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**Article**

## Fertility postponement and labor market outcomes

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# Fertility postponement and labor market outcomes

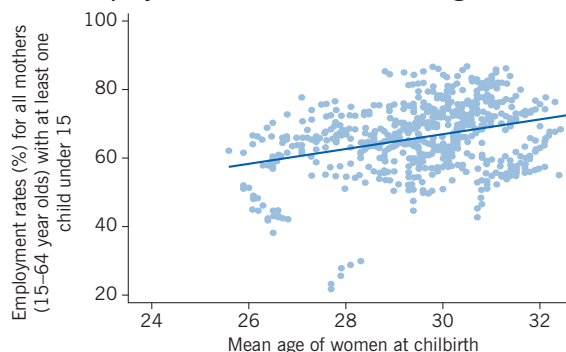
## Postponed childbearing improves women’s labor market outcomes but may reduce overall fertility

Keywords: fertility postponement, labor market outcomes, completed fertility, family-friendly policies

### ELEVATOR PITCH

The rise in the average age of women bearing their first child is a well-established demographic trend in recent decades. Postponed childbearing can have important consequences for the mothers and, at a macro level, for the country in which they live. Research has primarily focused on the effect postponing fertility has on mothers’ labor market outcomes and on the total number of children a woman has in her lifetime. Most research finds that postponing the first birth raises a mother’s labor force participation and wages but may have negative effects on overall fertility, especially in the absence of supportive family-friendly policies.

Mother’s employment increases with her age at childbirth



Note: Each point is a country-year observation. Data refer to an unbalanced panel of 44 OECD countries observed in the 1990–2019 period.  
Source: Based on the OECD Family Indicators database. Online at: <https://www.oecd.org/els/family/database.htm>

### KEY FINDINGS

#### Pros

- + Postponing childbearing helps women accumulate more work experience (human capital).
- + Postponing childbearing strengthens women’s attachment to the labor market and raises wages.
- + Family-friendly policies can mitigate the negative effects of postponing childbearing on total fertility.
- + Egg freezing and in-vitro fertilization may help women who delay motherhood bear children at an older age.

#### Cons

- Postponing childbearing may have negative consequences on women’s total fertility.
- It is difficult to assess the causal effects of postponing childbearing because of unobserved differences among women.
- Differences in the measures of postponement and in the proxies of labor attachment make results from the literature hard to compare.
- Cross-country comparative research is lacking with respect to the impact of family-friendly policies on motherhood wage and employment penalties.
- More research is needed to assess the unintended consequences of egg freezing and in-vitro fertilization, such as further postponement of childbearing.

### AUTHOR’S MAIN MESSAGE

While postponing childbearing may help women accumulate more human capital before having a child, thereby increasing their labor market participation and boosting wages, it may also hinder their fertility plans. While studies find that women who postpone childbearing have stronger labor market attachment and higher wages, they are also more likely to have fewer children. Countries may want to lessen this tradeoff by investing in family-friendly policies. Examples include the provision of public childcare, incentives to private firms to provide childcare services, and promotion of paternal leave policies to improve the gender balance in childrearing.

## MOTIVATION

A steady increasing trend in mean age at childbirth has been observed during the past several decades. Just to cite a few figures from the OECD Family Indicators database, the mean age at childbirth was 27.4 in 2000 and rose to 29.4 in 2017 in the US; it was 28.8 in 2000 and 31.2 in 2019 in Germany; 27.7 in 1990 and 30.6 in 2018 in the UK; and 28.9 in 1990 and 32.1 in 2019 in Italy. As seen in the Illustration on p. 1, cross-country panel data reveal a strong positive association between delayed fertility and female labor force participation. The positive association also extends to individual-level data: women who give birth at an older age generally have better labor market outcomes, with higher employment probabilities (and wages).

The economic literature consistently shows that a wage penalty is associated with motherhood—the “motherhood wage gap.” Women who are mothers can find themselves on a different career path than childless women, one characterized by a fixed wage penalty or even by a wage gap that widens over time because of lower economic returns to labor market experience. This is often referred to as the “mommy track.”

Findings suggest that postponing first childbirth could be an effective strategy to avoid some of the negative labor market consequences of motherhood. If a woman decides to have children after she has progressed toward the top of her career, for instance, she reduces the risk that motherhood will represent an obstacle to future career promotions. These labor market gains may come at a cost, however. Both time series and cross-sectional data show that postponing childbearing may prevent women from achieving their desired family size (desired fertility). Delayed childbearing is generally associated with fewer children per woman, and demographers have hypothesized that postponing childbearing may exacerbate the fertility decline. The negative effect on fertility may stem from biological consequences, as a woman’s fecundity (and that of her partner) declines with age. It may also be caused by stigma effects (the perception that there is a socially acceptable maximum age for becoming a mother) or other consequences of waiting to have children, such as the likelihood that a stable relationship with a partner will break down.

