.L. Barham. Women's power, conditional cash transfers, and schooling in nicaragua. *The World Bank Economic Review*, 22(2):271–290, 2008.

[26] J. Greenwood, R. Rogerson, and R. Wright. Household production in real business cycle theory. *Frontiers of Business Cycle Research*, 1995.

[27] B. Guler, F. Guvenen, and G.L. Violante. Joint-search theory: New opportunities and new frictions. Staff Report 426, Federal Reserve Bank of Minneapolis, 2009.

[28] D. Grlich and A. de Grip. Human capital depreciation during family-related career interruptions in male and female occupations. Kiel Working Papers 1379, Kiel Institute for the World Economy, September 2007.

[29] G.D. Hansen. Indivisible labor and the business cycle. *Journal of Monetary Economics*, 16:309–327, 1985.

[30] J.J. Heckmand and M.R. Killingsworth. Female labor supply: A survey. In O. Ashenfelter and R. Layard, editors, *Handbook of Labor Economics*, volume 1 of *Handbook of Labor Economics*, chapter 2, pages 103–204. Elsevier, 1987.

[31] J. Hopkins, C. Levin, and L. Haddad. Women's income and household expenditure patters: Gender or flow? evidence from niger. *American Journal of Agricultural Economics*, 76:1219–1225, 1994.

[32] J.V. Hotz and R.A. Miller. An empirical analysis of life cycle fertility and female labor supply. *Econometrica*, 56(1):265–289, 1988.

[33] W.R. Johnson and J. Skinner. Labor supply and marital separation. *The American Economic Review*, 76(3):455–469, 1986.

[34] R. Lucas. Econometric policy evaluation: A critique. *Carnegie-Rochester Conference Series on Public Policy*, 1(1):19–46, 1976.

[35] R.T. Michael. Consequences of the rise in female labor force participation rates: Questions and probes. *Journal of Labor Economics*, 3(1(2)):117–146, 1985.

[36] J. Mincer. Investment in human capital and personal income distribution. *Journal of Political Economy*, 66(August):281–302, 1958.

[37] J. Mincer. Intercountry comparisons of labor force trends and related developments: An overview. *Journal of Labor Economics*, 3(2):1–32, 1985.

[38] A. Nakamura and M. Nakamura. Predicting female labor supply:effects of children and recent work experience. *The Journal of Human Resources*, 29(2):304–327, 1994.

[39] R. Oaxaca. Male–female wage differentials in urban labor markets. *International Economic Review*, 14(3):639–709, 1973.

[40] M. Paglin and A.M. Rufolo. Hetergeneous human capital, occupational choice, and male-female earnings differences. *Journal of Labor Economics*, 8(1):123–144, 1990.

[41] A.M. Parkman. Unilateral divorce and the labor-force participation rate of married women, revisited. *The American Economic Review*, 82(3):671–678, 1992.

[42] S.W. Polachek. Occupational self-selection: A human capital approach to sex differences in occupational structure. *Review of Economics and Statistics*, 63(Febuary):60–69, 1981.

[43] Target Groups Project. Women in canada: A gender–based statistcal report. Staff Report 89-503-XIE, Library and Archives Canada, 2006.

[44] R. Rogerson and J. Cho. Family labor supply and aggregate fluctuations. *Journal of Monetary Economics*, 21(2):233–245, 1988.

[45] P.A. Samuelson. Social indifference curves. *The Quarterly Journal of Economics*, 70(1):1–22, 1956.

[46] B. Senauer and M. Garcia. Determinants of nutrition and health status of preschool status: An analysis with longitudinal data. *Economic Development and Cultural Change*, 39(2), 1991.

