

Women's Reproductive Health and Economic Activity: A Narrative Review

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ABSTRACT

In this paper a narrative review of the literature that addresses the connection between women's reproductive health and women's economic activity is presented. Women's reproductive health, gender equality and decent work, are all part of the Sustainable Development Goals and this review highlights how these goals are interconnected. The review focuses on the relationship between fertility and women's work, and the causal effect of fertility on changes in female labor force participation. Fertility is captured by timing, spacing and number of children, and career advancement, job quality, and hours worked are addressed on the work side. The review contrasts the fertility-work nexus for low-, middle- and high-income countries separately, recognizing national income per capita as a moderator of the effect of fertility on female labor force participation. As the relationship between fertility and women's work varies by income per capita, policies that support women in achieving balance in their desired family size and accessing decent work will vary.

Keywords: reproductive health, fertility, women's labor force participation, women's economic empowerment, Sustainable Development Goals, policy.

Introduction

Reproductive health, because of its time intensity, its creation of vulnerability, the sexed assignment of roles, and its perpetuation of gendered norms, connects it to any activity a woman does, including her economic activity. In this review academic peer review literature that analyzes the connection between women's reproductive health and women's economic activity is explored. The underlying theories that connect reproductive health and women's economic activity draw mainly on the high-income country (HIC) context. However, in this review efforts are made to also include literature from low-income countries (LICs) and middle-income countries (MICs). Among the Sustainable Development Goals (SDGs) are the aims for good reproductive health (SDG 3), gender equality (SDG 5) and decent work for all (SDG 8). This review of the connection between reproductive health and women's economic activity highlights the interconnected nature of women's experience in the development process. Achieving the

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SDG targets in a way that works for women, must account for the competing demands on women's time and resources, and this review highlights some of these complexities.

Reproductive health, according to the definition by the World Health Organization, implies that people are able to have a satisfying and safe sex life and that they have the capability to reproduce and the freedom to decide if, when and how often to do so. Of relevance to women's economic activity, reproductive health matters including gender-based violence (safe sex life), abortion, contraception, and child marriage (proximate determinants of fertility that are related to enabling fertility decisions), and the timing, spacing and number of children (the elements of fertility). In this review, abortion, contraception, and child marriage, and the timing, spacing and number of children are all addressed. The issue of gender-based violence and women's labor force participation is kept for another review¹.

Economic activity can be defined through the inputs to production: technology, capital (physical and human), labor, and land. As this review focuses on the connection between reproductive health and economic activity, the channels work through labor-related economic activity. The connection of reproductive health and technology, capital and land, all relate through labor. Labor is time intensive, as is childbearing and rearing. Thus, the connection between reproductive health and economic activity is through time, and the tradeoff women must make between fertility decision and time-intensive economic activity – labor supply.

Theoretical Frameworks Connecting Fertility and Women's Labor Force Participation

Women's labor force participation, through the arc of economic development, has been empirically characterized by a U-shape (Goldin, 1995). Goldin describes this U-shape where women's labor force participation is high in agrarian societies. As economies develop and manufacturing jobs begin to dominate the labor market, women's labor force participation decreases, forming the downward slope of the U. Goldin cites two reasons for this decline in women's labor force participation as the macroeconomy develops. One being that manufacturing work is considered to be a man's job and a woman working in such a job would bring stigma to the husband and household. Second, households practice income sharing, which enables women to rely on her husband's labor force participation for survival. As the economy develops further, service sector jobs increase. These high skill, low physical effort jobs are then considered well suited for women. Women's labor force participation increases from the manufacturing economy state, forming the upward slope of the U. It is important to mention this seminal model of women's work, as it has motivated much analysis of women's labor force participation behavior across countries, and within countries across time². Female labor force participation across national levels of income per capita varies considerably. Goldin's U-shape (Goldin, 1995), and for more recent data in 2010 in (Verick, 2014), outline the high rates of female labor force participation for LICs and HICs and a lower rate of female labor force participation for MICs.

A striking feature of women's labor force participation by the level of GDP per capita is the fraction of female labor force participation that is in the informal sector (Bhalotra & Umana-Aponte, 2010; Verick, 2014). For women in LICs (particularly LICs in sub-Saharan Africa), the

rate of female labor force participation can range between 50 percent to 90 percent, a broad range of participation rates. However, consistently, of those women who are working around 90 percent of that employment is in the informal sector. For women in MICs, around 50 percent of women who are working are working in the informal sector. In HICs, this fraction is less than 10 percent.

Based on the Goldin U-Shape of female labor force participation, fertility is neither a cause nor a consequence of the labor market decision. In these models, women's labor force participation is determined by her wage, the household income (which implies income-sharing within a co-operative household), the stigma her (blue-color) work may invoke for the family. The time spent in childcare is the remainder of her time once the labor supply decision is taken. Thus, while she splits her time between childcare and work, the amount of time she devotes to childcare is the residual of her work decision. In these models, the tradeoff for the woman is the type of work she does, and to work or not. The tradeoff is not between her decision for more children or more work.

In connecting birth rates and national income per capita, theories extend back to the Malthusian hypothesis (Malthus, 1798) that states that in times of economic boom birth rates will be high as resources (food) are abundant. In times of economic scarcity, fertility rates will be low as families employ "moral restraint" as they cannot provide for additional children. This positive relationship between fertility and economic development continued into a post-Malthusian regime where there was considerable technological advancement (Galor & Weil, 1999) but fertility rates continued to increase along with income in that second phase. It was not until the advent of the demographic transition, where declines in infant and child mortality triggered declines in fertility, that a negative relationship between fertility and income emerged. This is our modern regime (Galor & Weil, 1999).

To explain fertility rates across income levels, seminal research by Becker and Lewis (1973) introduced the quality-quantity trade-off. The theory explained a low income elasticity of child quantity (an increase in income leads to a less than proportionate increase in quantity of children demanded) and a high income elasticity for child quality (an increase in income leads to a relatively larger increase in quantity demanded of the "quality" in each child). Where child quality was explained as children having private education and engagement in extracurricular activities. As households become richer, they demand fewer children, but higher quality children³.

Female labor force participation (rate and type) varies across income (Bhalotra & Umana-Aponte, 2010; Goldin, 1995; Verick, 2014) and fertility (child quantity and quality) varies across income (Becker & Lewis, 1973; Becker & Tomes, 1976). Thus, it may be hypothesized that the relationship between fertility and female labor force participation varies across income levels. That is, income is a moderator in the relationship between fertility and women's labor force participation. This hypothesis is explored in this review.

Scope of the Review

Before starting with the body of the review, a few clarifying notes are needed with respect to reproductive health and women's economic activity.