## DISCUSSION OF PROS AND CONS

### The effect of delaying motherhood on women’s labor outcomes

#### *Conceptual model*

Before summarizing the empirical evidence on the effects of delaying motherhood on labor market outcomes, it is important to have some idea of why such an effect is expected in the first place. Figure 1, with wages on the vertical axis and age at motherhood on the horizontal axis, summarizes the main insights of a conceptual framework for understanding why delaying fertility may affect wages and labor supply [1]. The framework incorporates different types of motherhood wage gaps: a fixed cost gap and a flatter wage profile for mothers (the “mommy track”). In both cases, delaying fertility entails higher total lifetime incomes. Giving birth entails a temporary withdrawal from the labor market for women and a proportional wage loss (the wage loss will be greater the lower the maternity leave benefit). After going back to work, women may return to their pre-birth wage level or to a lower level, for instance shifting to part-time work, which often pays lower wages, or doing less overtime work, which pays higher wages, compared to before having a child (the fixed cost of motherhood).

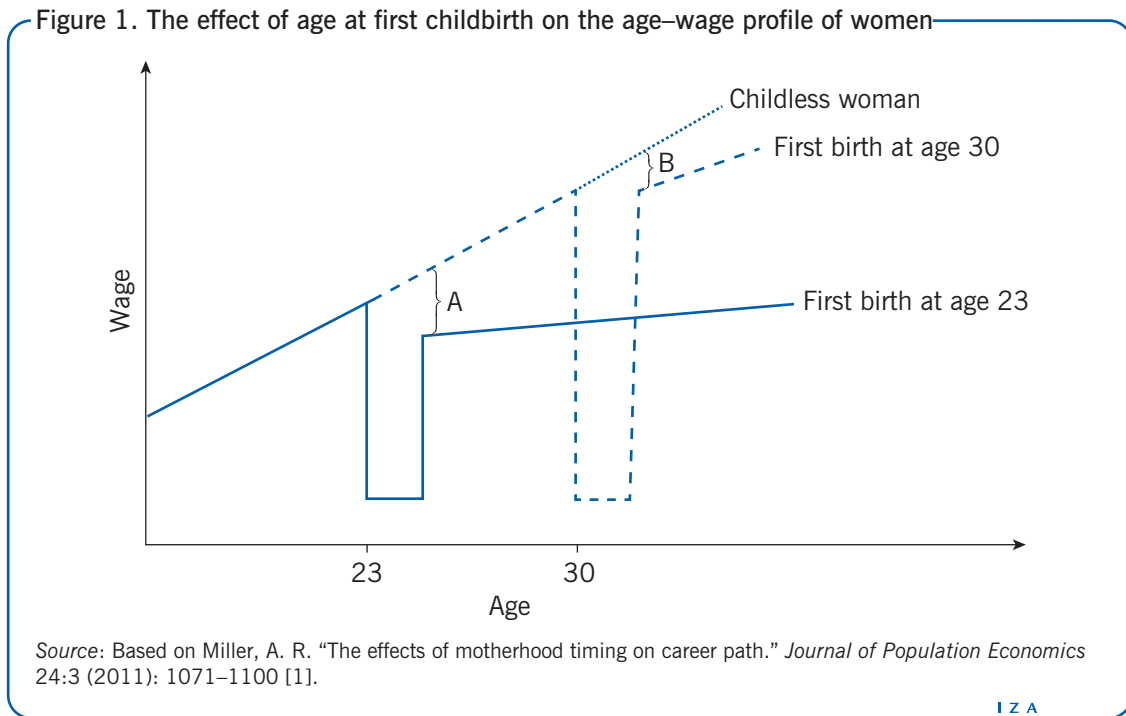


Figure 1 depicts the worst-case scenario for young mothers: a greater fixed cost and a more severe flattening of the age–wage profile. In this case, delaying fertility has a twofold effect:

- (i) First, it increases the re-entry wage level for mothers returning to work after childbirth, resulting in a smaller wage drop compared with women who bear children at a younger age (the difference between the gaps A and B).
- (ii) Second, it implies a smaller reduction in the slope of the wage profile (the return to experience) after re-entry to the labor market, as represented by the relatively steeper post-childbirth wage profile for women giving birth at age 30.