A Figures

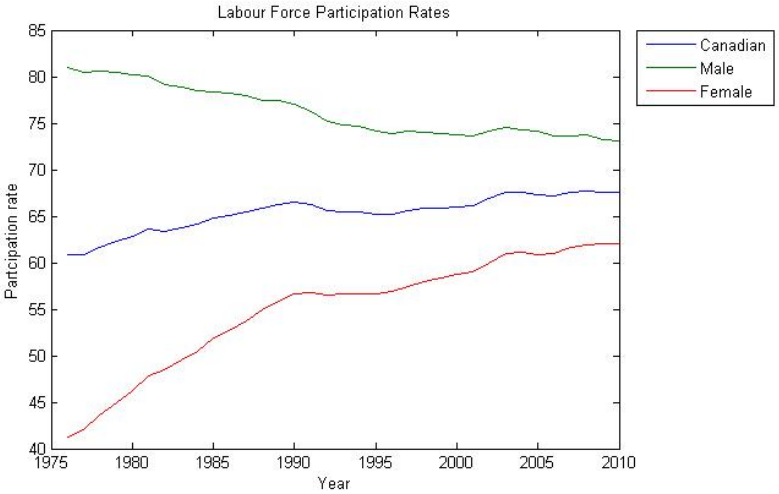

Figure 1: Labour force participation rates

— Source: Figure prepared by the author using data obtained from Statistics Canada, "Labour force survey estimates (LFS), by sex and detailed age group", Table 282-0002, CANSIM (database), Using E-STAT(distributor).

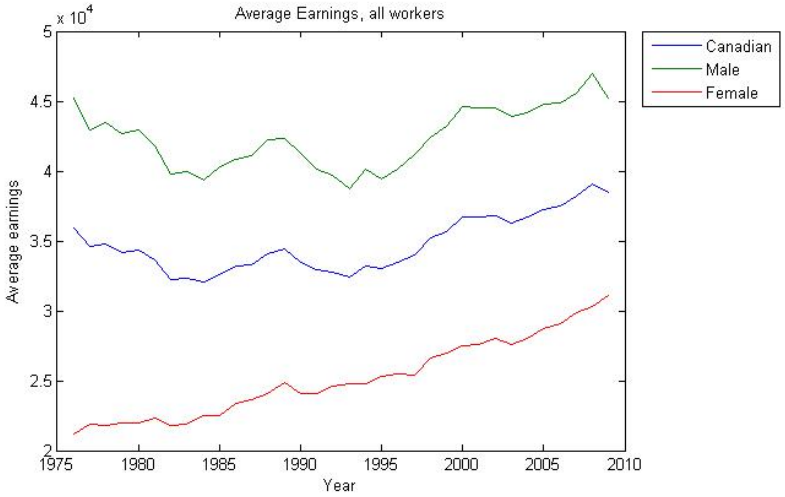

Figure 2: Average earnings

— *Source: Figure prepared by the author using data obtained from Statistics Canada, "Income of individuals, by sex, age group and income source, 2009 constant dollars, annual", Table 202-0407, CANSIM (database), Using E-STAT(distributor).*

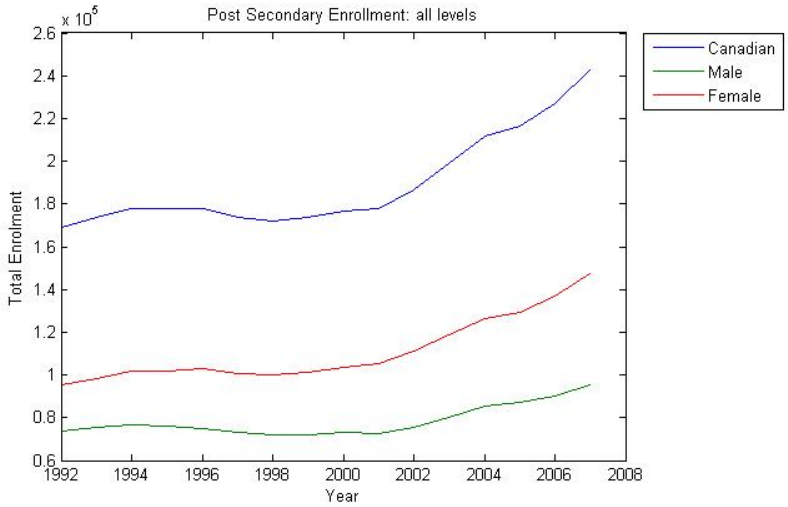

Figure 3: Post-secondary enrollment

— *Source: Figure prepared by the author using data obtained from Statistics Canada, "University enrolments, by registration status, program level, Classification of Instructional Programs, Primary Grouping (CIP_PG) and sex, annual (number)", Table 477-0013, CANSIM (database), Using E-STAT(distributor).*