First a note on gender norms. Women's reproductive position, the woman as the child bearer, has shaped gender norms of the primary care giver of the child to be the woman. By this gender norm, her place is within the home bearing and raising children rather than out of the home and working. Gender norms connect strongly to women's access to technology (Alesina, Giuliano, & Nunn, 2013), physical capital, human capital, and labor force participation (Field, Pande, Rigol, Schaner, & Moore, 2019; Jayachandran, 2020). This highlights that the study of the connection of reproductive health and women's economic activity, is nested within a broader context of gender norms and economic activity (Boserup, 1970; Duflo, 2012; Nussbaum, 2011; Sen, 1989). However, in this review of reproductive health and economic activity the focus is on the direct connection between fertility and women's labor force participation, and thus the mediating role of gender norms in explaining the connection between the two is not fully explored in this review.

Second is a note on education. Fertility and women's education are strongly related (Ardington, Menendez, & Mutevedzi, 2015; Herrera Almanza & Sahn, 2018). In one such relationship of fertility and education, there is a direct impact on the age at first birth on enrollment or high school completion. Another relationship is that education is a mediator between reproductive health and economic activity. More educated women have fewer children and better job opportunities (Averett, Argys, Hoffman, Blau, & Winkler, 2017). In most cases, better education leads to better jobs for women (Heath & Jayachandran, 2017). Thus while education has a direct effect on women's employment, and is a mediator between fertility and women's work, the role of education is not fully explored in this review as it deviates from the central theories and empirical studies that explore the direct connection between reproductive health and women's economic activity. However, in the context of early childbearing and job opportunities education is addressed.

Third is a note on women's empowerment, or women's economic empowerment. When women's economic activity and women's labor force participation is discussed in this paper, these factors should not be interpreted as proxies for women's economic empowerment. The connection from women's labor force participation to women's economic empowerment is a complex function (Kabeer, Mahmud, & Tasneem, 2018). In some cases, women's labor force participation does empower her (Field et al., 2019), but in other cases women's labor force participation is a signal of poverty and the distress sale of labor (Kabeer, 2012). Women's work may not represent autonomy (Anderson & Eswaran, 2009), nor be an expression of her capabilities and freedom. Women's work may in fact be forced as in the case of slave labor, kidnapped sex workers, underpaid or unpaid international domestic workers who lack individual rights to basic freedom. Women may be working for the family unit, but see no returns to her work or have the opportunity for skill-building for outside employment (Anderson & Eswaran, 2009). Women's labor force participation is a pathway (a necessary condition) for women's economic empowerment, but it is by no means a sufficient condition to ensure empowerment (Gammage, Joshi, & Rodgers, 2020).

Fourth, and the last clarifying point, the second order effects of reproductive health and economic activity improvements are not explored in this review. There is a large literature at the macroeconomic level on the benefits of enabling women's economic participation (Doepke & Tertilt, 2019; Mammen & Paxson, 2000), and at the micro (household) level where economic participation may increase a woman's bargaining power within the household (Field et al., 2019). Similarly, there is a large literature on the welfare benefits of enabling women to take command of their fertility decisions (Balbo, Billari, & Mills, 2013; Bongaarts & Casterline, 2018). These are all important lines of research that show the broader benefits of reproductive health improvements and the benefits of enabling women's economic activity. However, this discussion is secondary to the central review of connecting reproductive health and women's economic activity.

These four clarifying points emphasize that the scope of this review is confined to the direct connection between reproductive health and women's economic activity, and specifically the effect of fertility on women's labor force participation. The mediating⁴ factors (for example, education) and the second-order effects (for example, positive economic development, increased bargaining power, greater realization of desired fertility), would require separate reviews due to the breadth and complexity of those relationships. Thus, within this review, the direct connection between fertility and women's labor force participation across income levels is considered.

Measurement

The measurement of fertility and women's labor force participation, particularly in low- and middle-income countries (LMICs) has been challenging. While the Demographic and Health Surveys (Corsi, Neuman, Finlay, & Subramanian, 2012) remain the primary source of fertility – timing, spacing and number of children – these surveys are infrequent (every five years at best). Furthermore, the surveys across waves are repeated cross sections, and thus tracking the same woman across time is not possible. While the fertility history can be constructed into a panel, other socio-demographic variables are not recorded across time. In particular, the variables in the DHS relating to women's work are narrow in their scope, asking women if they worked in the past year or not. Efforts to improve the measurement of women's work are underway (Finlay, Efevbera, Ndikubagenzi, Karra, & Canning, 2019). To gain a comprehensive understanding of women's lives a complementary improvement in the measurement of fertility would also be warranted. Without the comprehensive panel data from a source as broad in its country coverage as the DHS, studies using the natural experiments method are limited to single country analysis.

Note that in the analysis to estimate the sign and magnitude of the relationship between fertility and female labor force participation the comparisons are not symmetric. Where there is panel data, the labor market response to an additional child can be estimated for an individual woman. That is, for a woman, how an increase in fertility by one child impact here labor force participation. To study the impact of a decline in fertility, this would be the analysis of the impact of the death of a child on women's labor force participation. Bhalotra, Venkataramani, and Walther (2018) estimate the effect of a decline in average child mortality on women labor

force participation, but not the individual level of an increase in child mortality on labor force participation. Thus, estimates are typically made from an increase in fertility, not of a decrease, yet in the interpretation the sign of the coefficient is considered symmetric for increases or decreases in fertility. This interpretation is tempting because over time within countries a decline in average fertility has been observed, yet for an individual woman her life course increases in fertility are observed.

Endogeneity fertility in the labor supply decision

With respect to the causal effect of fertility on women's labor force participation, this follows from the child quality-quantity tradeoff as returns to education investment (future wages of children) increase, reducing the demand for the number of children (and increasing the education of each child). As women had fewer children to care for, this frees up her time for entry into the labor market. The decline in fertility leads to an increase in women's labor force participation. The empirical investigation of the sign of this relationship between fertility and women's labor force participation has been addressed and such literature is covered in this review, and the literature demonstrates that this theoretical inverse relationship does not hold within and across countries in all cases.

There is a competing explanation for the connection between fertility and women's economic activity. That is, changes in women's labor force participation causally affect fertility. The rising opportunity cost of childbearing for women in response to woman's rising wages that encouraged women's labor market participation (Galor & Weil, 1996). Rising female wage and the increase in women's labor force participation, that then lead to the decline in fertility. In this case, the causal flow runs from women's labor force participation to fertility⁵.

By these theories, the direction of causality goes both ways between fertility and female labor force participation. A decline in fertility rates, triggered by the quality-quantity tradeoff of having fewer children and investing more in each child, can lead to an increase in female labor force participation as women spend less time caring for (now fewer) children. The reverse argument goes that as relative wages increase women increase their labor force participation. This labor force attachment and wages raises the opportunity cost of having a (or an additional) child. The increase in labor force participation leads to a decline in fertility. Fertility is endogenous to the labor supply decision for women.