As noted, this represents an extreme case in which women have high economic returns to postponing first birth. However, even when there is only a fixed cost of motherhood (the same “mommy track” for early and late mothers), women will have an incentive to postpone fertility to maximize their labor market income. Following on from this description of how delaying fertility may affect wages, a logical next question is: what are the mechanisms?

The literature agrees in identifying the stock of pre-childbirth human capital (labor market experience) accumulated by women as the main driver of such effects. A higher stock of human capital (i.e. skills and working experience, which raise worker productivity and are valued by employers) implies that even if some of that human capital is lost during a labor market absence, women who delay childbearing retain sufficient skills to prevent their wage profile from flattening too much (e.g. the accumulation of skills can prevent women from being allocated to less complex jobs or having to switch to an employer offering fewer career prospects).

### **Empirical evidence**

In moving from theory to empirical data, identifying the effect of delaying motherhood poses many challenges. Theoretical models of age at first childbirth suggest that fertility timing is

a variable of choice for women (endogenous variable) and that simply comparing the labor market outcomes of younger and older first time mothers is inappropriate. Women in one group may differ from those in the other group in unobservable characteristics, such as propensity for labor market work, desired fertility, and innate ability, which simultaneously affect their fertility and their labor market outcomes. Likewise, women may decide on the timing of their fertility by taking into account the expected costs and benefits on their careers.

Studies fall into two broad categories. One category uses methods that aim to control for potential observed and unobserved differences between early and late mothers. This can be done, for instance, by using panel data on observations of women before and after childbirth, looking at whether later motherhood is associated with a smaller (or no) drop in wage level or with a steeper wage profile after returning to the labor market. The second group of studies uses quasi-experiments. A thought experiment would be to randomly assign women to groups, each of which would have a different age at first childbirth, and then to compare their post-childbirth labor market outcomes. This is clearly unfeasible, and researchers have tried to identify factors that affect fertility timing but are not under a woman's control. Examples include biological fertility shocks, such as miscarriages and stillbirths (already used in the literature examining the effects of teenage pregnancies [2]), contraceptive failures, and infertility. Empirical findings from studies using quasi-experiments are generally considered stronger than those based on controlling for potential observed and unobserved differences between early and late mothers.

### ***Quasi-experimental studies***

The body of literature on the effect of age at motherhood on women's labor market outcomes using quasi-experimental methods is still quite small, largely due to the difficulty of finding good identification strategies. That is a particular problem when both total fertility and fertility timing are modeled.

Most empirical evidence is based on US data drawn from a single survey, the 1979 National Longitudinal Survey of Youth (NLSY79). A study from 2011 uses data on a variety of fertility and infertility shocks, which are likely to shift motherhood timing for women in their 20s and early 30s [1]. After providing reassuring evidence that these shocks can be considered "as good as randomly assigned" (because they do not correlate with observable characteristics that are likely to directly affect women's labor market outcomes), the study shows that delaying motherhood by one year raises women's earnings by 9%, working hours by 6%, and wages by 3%. The positive effects are greater for college graduates and women working in professional and managerial occupations.

Other studies have used data on miscarriages or stillbirths to investigate the effect of motherhood timing. A study for Italy uses cross-section data from a survey of mothers and shows that postponing a woman's first childbirth by one year raises labor force participation by 1.2 percentage points and weekly working hours by about half an hour (2.2%) in the period around childbirth (when children are 18–26 months old) [3].

Miscarriages and stillbirths are also leveraged in a study for Sweden that uses a data set obtained by matching several administrative registers, thereby overcoming measurement error problems related to the under-reporting of fertility shocks [4]. Contrary to the earlier literature, the study finds a negative effect of delaying motherhood on both the long-term income and the wages of highly educated women. The study suggests that one reason

for the difference between the Swedish and previous studies is the higher labor market protection that Sweden provides to mothers compared with other countries (including the US and Italy). In Sweden, family policies are universal and generous, including a long job-protected parental leave (480 days) for the birth of each child, high maternity leave benefit replacement ratios, and the right to reduce working hours by up to 25% until the child turns eight years old. In that context, the study conjectures that the long-term income and wage penalties found for more closely spaced births may stem from the negative signaling about job commitment that some employers infer when a woman has several pregnancies in a short time interval. Other forces may also be at work. Even when the amount of work interruption is comparable, having children spaced more closely may impact a woman's productivity differently than having them at longer intervals, thereby affecting women's future career opportunities differently as well.