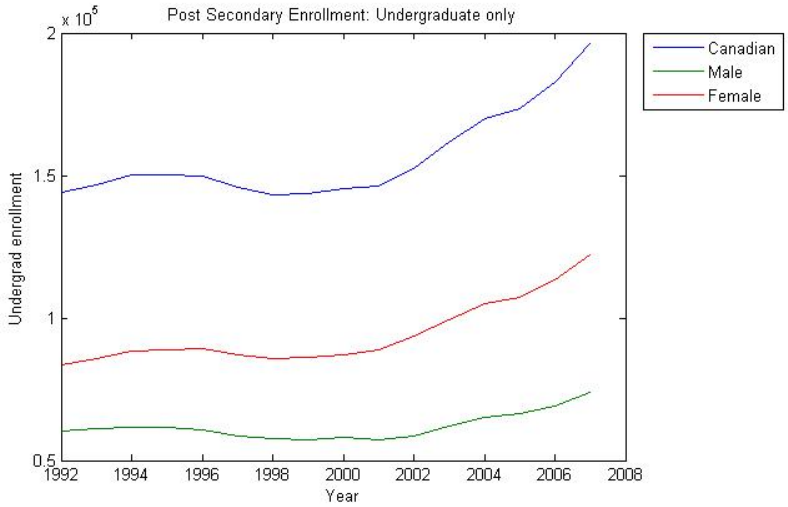

Figure 4: Undergrad Enrollment

— *Source: Figure prepared by the author using data obtained from Statistics Canada, "University enrolments, by registration status, program level, Classification of Instructional Programs, Primary Grouping (CIP_PG) and sex, annual (number)", Table 477-0013, CANSIM (database), Using E-STAT(distributor).*

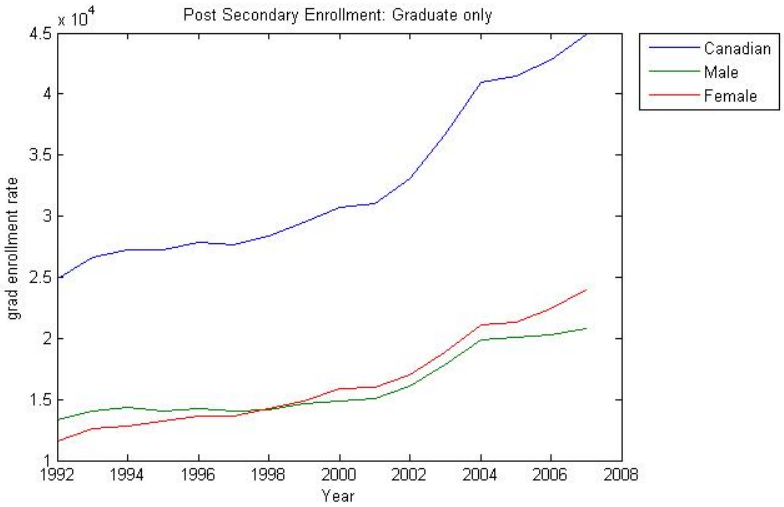

Figure 5: Graduate Enrollment

— *Source: Figure prepared by the author using data obtained from Statistics Canada, "University enrolments, by registration status, program level, Classification of Instructional Programs, Primary Grouping (CIP_PG) and sex, annual (number)", Table 477-0013, CANSIM (database), Using E-STAT(distributor).*