Empirically, to identify the causal impact of fertility on women's labor force participation, distinct from an association, methods of instrumental variables (Angrist & Evans, 1998) and natural experiments (Miller, 2010) have been applied. A few studies using quasi-experimental designs have been conducted with a focus on fertility outcomes (Debpur, Phillips, Jackson, Nazzar, & Binka, 2002) and some reference to women's work (Joshi & Schultz, 2007). There are a growing number of randomized control trials in the developing country context that examined the impact of childcare subsidization on women's labor force participation (Barros, Olinto, Lunde, & Caralho, 2013; S. Clark, C. Kabiru, S. Laszlo, & S. Muthuri, 2019). All of which are reviewed in this paper.

External Validity

At low levels of income, women's labor force participation rates and fertility rates are high. The concerns and motivations for women and their work in LICs and MICs differ from those of women in the HIC context. Mammen and Paxson (2000) consider women's work across the arc of economic development and point out that the barriers women in developed countries face within the labor market— gender wage gaps, glass ceilings – are of little relevance to women in developing countries where the majority work in the informal sector, for family members, and often unpaid. With the flexibility of the informal sector comes vulnerability, as women – and ultimately their children – are not protected with social policies for job stability, healthcare, and other tax-breaks (Gammage, Sultana, & Glinski, 2020). Women in developing countries, have limited access to credit, are limited in their ability to accumulate assets (including through paid work) and face discrimination with regard to inheritance laws (Mammen & Paxson, 2000).

Fertility rates remain high in LICs at 4.5 children per women, compared to 2.5 children per woman in MICs and below replacement at 1.7 children per women in HICs.⁶ Fertility decline has stagnated in some LICs (Alkema, Raftery, Gerland, Clark, & Pelletier, 2012; Bongaarts, 2008). Fertility decline is set to vary significantly across countries and impact population sizes (Vollset et al.).

Studies of the connection between fertility and women's labor force participation can be macroeconomic (country level data), microeconomic (household level data), cross-sectional (across units of analysis such as across countries or across household at one time point), or within-unit (country or household) across time. Analysis can be concentrated in developed countries or developing countries. The type of data, and the group of countries, that are the center of a study to find a particular relationship between fertility and women's economic activity, must be interpreted with caution. For example, drivers of a (surprising) positive relationship between aggregate fertility and women's work for a group of rich countries across time, may be quite different to the drivers of a positive relationship between fertility and women's work at the household level in a developing country context. Both formulate an interesting analysis as the positive relationship goes against the theoretical prior of an inverse relationship of the quality-quantity tradeoff. But the mechanisms will differ, and thus as with all studies, issues of external validity are also present in our analysis of fertility and women's economic activity.

This Review

In this paper the literature that examine the effect of fertility on women's economic activity is reviewed. The literature are divided according to the moderator of income per capita, with LICs, MICs and HICs⁷ all experiencing different relationships between fertility and women's work, and where different policy solutions are prioritized. This review is a narrative review and not a systematic review. Literature were primarily drawn from Web of Science and the Harvard

University Library and then snowballing to other relevant papers by looking through the bibliography of seminal papers. The focus is on understanding the effect of fertility on women's labor force participation across the arc of development (national income per capita) rather than a priority of counting each article as would be done in a systematic review. That being said, the inclusion of articles is as comprehensive as possible. The cited texts are predominantly from economic journals, with some important texts coming from sociology and public health. Previous reviews have been conducted, but were limited in their scope compared to this review (Canning & Schultz, 2012; Finlay & Lee, 2018)

Low-income countries

Women's labor force participation can increase in LICs with the birth of a child, not decrease as the quality-quantity tradeoff predicts. In Ghana, Heath (2017) finds that fertility decreases the extensive margin of women's labor supply. However, for women already in the labor force, she finds that fertility increases the number of working hours, mainly in self-employed labor activities.

This increase in women's labor force participation in the event of the birth of a child begs the question of why she does this. Heath (2017) presents a theoretical model, backed by empirical evidence from urban areas in Ghana, that shows how women will make time or monetary investments in their children. If returns to monetary investments in her newborn child are higher than time investments, then the woman will increase her labor force participation following the birth of a child. Empirically, Heath (2017) finds that women do not increase their labor force participation at the extensive margin, but for women who are already in the labor force they increase their hours worked following the birth of a child.

Beyond the explanation of the time and monetary investment theory, to address the question of why the woman increases her labor supply when her child is born for the context of sub-Saharan Africa, Heath (2017) explores the disfunction of unitary model of the household. underlying the reason why women increase their labor supply following the birth of a child. If households engaged in income sharing, and within the couple the man earns more than woman, the birth of a child would see the man increase his labor supply and women decrease their labor supply to care for the child (Alderman, Chiappori, Haddad, Hoddinott, & Kanbur, 1995; Doss, 2013). The empirical finding from Heath (2017) suggests that men do not change their labor supply, but women increase, is suggestive of a lack of household cooperation and a lack of income sharing within the household. While Heath (2017) acknowledges that her evidence is only suggestive of a lack of income sharing, if it is the case, then the women's tradeoff of time and monetary investment in a child has less of an element of choice. Without household income sharing, women will be required to continue to work – and work more – to provide for the basic needs of the child. This finding bridges over to a growing literature dispelling the unitary household model, to show that in the sub-Saharan African context intrahousehold income is not shared equally (Duflo & Udry, 2004; Dunbar, Lewbel, & Pendakur, 2013).

The increase in women's labor force participation at the birth of a child also begs the question of how she does this when both work and childcare draw on her fixed stock of time. Heath (2017) finds that the effect of an increase in labor force participation at the event of a birth of a child is greater when the woman has older children. This is supportive of the idea that older siblings share the care responsibilities enabling the mother to work (Heath, 2017).

Exploring another avenue that enables women to increase their labor force participation at the event of birth of a child, there is evidence from qualitative research that women in sub-Saharan Africa prefer long birth intervals so that they only have one very young child to care for at a time. With one young child, work and childcare can be combined in agriculture and the informal sector, but the women in the qualitative study stated that two or more young children make the combined task of childcare and work very difficult (Finlay, Efevbera, Ndikubagenzi, Karra, & Canning, 2018). Using a pooled sample from sub-Saharan African countries, de Jong et al (de Jong, Smits, & Longwe, 2017) found that the number of children below age six had a significant negative effect on the woman's ability to work in the non-farm sector; it reduces the odds of employment of African mothers by 6%. Results regarding the age of the child and women's work could be interpreted as birth spacing, ensuring that there is only one child under the age of six at one time to enable simultaneous childcare and work.