### ***Other types of studies***

A few studies use other methods in place of quasi-experiments. Using data from the US NLSY79 and an earlier cohort survey, a study reports evidence suggesting that the wage level of high-ability women rises by 1.1% for each year after age 21 that a woman postpones first childbirth [5]. This evidence is not very robust, however, as the results change when the wage profile is allowed to differ by a woman's age at first childbirth.

A more structured way of investigating the issue is by simultaneously modeling both labor market involvement and fertility (timing and spacing of births) and their reciprocal interactions. Again using data from the US NLSY79, a 2013 study concludes that postponing first childbirth leads to higher pre-childbirth human capital accumulation and reduces the negative effect of the first child on a mother's labor market participation [6]. This study, unlike the Swedish study [4], reports that increasing the time between the first and the second childbirth worsens labor market outcomes for mothers by reducing the probability of working full-time and increasing that of working part-time. The quicker return to the labor market for late mothers whose childbirths are more spaced is thought to come at the price of a reduction in the time devoted to work. The difference in results may derive again from the different institutions in the two countries: Swedish women benefit from a longer paid parental leave, while US women may perceive that staying out of the labor market too long will lower their current income and reduce their future career prospects.

A recent study for Italy combines structural and quasi-experimental methods to investigate the motherhood penalty up to 21 years after school completion [7]. The authors count motherhood postponement from completion of formal education and find that the wage penalty is long-lasting, non-linear, and is minimized when delaying motherhood by seven to nine years from school completion. By contrast, the effect on labor market attachment, measured by yearly fraction of days worked, falls with delayed motherhood. The authors explain this effect with the lower protection enjoyed by younger mothers (i.e. those delaying less), who are pushed to work more even in the presence of young children to avoid harming their future career prospects.

### **The effect of delaying motherhood on women's fertility**

Economic theory suggests that decisions about optimal fertility timing seek to maximize expected utility [8], [9]. This implies that fertility postponement is not a random event,



but is rather a decision women make based on expected costs and benefits. Key reasons for postponing fertility are consumption smoothing and career planning. The consumption smoothing motive implies that women will tend to have children when their income is high enough to smooth consumption over the child-rearing years. The career planning motive suggests that women decide to give birth when it minimizes the negative impact on their careers (i.e. when their income profile is relatively flat). Although most economic models have considered fertility as a deterministic process and have assumed that women control the number and timing of their children, there is substantial uncertainty related to both. Postponing fertility may have consequences for the number of children and for birth spacing. A late age at motherhood may cause lower fertility because of a decline in women's fecundity or because of perceptions of being too old to have children (social stigma).

A negative effect of fertility postponement on total fertility is generally referred to as a "postponement effect" (because young mothers may wait for the second child until it is too late), while a positive effect is called a "catch-up effect" (because older mothers may space children more closely). Both of these are examples of "tempo effects."

There appears to be only one published study that uses quasi-experimental methods to assess the effect of birth postponement on fertility. That study exploits the earlier availability of abortion in Oslo compared to the rest of Norway, finding a positive effect on age at first birth, but no effect on completed fertility. Most evidence is based on descriptive studies (see, for instance, [10]). Only a handful have dealt with the fact that fertility timing is not random but largely chosen by the woman (endogeneity). Seminal studies analyze the case of Sweden, where a catch-up effect is found: women delaying motherhood tend to have more children quickly [11], [12]. The authors address endogeneity by jointly modeling the transitions to different parities. This method allows the authors to account for unobservable individual factors that may influence birth timing.

The same method is used in a study that analyzes postponement effects in Europe [13]. The main message is that tempo effects may differ across countries according to the type of welfare state. Single-country analyses find evidence of postponement effects (a late first childbirth has a negative effect on the likelihood of progressing to a second one) in countries where a traditional male breadwinner model prevails and family-friendly policies are not in place (e.g. Greece, Portugal, and Spain). Catch-up effects (late motherhood positively affects progression to the second child) are found in Denmark, where women are better able to reconcile family and work. When data for all countries are pooled, the probability of a second childbirth by women who came late to motherhood rises with a higher share of part-time job opportunities, longer maternity leave, and higher public spending on childcare (these factors reduce the postponement effects). In other words, tempo effects are expected to vary greatly by country, since countries differ strongly with respect to family-friendly policies.

