
**ECTOGENESIS:
AN EFFECTIVE COMPENSATION FOR THE
INJUSTICE OF CHILDBEARING**

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Submitted to
Central European University
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*In partial fulfilment of the requirements for the degree of Master of Art in
Philosophy*

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Vienna, Austria

2024

Abstract

This paper aims to examine the impact of a child's arrival, illustrating how the advent of a child can place the mother in an unjust situation. It explicates why natural gestation and parturition are themselves burdens to women and why the current laws and policies cannot properly compensate for the unequal sacrifices made by women. A gender-just family asks both father and mother should bear relatively equal burdens to their children, and no one should be disadvantaged because of their sex in the process of childbearing and childrearing. However, the biological fact that only women have the function of gestation and parturition is a natural inequality that puts women in a vulnerable position which faces mental and physical risks, the gender pay gap, inferior social status, and diminished career competitiveness in the labour market. Women are disproportionately disadvantaged as a result of childbearing and childrearing when compared with men. Therefore, it is reasonable to incorporate the biological realities of childbearing into the framework of gender justice which provides a ground for redress. To achieve a gender-just society, a promising proposal for effective compensation is ectogenesis, which can provide technical alternatives to replace childbearing.

Keywords: ectogenesis; gender justice; equality of opportunities; childbearing inequality

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Introduction

“You, the reader, from behind the veil of ignorance, are asked whether you would prefer to be born into society A, where women bear all the risks and burdens of gestation and childbirth, as they do now, or society B, where ectogenesis has been perfected and is routinely used. You do not know whether you will be born as a man or a woman. Which would you choose?”

(Smajdor, 2007, p.343)

At the beginning of this essay, I would like to invite readers to think about the above scenario. This thought experiment was proposed by Anna Smajdor in the last paragraph of her paper (2007), and she did not give us a clear answer. This essay will investigate the notion of gender justice within any family that aims to bear children, especially heterosexual families¹. I will specifically examine the impact of a child’s arrival, illustrating how the advent of a child can place the mother in an unjust situation. I will explicate why natural gestation and parturition are themselves burdens to women² and why the current laws and policies cannot compensate for the unequal sacrifices made by women. I argue that ectogenesis as a technical alternative is an effective compensation for the injustice of childbearing, and it can improve gender justice within a family. Therefore, my answer for the scenario is that society B is more just and therefore more desirable.

Ectogenesis is commonly defined as the process of developing and sustaining an organism outside the natural environment of the womb. It involves the use of artificial

¹ A woman who gives birth to a child in a lesbian family may also suffer injustice due to gestation and a trans man who has the function of gestation falls within the scope of my argument as well.

² All references to “woman” in this essay exclusively pertain to an individual who possesses the female biological function of reproduction, including trans men who have female reproductive organs. Gender identity is beyond the purview of this essay.

means to support the growth and development of the organism. “Ecto” means outside and “genesis” means origin. Broadly speaking, it refers to the complete gestation of a fetus outside of the uterus. Glass womb, biobag, or incubator are often used to describe the fetus’ container. Ectogenesis itself is not a new topic, it first appeared in a biological discussion given by J.B.S. Haldane at the Heretics Society of the University of Cambridge in 1923 and has since been used in numerous literary works³. Followed by the concept, relevant technology has significantly developed. Lamb fetuses and mice can successfully live outside of their mother’s biological wombs⁴ and fetuses after 20 weeks can also keep alive in an incubator until delivery. It is the law that forbids embryos in vitro beyond 14 days, but not the technology itself unable to support the embryos growing outside of their mother's body⁵.

Even though it may seem very unrealistic from legal and practical perspectives, in the areas of medical ethics, bioethics and feminism, ectogenesis as a possible alternative reproduction choice for women has gone through three periods of debates in the last 100 years. In the 1920s to 1930s, J.B.S. Haldane (1923), George Bernard Shaw (1923), Dora Russell (1925) and Aldous Huxley (1932) were involved in this discussion. They believed that it was scientists’ duty to develop ectogenic technology which is freeing women from the necessity of pregnancy, since it could balance the power mechanism

³ In 1923, J.B.S. Haldane, an English biologist who was among the first people to propose that an egg could be fertilized outside of the womb. Haldane, B.S. (1925). *Daedalus or Science and the Future*; Huxley, A. (1932). *Brave New World*. Piercy, M. (1999) *The Matrix*.