Contrasting to the sub-Saharan African experience, South Asian countries that classify as LICs, show a different relationship between fertility and women's labor force participation. In Bangladesh, in Matlab (Joshi & Schultz, 2012), it was found that declines in fertility led to an increase in labor force participation. However, in South Asia, women can be denied access to the labor market (Anderson & Eswaran, 2009) as she is confined to the home and home duties. Thus, in this context a positive labor supply response to fertility decline is not easy with barriers to entry into the labor market. Thus while in SSA LICs there is a strategy regarding why and how women combine childbearing/rearing and labor force participation, in South Asian LICs options for work are limited for women as social norms prevent their interaction with the labor market (Jayachandran, 2020).

LICs early childbearing and labor market opportunities

In the developing country context, early childbearing and female labor force participation is analyzed in the context of the lack of viable employment opportunities for young women.

Using panel data from a study in Madagascar Herrera, Sahn, and Villa (2019) find that adolescent mothers have higher rates of employment than young women without children, and furthermore their work is more likely to be in the informal sector (Herrera et al., 2019). In this study the authors use condom access as the instrumental variable to assess the causal impact of early (teen) fertility on women's labor force participation rates in the formal or informal sector. The authors find that women who have their first birth in their early twenties or teens are much *more likely* to be working than women who have their first birth after the age of 25. An important distinction is with regard to job quality, and the authors found that teen mothers are more likely to be working in the informal sector than the mothers who have their first birth in their early twenties. The authors show that advancing childbearing by one year (childbearing at a younger age) increases the probability of working in the informal sector by 7.2%.

In the Madagascar study (Herrera et al., 2019), it was noted that the teen pregnancy and entry into the informal sector is confounded by incompleteness of school, thus potentially leading to lower life-long earnings for these teen mothers. For girls who become pregnant in their teen years, the impact on schooling and high school completion is well documented (Ardington et al., 2015; Menon, Kusanthan, Mwaba, Juanola, & Kok, 2018).

There is evidence that teen pregnancy is not always the factor that pushes girls out of school, but rather that girls are first pulled out of school, and pregnancy follows. In an example in West Bengal Chakravarty (2018) found that parents did not invest in their girls' education as they viewed this as a low-return investment. It was not expected in this context that girls would be able to gain higher wage returns to their education on graduation and entry into the labor market. The lack of economic opportunities for young women in this context trickled down to cause low enrollment rates of girls.

Without economic opportunity, or school, a girls' option in life is limited to early marriage. In a study in Tanzania, it was found that early marriage in places of limited female economic opportunity was not unwanted by the teenage girls (Stark, 2018), as marriage was a way to secure resources (food and shelter) in places of poverty.

The lack of economic opportunity, low education attainment, poor adolescent sexual and reproductive health education, child marriage norms, combine to shape a desire for early childbearing in LICs. If early childbearing (and child marriage) are desired and a social norm, then programs that target a select group (a research studies treatment group, for example) may generate unintended consequences. For example, in Malawi (Baird, Chirwa, McIntosh, & Özler, 2015), women were incentivized with cash transfers to delay marriage and first birth, but the study findings revealed that the time gained was not always used for capital investment (for example, education). Moreover, for the women who did increase their education, the men did not adjust their preference for women with higher lifetime earning capacity, but rather still preferred homemaker partners without regarding the importance education in this role. This project provided important lessons for programs aimed at improving economic opportunity for women through reducing fertility or raising the age at first birth: such programs will generate unintended negative consequences for girls and women if underlying gender norms are not confronted.

LIC policies enabling reproductive freedom and subsequent female labor force participation

There is ongoing debate regarding the role of economic development shaping fertility preferences (L. H. Pritchett, 1994; Lant H. Pritchett, 1994), relative to the role of family planning programs enabling desired fertility levels (Bongaarts, 1994). The evidence leans towards the economic development argument (Gunther & Harttgen, 2016; Miller & Babiarz, 2016), where, with economic development and higher national income per capita, preferences for lower family size emerge and family planning programs can then enable a realization of these preferences.

In 1977 an experimental family planning, maternal and child health program was rolled out in Matlab, Bangladesh. This study remains one of the few experimental designs that involved a

family planning intervention. The family planning intervention was done within the study design and roll out of a child vaccination program. With declining child mortality, preferences for smaller family sizes were emerging thus leaning to support the argument of L. H. Pritchett (1994) that it was not the family planning program per se but rather shifting fertility preferences with family planning demand increasing as this preferences adjusted (Miller & Babiarz, 2016).

Joshi and Schultz (2007) in the working paper version of their seminal analysis found that the 15 percent decline in fertility in the treatment areas led to three times higher wage return to schooling (subsequent earnings) for women in the treatment areas. In another study in India, Francavilla and Giannelli (2011) found that access to family planning services by the treatment group increase paid employment for women. This was reported to be particularly strong effect for women in urban areas. However, in this study, the preferences of urban couples for smaller family sizes and more liberal gender norms enabling women to work were not accounted for in the analysis.

Note that in Indonesia, a family planning program was shown to have an impact on fertility decline independent of economic development and advancement of the status of women (Molyneaux & Gertler, 2000). The program had two parts, one a subsidy on contraceptives and this had a very small effect but expanding the distribution network had a much larger impact on fertility decline. Other experimental studies exist that show the social impact of a family planning program intervention. One study in Nvrongo (Debpuur et al., 2002), in Northern Ghana, was a quasi-experimental design to examine the impact of improved health and family services in an African setting on fertility. After three years of the program, it was found that fertility declined by 15% in treatment areas. No analysis of the subsequent impact on women's labor force participation was conducted. In another study, a randomized control trial in Zambia Ashraf, Field, and Lee (2014) found that women who concealed their contraceptive use from husbands were 27 percent less likely to give birth than women who shared contraceptive use decisions with their husbands. This study focused on the finding of the subsequent psycho-social cost of concealing contraceptive use information from husbands, rather than examining the labor market effects of the increased contraceptive use and fertility decline. Two other studies, one in Ethiopia (Desai & Tarozzi, 2011) and another in Kenya (Kosgei et al., 2011), found no impact of family planning programs on fertility outcomes.

For access to contraception in LICs, women are vulnerable to cuts in contraceptive supplies, which are for the most part funded by US and foreign nongovernmental organizations (Jones, 2015). Jones (2015) found that the reduction in contraceptive supplies led to an increase in conceptions in rural areas of the study site in Ghana (but not in urban areas). This led to an increase in induced abortion for some women, but for others (the poorest) fertility increased. (Labor market consequences were not analyzed in this study).