## LIMITATIONS AND GAPS

The main limitation of existing research stems from the difficulty in finding exogenous sources of variation in fertility timing. Researchers must find factors associated with the postponement of first childbirth that are not under the mother's control and therefore

are not associated with unobserved characteristics affecting both fertility timing and labor market outcomes and, moreover, that affect labor market outcomes only through their effect on fertility timing.

Although recent studies using biological fertility and infertility shocks are an important step toward achieving this goal, relying on such events may still be problematic. There are three main criticisms: First, these events may be under-reported in survey data (measurement error). Second, miscarriages and stillbirths may have a direct impact on women's labor market outcomes, such as through their impact on a woman's health. Third, miscarriages and stillbirths may be non-random and might increase with certain behaviors, such as abusing tobacco or alcohol, not reported in the data (i.e. "unobserved heterogeneity"), or job-related characteristics (e.g. stressful or risky jobs) which directly affect labor market outcomes (reverse causality).

Some studies try to control for women's health status and risky health behaviors [1], [2], [4]. One study uses administrative hospital data to show that women who miscarried and those who did not had only small differences in hospitalization before their first childbirth [4]. That study also uses administrative data to address the second source of criticism by comparing sickness absences from work since childbirth for women who did not miscarry and since miscarriage for women who miscarried. The study finds differences between the two groups in the first five to six years after first birth or miscarriage (women who miscarried had more absences from work, whether because of the health consequences of miscarrying or a health problem that caused the miscarriage) but no long-term differences (total earnings and average wages in the 20 years after childbirth). Other studies that use survey data address this issue simply by including indicators of women's self-reported current health status or health behaviors in the analysis.

The second and third sources of criticism (miscarriages and stillbirths may be non-random and may have a direct impact on women's labor market outcomes) would tend to cause a downward bias in estimates of the effect of delaying motherhood on labor market outcomes, making the effects appear smaller than they really are. This happens because women who have health problems and experience miscarriages tend both to postpone fertility and to have worse labor market outcomes.

As for the first criticism, that survey data may under-report miscarriages (measurement error), a study comparing raw statistics from survey and administrative data does not show evidence of under-reporting [3]. Another study finds that reporting a miscarriage is unrelated to religious beliefs (some women could self-report voluntary abortions as miscarriages or not report it at all) [1]. Using administrative data from inpatient records reduces the risk of errors in self-reporting in survey data [4], but these data are also unlikely to be totally free of measurement error. That is because the number of hospitalizations related to miscarriages falls over time as technological change shifts care from hospitals to outpatient care. One such study looks at whether women who are hospitalized for miscarriages and later have children have more severe health problems than mothers not experiencing miscarriage and finds no evidence of this [4].

A further limitation of studies leveraging miscarriages and stillbirths is that these shocks cause only a limited delay in first childbirth, and therefore studies using incidences of



miscarriages and stillbirths are only able to estimate the effect of delaying childbirth within a narrow time interval [5].

There are even more severe shortcomings with the use of other types of shock. For instance, “unwanted” or “unexpected” births, such as births occurring despite the use of contraceptives, may be related to a woman’s effectiveness in using contraception, which in turn may be correlated with her innate ability and potentially with labor market outcomes (see the discussion in [5]).

As one study points out, women who had children before entering the labor market and those who gave birth after entering it should be analyzed separately, since the effect of delaying childbearing is very different in the two cases [14]. In particular, pooling the two groups leads to an underestimate of the positive return of delaying childbirth for women with some pre-childbirth labor market experience and hides any negative return of delaying childbirth for most women who entered the labor market after having children [14]. The most recent studies reviewed here analyze only women who gave birth after entering the labor market [3], [4].

Another limitation relates to the fact that studies and their estimated effects may not be fully comparable. Indeed, some studies investigate the effect of postponing motherhood considering age at motherhood (e.g. [1], [3]), others the time elapsed since school completion [7], or the time since labor market entry [14]. Moreover, scholars have used very different measures of labor force attachment, such as labor force participation, employment, working hours, or yearly fraction of days worked, making comparisons even harder.

In addition to the difficult task of finding exogenous variation in fertility timing, the main gap in the literature is the lack of comparative cross-country analyses using panel data to explicitly investigate the role of family-friendly policies in shaping the effect of fertility postponement on labor market outcomes. Comparative work would be useful for rationalizing the conflicting results found by some single-country studies. A descriptive study uses EU Statistics on Income and Living Conditions (EU-SILC) data to estimate birth-postponement wage premia across EU countries. The study finds that the wage premium of delaying motherhood turns out to be negatively associated with early formal childcare availability and longer parental leave at country level, and positively associated with cultural and value indicators of more traditional societies.