⁴ The earliest examples of ectogenesis started in the 1950s in Europe, Canada and the United States. In recent years, mouse endometrial cells were procured and seeded successfully onto a collagen scaffold at Weill Cornell Medical College, 2003. The first baby was born from a transplanted uterus in Sweden, 2014. a pre-viable lamb fetus alive in a prototype artificial womb for four weeks at the Children’s Hospital of Philadelphia, 2017. (Unno, 2000; Kendal, 2015; Romanis, 2021)

⁵ In many countries, it is illegal to keep embryos in vitro over 14 days. See Human Fertilisation and Embryology Act 1990.

between men and women. Opponents such as Anthony Ludovici (1924), Vera Brittain (1929) and John Bernal (1929) expressed their worries that ectogenesis would not only corrupt the natural roles that women are supposed to play, but also could be misused by dictatorship to control reproductive power. In the 1970s to 1980s, feminists represented by Shulamith Firestone sparked the debate again. The oppression women suffered has been directly attributed to the biological inequality that it is women and not men who give birth to babies. The original division of reproductive labour directly caused the general division of labour in gender, which in turn laid the root for further division into cultural and economic classes. Therefore, Firestone argued that “the end goal of feminist revolution must be not just the elimination of male privilege but of the sex distinction itself” (1970, p.12). During this round of discussion, the focus is on whether this technology would bring liberation or oppression. Later, Peter Singer and Deane Walls (1985) drove this debate into bioethics. They put forward five arguments which aim to prove that ectogenesis is ethically desirable and also involve equality concerns in this discussion. According to them, ectogenesis can: 1) raise the chance of premature baby’s survival; 2) offer an alternative way for women who are infertile; 3) create reproductive equality; 4) free children from the constraints of possessive mothering; 5) provide an alternative way of organ transplantation (1985). On the other side, Julien Murphy (1989) strongly rejected ectogenesis, since it would violate women’s reproductive rights and lead to an unequal distribution of medical resources. After entering the 21st century, the exploration of this topic has become more detailed: the concern of the “maternal-fetal conflict” (Romanis et al., 2021); the impact upon future

“ecto-children”; a relevant new set of legal principles (Hammond-Browning, 2018); the fetus’s status of “personhood” (Steiger, 2010) and so on.

Compared to the various interpretations of ectogenesis mentioned above, this essay aims to thoroughly investigate what burdens one must bear to become a mother by natural gestation in our society and it is only a unilateral burden on women, therefore, from an egalitarian perspective that the advent of a biological child can place the mother in an unjust situation.

My argument is based on the idea of ‘equality of opportunity’ which asks for treating people equally and no one should be disadvantaged by their gender, race, or social background. Inequality can be justified if and only if there is fair competition. Equality of opportunity can ensure that “people’s fate is determined by their choices—by the decisions they make about how to lead their lives—not by the circumstances which they happen to find themselves in” (Kymlicka, 2002, p.59). In the case of being a parent, disadvantages between parents and non-parents are *prima facie* fair since being a parent is a choice. However, pregnancy and childbirth place burdens solely on mothers⁶, while biological sex is not determined by individuals. Therefore, the differing disadvantages faced by fathers and mothers are *prima facie* unjust since they both made the same choice. The main point of justice here is that people with the same ambitions should face the same costs. If the father holds the same ambition to have a biological child with the mother, then both of them should fairly share their burdens.

⁶ My focus is on any family that decides to procreate children, either in heterosexual or homosexual families. In our society, most cases are heterosexual couples, but lesbian couples will meet exactly the same problems. In lesbian families, there might be two mothers. I use the term “father” and “mother” simply to highlight the biological relationship between parents and their children. “Mother” is the one who was pregnant and gave birth to the child, while “father” is the one who did not experience the series of bodily changes.

In this essay, I will specifically tackle burdens coming from pregnancy and childbirth and illustrate how those burdens create disadvantages for women and continue to have a negative impact during the childrearing process. Furthermore, our current policies inadequately address and compensate for these issues. Building upon these considerations, and for the sake of gender justice, I advocate for an alternative compensation strategy: state-sponsored ectogenesis.