In summary for the role of family planning programs on women's labor force participation, in Bangladesh Matlab there was a positive effect of a family planning program on women's labor force outcomes, but this program was possibly confounded by the child vaccine program (Joshi & Schultz, 2007; Miller & Babiarz, 2016). In Ghana (Debpuur et al., 2002) and Indonesia (Molyneaux & Gertler, 2000) the family planning program led to a decrease in fertility. In

Zambia contraception access reduced fertility but had a psycho-social cost of diminishing couple trust (Ashraf et al., 2014). In Ethiopia (Desai & Tarozzi, 2011) and Kenya (Kosgei et al., 2011) there was no impact on fertility from those family planning interventions. However, to understand if family planning programs have a direct effect on fertility, or if it is because development is shaping preferences for smaller family size, a comparison of these study results do not inform this question without knowing the underlying desired family sizes. It could be that the programs that were effective in reducing fertility were such because underlying preferences for smaller family sizes were already trending. For regions where family planning programs had no effect, there may be no preference for smaller family sizes and thus no demand for family planning programs (Bongaarts, 2011; Bongaarts & Casterline, 2013).

LIC policies enabling the balance of fertility and women's work

Across six low- and middle-income countries (across three continents), at the macro level it was found that declines in fertility did not immediately translate to higher female labor force participation. Although women had fewer children on average, they still had some children, and the lack of formal childcare and family friendly policies, may contribute for this observed lag in emerging economies (Gammage, Sultana, et al., 2020).

Upon childbearing, for women in many developing countries, the size and composition of the formal labor market may be limited. That is, opportunities in the formal sector are few – with or without children. For women with children, they may select into the informal sector, where they believe they can more easily combine childcare and economic activity, as was found in the case of a study in Indonesia (Radhakrishnan, 2010).

Other women in the household, or neighbors, may share the responsibility of caring for children. This enables women in developing countries to be economically active, but the informality of the childcare contributes to her labor force options and plays a role in pushing her into the informal labor market (Quisumbing, Hallman, & Ruel, 2007).

Formal childcare is not a reality for most women in developing countries (S. Clark, C. W. Kabiru, S. Laszlo, & S. Muthuri, 2019; Wong & Levine, 1992). However, even for poorer women (who supposedly work in informal jobs that make it easy to combine childcare and work) take up the offer of childcare when it is offered at a subsidized price. From this study (Shelley Clark, Caroline W. Kabiru, Sonia Laszlo, & Stella Muthuri, 2019), where childcare vouchers offered subsidized childcare to women in an informal settlement in Nairobi, women who took up the childcare offer were more likely to switch job-type to higher earning jobs with fewer, more regular hours.

When childcare (or preschool in the case of Halim, Johnson, and Perova (2019)) expansion is marginal, then this has had no impact on job-type selection in the case of the Indonesian study. In that study, preschool hours expanded from three to four hours, and this saw women increase their unpaid work within the family business, but not paid work outside the home.

For women in LICs, reliable childcare has shown to have an impact on job type (Shelley Clark, Caroline W. Kabiru, et al., 2019), but informal childcare or no childcare push women into the informal job sector. The ability of women to combine informal work with childcare may enable women to work, but the large response to switch job-type when women do not have to combine childcare and work may be an indication that combining work and childcare may not be desirable for women.

To summarize, in LICs, women strategize to enable work and childbearing and rearing as formal childcare is seldom available, but used if offered (Shelley Clark, Caroline Kabiru, et al., 2019). Household income sharing is not a given (Duflo & Udry, 2004), and women need to work to support the basic needs of their children. In SSA, an increase in fertility can lead to an increase in women's labor force participation (Heath, 2017; Herrera et al., 2019), but in SA women are restricted by gender norms in their access to the labor market (Jayachandran, 2020). To enable work and childrearing, women will choose informal work that offers greater time flexibility (Quisumbing et al., 2007; Radhakrishnan, 2010) and birth spacing to ensure there is only one young child to care for while working (Finlay et al., 2018), or rely on older siblings for childcare support (Heath, 2017).

Middle-income countries

Turning now to MICs, where fertility rates are lower than in LICs (an average of 2.5 children per woman), and the fraction of women participating in the informal labor market is lower (around 50 percent). Middle income countries have higher income inequality⁸ than LICs and HICs, thus any analysis of fertility and women's labor force participation in MICs can benefit from stratification across within-country wealth or income per capita.

There are detailed studies of the causal effect of fertility decline on female labor force participation in Latin American MICs, but these did not account for within-country income inequality. With the aim of replicating Angrist and Evans (1998) but in Argentina and Mexico instead of the US, Cruces and Galiani (2007) used family size and sibling sex composition as an instrumental variable to find that in these two MICs an increase in fertility led to a decrease in female labor force participation. As the aim of this paper was methodological, there was no contextual analysis to examine the mediating effect of income inequality and job type was not explored.

Aguero and Marks (2008) found in six Latin American MICs that the number of children does not change a woman's labor force participation once the reverse causality is accounted for using the novel instrument of infertility. In a later study the same authors included LICs (Aguero & Marks, 2011) and found using the same methodology with the infertility instrumental variable, that an increase in fertility in LICs did not change the intensity to work, but did change they type of work a woman did. As their earlier research had shown, in the MICs an increase in fertility led to no change in female labor force participation.

In another study using multiple births as an instrument for fertility Cáceres-Delpiano (2012) found that in the MICs within their sample (Latin American countries in the Demographic and

Health Surveys) that women who went from parity one to two decreased their labor force participation, but subsequent children had no effect on women's labor force participation. Cáceres-Delpiano (2012) show that this decrease in fertility leading to an increase in female labor force participation is driven by women in urban areas, and in rural areas there is no effect of fertility on female labor force participation (although the data are pooled across LICs and MICs for the urban/rural analysis).

In other MICs outside Latin America, studies have shown that a decline in fertility led to an increase in female labor force participation in Turkey (Gündüz-Hoşgör & Smits, 2008). In the Philippines, Adair, Guilkey, Bisgrove, and Gultiano (2002) found that two or more children within an eight year period reduced women's earnings, and that having a child under the age of two years reduced the women's hours worked.

None of these studies account for income inequality. To address inequality, Buvinic (1998) found that in Chile adolescent childbearing had a different effect on the poor and rich mothers. For adolescents, this difference in work patterns between rich and poor was defined by household composition. For adolescent mothers in rich households, there was no effect of childbearing on their labor force participation. But for adolescents' mothers living in poor households, they were more likely to be working. For the adolescents living in richer households they were less likely to be head of household and may have been able to rely on financial support from within the household than poorer adolescent mothers.