## SUMMARY AND POLICY ADVICE

What can policymakers learn from the empirical evidence on postponed motherhood and labor market outcomes? First, there is potential tension between motherhood and work. Mothers are generally penalized in the labor market, and this creates incentives for delaying fertility. Second, postponing motherhood helps women reduce the labor market penalties for motherhood but may potentially prevent them from attaining their desired fertility. The role of policies would be in lessening this tradeoff.

Two types of policies could help achieve this goal. One aims to lessen the tradeoff from the labor market side. Policymakers could try to increase mothers’ labor market attachment and lower the motherhood wage penalty using family-friendly policies. These

policies could help women reconcile family and work and thus ease the pressure on women to withdraw from the labor market to have a child. One recent study theoretically investigates the effect of such policies on childlessness and time at first birth [15]. The authors structurally model having children as a “risky project” and delaying motherhood as an irreversible investment. Structural parameters are estimated to match NLSY79 data and show that “The uncertainty surrounding income growth is shown to increase with childbearing, and this increase is stronger for more educated people” [15], p. 1. The authors simulate two different policies, one providing free assisted reproduction technology and another insuring mothers against income risk. While the first lowers childlessness but has no effect on fertility timing, the latter is shown to significantly reduce age at first birth.

Examples of family-friendly policies include public childcare services, incentives for private firms to provide childcare services (through tax deductions, for example), and promotion of paternal leave policies that can improve the gender balance in childrearing. A study in Norway shows that having publicly financed childcare more readily available at the municipal level was related to higher probabilities of making the transition to motherhood at every age. (The central government provided a 50% subsidy for childcare costs and municipalities paid additional subsidies to low-income households.)

A study in the UK shows that the availability of breastfeeding facilities at the workplace was associated with a higher probability of mothers returning to work within four to six months of the birth of a child. As for paternal leave, countries such as Iceland, Norway, and Sweden have adopted “daddy leave” policies. In Iceland, for instance, in an attempt to destigmatize the use of paternity leave, a 2000 law introduced three months of nontransferable parental leave for both mothers and fathers and an additional three months of leave to be shared between parents. As a consequence, some 90% of Icelandic fathers take paternity leave.

A caveat with family-friendly policies is that they create costs for firms, which could backfire on women. Firms may increase labor market discrimination against women of childbearing age or transfer the costs of these policies to their employees in the form of wage cuts.

A second kind of policy deals with the tradeoff from the fertility side. Some firms, such as Apple and Facebook, now offer their female employees financing to cover the costs of egg freezing, allowing—and perhaps encouraging—them to work longer into their fertile years with less fear of reduced fertility. In other countries, egg freezing is increasingly being used as a viable means of reconciling family and work. In Spain, for instance, the percentage of women using egg freezing rose by 61% between 2012 and 2013. Policymakers might consider partly subsidizing in-vitro fertilization of fresh or frozen eggs for childless older women.

However, although these policies may be an attractive (though expensive) way for women to reconcile family and work and for firms to increase the career attachment of women in their childbearing years, they may also have unintended social consequences.

First, successful implantation declines with age. According to a meta-analysis, the success rate after age 40 is 4.3% for slow freezing and 8.6% for vitrification (the newest method). The American Society for Reproductive Medicine cautions that marketing this technology

may generate in women the false belief of being able to overcome the biological limits and encourage further delays in childbearing.

Second, a woman who is living in a stable relationship may decide to postpone childbearing using in-vitro fertilization (IVF), but the relationship may later break down, negatively impacting her desire to have children.

Third, the availability of IVF and the new emerging social norm of late motherhood may increase labor market discrimination against women who decide to have children relatively early, further increasing labor market inequality. Fourth, the availability of IVF technologies *per se* may further increase age at motherhood. For instance, a study on Israeli women has shown that the free availability of IVF introduced in 1994 increased women's age at first birth, which in turn has been found to be associated with lower fertility in other studies.

The full interactions between policies aimed at solving the tradeoff between better labor market outcomes and possibly reduced fertility due to motherhood postponement are far from being fully understood. However, since a powerful driver of delaying childbearing is women's career concerns, provision of public childcare facilities and in general public policies aiming at making childrearing compatible with maternal work have the potential to reduce the negative labor market consequences of an early first childbirth and, therefore, the incentive to postpone maternity.

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### **Competing interests**

The IZA World of Labor project is committed to the IZA Code of Conduct. The author declares to have observed the principles outlined in the code.

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