For women, and adolescent mothers in particular, gaining support and commitment from the child's father is not a given. In Latin America, single motherhood is common (Esteve, García-Román, & Lesthaeghe, 2012). Yet Millán-Quijano (2015) found in the case of Colombia adolescent childbearing is desirable, and that areas with higher homicide rates have higher incidence of early childbearing. The authors attribute this to the culture of despair (Kearney & Levine, 2012, 2015) where adolescent girls have few economic opportunities, and they use childbearing as a way to secure commitment from their male partners.

As for policies that enable family planning access, in the case of Columbia, Miller (2010) found that increased access to affordable contraception through the nationwide family planning organization of Profamilia, contributed less than 10% of the explanation for the fertility decline that occurred during Columbia's demographic transition. However, the important impact of Profamilia was had for young women who could now postpone first birth, thanks to the access to affordable contraception. This postponement in the first birth then enabled young women in Columbia to complete their education, and to go on to better paying jobs. While the Profamilia program had little impact on the number of children (thus little contribution to the demographic transition), it did have important welfare effects for young women to reliably control the timing of their first birth and complete their education.

As for policies in MICs that assist women in combining childbearing and rearing with labor force participation, one study showed in Colombia maternity leave increased economic inactivity rather than labor market retention (Uribe, Vargas, & Bustamante, 2019). Whereas for childcare Barros et al. (2013) found that for those who won a lottery to provide it for free to low-income families in Rio de Janeiro, Brazil, this increased women's labor force participation. In Nicaragua,

Hojman and López Boo (2019) found that access to subsidized childcare increase female labor force participation by approximately one-third. In Chile, Martínez A and Peticar (2017) found that free after-school childcare for primary school age children increased women’s labor force participation, and increased the uptake of a pre-existing early childhood care program. Thus, highlighting that women need quality childcare for all their children to enable work.

For studies in MICs, the comparison of rich and poor within countries is imperative as inequality is high. Analysis by parity (Cceres-Delpiano, 2012), motivations for early childbearing (Milln-Quijano, 2015) and household composition of teen mothers (Buvinic, 1998) provide valuable insights into the heterogeneity within MICs of the fertility and female labor force participation relationship. Policies that improve family planning access (Miller, 2010), and the provision of subsidized or free childcare (Barros et al., 2013; Hojman & Lpez Boo, 2019; Martnez A & Peticar, 2017), are appreciated and have an impact on women’s labor force participation in MICs.

High-income countries

Empirical research in the 1970s and 1980s emerged as the observation of the negative correlation between women’s labor force participation and fertility became apparent in the post-war era (Rosenzweig & Wolpin, 1980a), defying the Malthusian hypothesis of a positive relationship between income and fertility (Ahn & Mira, 2002). Identification of the causal impact of fertility changes on women’s labor force participation was tested using various statistical instruments for fertility such as twins (Rosenzweig & Wolpin, 1980b), sibling-sex composition (Angrist & Evans, 1998), and variations in fertility-related policies (Bloom, Canning, Fink, & Finlay, 2009). Clark (Clarke, 2018) provided a comprehensive review of the literature on the causal impact of a decrease in the number of children on women’s labor force participation.

Following this research on the negative causal impact of fertility on women’s labor force participation, came the observation in cross-country studies of a reversal in the sign of the impact between fertility and women’s labor force participation in developed countries. Fertility and women’s work were now positively related. The switch occurred in the mid-1980s (Ahn & Mira, 2002), and was possibly attributable to technological change and a skilled premium decreasing the relative cost of (unskilled) childcare (Martinez & Iza, 2004), thus both fertility and women’s labor force participation could increase⁹.

HICs Fertility and Career Progression

In HICs, for the study of childbearing and female labor force participation, career progression – or the impact of career interruption from childbearing is a central topic. In the US context, Gough (2017) outlined how there is a motherhood penalty across the reproductive life-course for women, and that short birth intervals or early childbearing that cut short education for women, limit her life course labor market opportunities. Gough (2017) formulates a testable hypothesis regarding the human capital theory that emphasizes the importance of minimizing the time out of

the labor market, to avoid human capital depreciation, skill depreciation, productivity declines, and wage cuts. Gough tests whether the motherhood penalty is lower when birth intervals are longer, secondly whether the age at first birth has an impact on the motherhood penalty, and thirdly if college education moderates the impact of timing and spacing on the motherhood penalty. Gough finds evidence for these hypotheses using data from the US and finds that the age at first birth (above 30 years old) mitigates the motherhood penalty more so than longer birth intervals. This works through the human capital accumulation theory, and Gough finds that women with higher education suffer a lesser motherhood penalty¹⁰.

Consistent with Gough (2017) and informed by lifecycle models others (Attanasio, Low, & Sánchez-Marcos, 2008; Goldin & Mitchell, 2017) show that there was a the human capital effect for women from decreasing or exiting the workforce even temporarily (Datta Gupta & Smith, 2002).

In a study using data from Germany, Adda, Dustmann, and Stevens (2017) decompose the effects of skill loss, earnings loss, and lower accumulation of experience on women's career development with interruptions due to childbearing. In this model, occupational choice and movement across sectors and positions, is central to the analysis. Because of the inclusion of occupational choice, the authors show that in the German context selection into different careers occurs well before the birth of the first child. Further, the authors highlight that pro-natalist policies will impact women's occupational type well before their fertility decision are made. Different occupations are more compatible with childrearing, and women will select into these occupations well before they make any actionable fertility decisions, with the intention of building a family in the future. These occupations are more flexible and lower paid, and thus the motherhood penalty is taken even before the woman is pregnant. Goldin and Katz (2011) show that some sectors have increased in their flexibility, and in part this has been driven by the increase in the number of women in these sectors.

In additions to issues of career progression, in HICs, the gender wage gap reducing the incentive for women to work, within households gender norms intensify following the birth of a child, and men and women are relegated to their roles according to their comparative advantage (Juhn & McCue, 2017; Waldfogel, 1998).

For LICs and MICs, early childbearing and labor market outcomes were a primary issue. This has been explored in HICs as well. Early childbearing and women's labor market opportunities, this has been studied in the US context (Geronimus & Korenman, 1992; Ribar, 1999). Concern rose in the 1970s as US teen pregnancy was markedly higher than in other developed countries (Kearney & Levine, 2012), and the intersections with welfare dependency were mixed into this discussion (Moffitt, 1983).

HICs policy enabling reproductive freedom and the subsequent impact on women's work

There is a literature on fertility control – abortion and contraception – and its direct link to women's economic activity.

For access to abortion Kalist (2004) found that prior to Roe v. Wade women, especially single black women, had favorable labor market outcomes compared to those women in restrictive states. A result that was confirmed by Myers (2017) who shows that access to abortion enabled the reproductive control needed for women to plan their labor market aspirations. Research on the impact of abortion on women's economic activity in developing countries is limited due to lack of data on abortion prevalence in LMICs.

In a seminal study, Goldin and Katz (2002) found that the introduction of the pill in the United States in the 1970s gave young women the opportunity to reliably complete college education. This encouraged young women to take on the challenge of studies for careers with higher income returns (medicine, law). The result of increased college completion by women was a delay in the age of marriage and first birth. As noted in a previous review (Finlay & Lee, 2018), this change benefitted women if two conditions were met: first, the time gained when delaying marriage was used to invest in one's human capital (education), and/or second, social norms progressed in unison with women's increased opportunities for education and career such that men in the marriage market also came to value women's higher lifetime earnings. In contrast, however, it should be noted that there has been recent mixed evidence of the impact of contraception on education attainment among more recent cohorts (1975) in the US (Eckstein, Keane, & Lifshitz, 2019).

Bailey (2006) uses US state variation in prescription drug consent laws, which included consent for the contraceptive pill prescription, and finds that women in states with legal access to the pill before the age of 21 had a lower likelihood of first birth before the age of 22, increased the likelihood of participation in the formal labor market, and increased the annual hours worked. Bailey, Hershbein, and Miller (2012) continued their research with these data and showed that women who had access to the contraceptive pill at a younger age had higher wages across their life course. Furthering this research again, Bailey (2013) found that the benefits of access to contraception at younger ages had beneficial intergenerational effects, and the children of these women, who had increased access to contraception thanks to family planning programs from 1964-1973, go on to have higher college completion rates, higher labor force participation, higher wages and higher family incomes.

These studies, Goldin and Katz (2002) and Bailey (2006) in particular, are cited as evidence of the efficacy of family planning programs in reducing fertility and expanding women's labor force participation. However, using evidence of nation-wide or state-wide changes within the US as evidence for family planning program (of a smaller scale) success in another (LIC or MIC) context may be an over-reach. These changes to contraceptive access in the US were at a large scale, and Goldin and Katz (2002) provide the caveat that this increase in access must be within a context where gender norms are apace with the change it will invoke (lower fertility and higher paid jobs for women).

HIC policy enabling the balance of childbearing, childrearing, and work

In HICs, where fertility rates are low and labor market participation is (for the most part) formal, women have access to vary degrees of maternity leave policies (Dustmann & Schönberg, 2012;

Ginja, Jans, & Karimi, 2020; Nandi et al., 2018), affordable childcare (Hardoy & Schøne, 2015), and tax breaks (Blundell, Costa Dias, Meghir, & Shaw, 2016). The purpose of these policies is to enable women to have children (and in cases of lowest of the low fertility countries to encourage, increase, fertility) and participate in quality work within the labor market. Persistent gender norms that pull women back into the house into traditional roles, or perpetuated gender-based discrimination in the labor market, are not the target of these policies (Barigozzi, Cremer, & Roeder, 2018; Endendijk, Derks, & Mesman, 2018). Paternity leave policies attempt to dismantle the gender norms of childcare but have had limited success at achieving this even in the egalitarian setting of Sweden (Ekberg, Eriksson, & Friebe, 2013).

In the context of Sweden, both men and women are legally permitted time out of work for parental leave (Albrecht, Edin, Sundström, & Vroman, 1999). Men were penalized for their exit from the labor force, over and above the human capital depletion explanation, and more than women are penalized. The authors argue that this is suggestive evidence of a signaling penalty, and that men who choose to use their paternity leave are not as committed to their gendered role of career-making as those men who do not take paternity leave when they are permitted. Employers penalize these men for selecting into the group who signal their secondary commitment to the labor market.

In summary for HICs, policies of maternity leave, childcare subsidies, aim to enable women to balance child rearing and work. However, while these policies are necessary, they are not sufficient in targeting underlying gender norms. In HICs, where fertility rates are low, policies aim to increase fertility and enable women to work, thus a positive relationship between fertility and women's labor force participation emerges. Career progression remains an issue within HICs, and while childcare policies help, it does not dismantle gender norms. Access to contraception has been instrumental in HICs, but gender wage gaps persist.

Discussion

In this paper, the impact of fertility changes on women's labor force participation has been analyzed, contrasting the LIC, MIC and HIC experience. The causal impact from fertility changes to female labor force changes carried with it the underlying theory of the child quality quantity trade-off (Becker & Lewis, 1973). Returns to each child's education investments increased and fertility declined. With fewer children, women spent less time in childcare and more time in the labor market. While this theory implies a negative relationship between fertility and women's labor force participation, empirically – in LICs and HICs in particular – the relationship can be positive.

Women face limits on their time, and gender roles place the burden of childbearing and child rearing on them. Women face barriers of career progression and achieving decent work as their careers are interrupted for childbearing. Work is not empowering for so many women, yet it is necessary for survival of herself and her children especially when income sharing is not practiced. Enabling women to work, enabling work to be empowering, enabling women to enjoy

the balance of children and work, is the driving goal that was underscored in all the research included in this review.

Resolving the fertility and work balance for women will not automatically lead to empowering work situations for all women. Steps to supposedly empower women can generate unintended consequences (Baird et al., 2015), and in the development of policies that promote the balance of childrearing and work, these unintended consequences should be clear.

In LICs, studies showed that fertility increases can lead to increases in (informal) work (Heath, 2017; Herrera et al., 2019). In many LICs, income sharing is not practiced (Duflo & Udry, 2004), and thus in this context women must work to support her children, and more children equates to more work (Heath, 2017). Norms around the acceptance of child marriage, coupled with limited economic opportunity for women (Chakravarty, 2018), make early childbearing desirable. With most women working within the informal sector (Bhalotra & Umana-Aponte, 2010; Verick, 2014) and high average fertility rates (Bongaarts & Casterline, 2018) policies to enable women to balance childrearing and work have little traction. Women make strategic decisions over job type (to combine childcare and work), birth spacing (to ensure only one infant at a time), and childcare from older children.

In MICs, the evidence suggests that on net an increase in fertility leads to a decline in female labor force participation. In MICs inequality is pervasive, and furthermore in Latin America, single motherhood, low rates of formal marriage, are prevalent. Despite the risk of childrearing alone, women can seek childbearing as a way of building identity, a sense of belonging, especially in fragile settings (Millán-Quijano, 2015).

In HICs, career progression, gender wage gaps, and persistent gender norms dominate the literature. As most working women in HICs are working in the formal sector, policies such as maternity leave and subsidized childcare are used to help women balance childrearing and work. Yet these policies do not target underlying gender norms that place women as the dominant caregiver.

Across LICs, MICs and HICs the balance between fertility and labor force participation is a juggle. There seems no exemplary country that provides an end goal with a perfect policy regime as one may expect of an HIC. There seems no perfect strategy to take as the women in LICs do to navigate their path. The juggle is difficult, and when women can (when childcare is available) they opt to not combine work and childbearing. Women in developing countries, being mostly in informal work, use their own strategies to juggle childrearing and work. Whereas in developed countries, where work is in the formal sector, women are dependent on policy efficacy within their country. Both approaches leave women vulnerable: women in LICs rely on their own strategies as social protection is not tied to the informal labor market, and women in HICs are reliant on national level policies that do not suit each woman's needs in balancing childrearing and work. Addressing gender norms at all levels of development would support women in the balance of family and work.

In this review, the focus was on the effect of fertility on women's labor force participation, moderated by income per capita. There were some notable omissions from the review, that

would need to be addressed in a separate research paper. The issue of gender-based violence and work is one area of research that is proliferating, The commute to work can be fraught with the threat of gender-based violence (Dunckel-Graglia, 2013). Once at work, the woman is subject to workplace sexual harassment (Hersch, 2011; McLaughlin, Uggen, & Blackstone, 2017; Weziak-Bialowolska, Bialowolski, & McNeely, 2020). Then at home, the woman faces the threat of retaliation in the form of intimate partner violence as women's participation in the labor market is a move against gender norms (of woman in the home), and this threatens the man's masculine role as breadwinner (Akerlof & Kranton, 2000; Macmillan & Gartner, 1999).

Furthermore, this review focused on the fertility and work nexus for women, and not the next step to economic empowerment. Women working is not viewed positively in all contexts. In some countries, where income sharing is not practiced, women may be expected to work but they are not necessarily enabled to work. Here the struggle with childrearing and work balance were presented, but women also come up against other barriers that prevent their access and success in the workforce. Work can empower women, and this may be viewed as a threat. In the review by Vyas and Watts (2009), they found that for programs that were designed to empower women, women implemented their own strategies to reduce conflict within the household. For example, women gave money to their partners for alcohol or cigarettes. Complementing Vyas's conclusion, Leite et al. (2019) also comments that women empowerment programs needed to be complemented with programs that enabled women to navigate the changing risk of intimate partner violence.

In conclusion, across the arc of development, income as a moderator in the relationship between fertility and women's labor force participation, was explored in a narrative review. At low levels of income informal labor force participation dominates and women strategize to combine work and childrearing as safety nets attached to the formal labor market are not an option, and household income sharing is not practiced. For women in MICs, inequality is pervasive, and women struggle to find their identity. And women in HICs continue to grapple with persistent gender norms that place women as the primary childcare provider, and career progression remains evident despite policy efforts. Development of the formal labor market and the accompanying supportive policies that come with it help women to achieve balance between childrearing and labor force participation, but the real work remains in dismantling gender norms and the inclusion of the male perspective and role in this balance.

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Endnotes

¹ Note that in this review, I exclude the elements of reproductive health of “satisfying sex life” and the “capability to reproduce”, where the latter may refer to infecundity. These elements of reproductive have a tenuous connection with economic activity relative (where the choice of childlessness differs from infecundity) to the other elements of safety and fertility.

² Note that while the U-shape is observed across countries, there are some exceptions. As detailed by Verick (2014) countries such as India and Turkey should observe higher levels of female labor force participation.

³ Note that the empirical evidence of a quality-quantity trade-off is still ambiguous. For instance, some studies show that there are no negative effects of larger family size on schooling and health outcomes (Black, Devereux, & Salvanes, 2010; Cáceres-Delpiano, 2006; Qian, 2009). Doepke (2015) comments that the reason why the quality-quantity tradeoff may not hold is that most countries offer free public education that reduces the cost of an additional (quality) child. Furthermore, laws against child labor also limit the opportunity cost of a child’s time. Jones (2014) notes that the quality-quantity tradeoff might not hold when child investments are considered club goods (goods that are only used by children) rather than private goods.

⁴ To clarify mediators and moderators for the general audience. A moderator, for example income, is a variable that influences the sign and magnitude of the relationship. In this paper, income is presented as a moderator both within and across countries. For example, lower income countries (and households with lower income within countries), are more likely than richer countries (or than richer households) to experience a positive relationship between fertility and women’s work. A mediator is a variable that explains the relationship between the two variables of interest, fertility and women’s work. For example, teen fertility leads to lower education attainment and lower education attainment leads to a higher likelihood of informal labor market participation.

⁵ This theory digs up an old literature on the economics of fertility (Becker, 1991; Davis & Blake, 1956; Easterlin, 1975; Leibenstein, 1974; Schultz, 1973). The (economic) analyses of fertility, has shown wealth signaling (Ferrara, Chong, & Duryea, 2012) and wealth effects on fertility (Lovenheim & Mumford, 2013). In demography and public health, the effect of women’s work on fertility outcomes has been explored in the case of Ghana (Dodoo et al., 2019), Tanzania (Westeneng & D’Exelle, 2015), and Nigeria (Odutolu, Adedimeji, Odutolu, Baruwa, & Olatidoye, 2003).

⁶ <https://population.un.org/wpp/Graphs/DemographicProfiles/Line/1500>

⁷ Countries are categorized and low-, middle-, and high-income countries by the United Nations and World Bank. <https://millenniumindicators.un.org/unsd/mi/worldbank.htm>

⁸ <https://ourworldindata.org/income-inequality>

⁹ This positive relationship was later questioned and it was suggested that at best the negative relationship between fertility and women’s labor force participation had weakened (Kögel, 2004). More recently, others observed that there is evidence of a mirrored-J shape in the association of fertility and the human development index (a broader measure of development than gross domestic product) (Myrskylae, Kohler, & Billari, 2009), explaining the positive relationship for the most developed countries. But these results may have been over stated according to a more nuanced analysis of the components of the human development index (Harttgen & Vollmer, 2014), leaving the question of the possible positive relationship between fertility and women’s work at high levels of economic development open for ongoing research. In a recent paper (Oshio, 2019) the author is able to use the methods of Kögel (2004) but have the benefit of time on their side and extend the dataset to 2017 (contrasting to Kögel’s 2000 upper bound). With the

addition of the 17 years, over which a number of developed countries became increasingly concerned with both low fertility and labor market gender discrimination, Oshio (2019) finds that there is a positive relationship between fertility and female labor force participation for the 24 OECD countries. To add to this ongoing discussion of a positive relationship between fertility and female labor force participation in high income countries, there is evidence that in the US case that women are having fewer children and working less than their US counterparts at the end of the baby boom (Vere, 2007). Thus, while in this US case the correlation is still positive, the *decrease* in both fertility and female labor supply are in opposition to the policies that are designed to promote, increase, fertility and female labor force participation.

¹⁰ Although Hotchkiss (Hotchkiss, Pitts, & Walker, 2017) finds the opposite in the case of Georgia, USA, where high school graduates suffer about half the motherhood penalty college graduates experience.