The structure of my thesis is as follows: In Chapter 1, I first introduce three approaches to gender justice, including equality of sharing childcare responsibilities, equality of capabilities, and equality of opportunity. I argue that gender justice requires that people with the same ambitions should face the same costs. The father and mother share the same ambition to be a parent, therefore, they should equally share the burdens of having a child. In Chapter 2, I investigate why pregnancy and childbirth unfairly disadvantage women. The biological fact that only women can be pregnant is followed by three burdens among inherent risks, financial vulnerability and unequal opportunities, which is brute luck for women. It is reasonable to incorporate the biological realities of childbearing into the framework of gender justice.

Chapter 3 focuses on the insufficiency of current care-support policies. If we examine current care-supporting policies, broadly speaking, there are only two methods to compensate for women in the process of pregnancy and childbirth, medical care and monetary compensation. Even though we did a much better job than hundreds of years ago, medical care still can't totally eliminate inherent risks and physical uncomfortable during pregnancy. The burden is still there, as long as women are the only carriers of

pregnancy and childbirth. Monetary compensation seems to benefit women that they can have income during maternity leave. But the problem is, the longer women leave their full-time jobs, the fewer opportunities and capabilities they have for it. The financial vulnerability burden is positively correlated with the duration and amount of monetary compensation. Moreover, it will cause the path-dependency and statistical discrimination, which I will explain later. Considering those inadequate compensations for women's suffering being mothers, it is morally desirable to find an alternative way which can effectively compensate for the injustice of childbearing. I argue that a promising proposal is a state-sponsored ectogenesis.

The main idea in Chapter 4 is how ectogenesis can improve injustice. I will provide three benefits which ectogenesis can bring to women. First, it can completely avoid reproductive risks and prevent mothers from facing various health threats; second, it can provide women equal free time and energy as men which makes it possible to eliminate the child penalties for women; ultimately, it can dismantle the metaphor that associates women solely with fertility.

At last, I will respond to three objections — the best-interest strategy of children, the value of bonding between children and mothers, and whether it will create new injustice between ectogenesis women and physical pregnancy women. For the child-centered objection, I argue that it is acceptable to trade off the benefits between mother and children, as long as the sacrifice of the mother significantly outweighs the benefits accrued by the child. For the valuable bonding objection, I respond that the bond established between the child and the mother through pregnancy is not necessary nor

sufficient, considering parents have hundreds of alternatives to build bonding with their children, losing one of the options such as pregnancy is not a big issue. Moreover, pregnancy actually hinders the involvement of the father, and we should exclude privileged options and ensure both father and mother have the same opportunity to build a bond. From a gender-just perspective, ectogenesis can provide fathers with the same opportunities as mothers to bond with their children, which is more desirable. For the third objection, I argue that ectogenesis and physical pregnancy can coexist without discrimination. Women who choose natural reproduction will only be seen as choosing a specific lifestyle, society should still provide sufficient compensation for her choice. Therefore, they will not be disadvantaged.

To present clearly, my arguments are as follows:

P1 Typically having a child is a joint decision of a family: both father and mother have the same ambition—to have a child.

P2 No one should not be disadvantaged because of their sex in the process of childbearing and childrearing.

C1 People who have the same ambitions should face some burdens. Both father and mother should take on relatively equal burdens for their children;

P3 Empirical facts show that the mother is the sole side who suffers a worldwide child penalty⁷ — either in physical harm or career opportunities — they are disproportionately disadvantaged in the process of childbearing and childrearing.

C2 The biological fact that only biological women can experience gestation and

⁷ See Kleven, H., Landais, C. and Mariante, G.L. (2023). The Child Penalty Atlas.

parturition should be seen as brute luck which provides a ground for redress.

P4 The existing compensation policies cannot fully compensate for the losses (healthy risks/ financial vulnerability/ reduced opportunities) suffered by women as the sole ones who experienced gestation and parturition.

P5 Justice of egalitarianism asks for full compensation for those in a disadvantaged position caused by brute luck

C3 The technology of ectogenesis should be encouraged to develop and select among alternatives.

In a word, the thesis is from a luck egalitarianism perspective to investigate whether ectogenesis is morally required.

Chapter 1 Gender Justice and Equality of Opportunity

In this chapter, I introduce three different ways to understand gender justice and argue for the conclusion that a gender—just society must require fair sharing of reproductive burdens, which means the cost of being a biological parent should be equally separated for both mother and father, no one should be disadvantaged just because of her biological sex.

In section 1.1, I first introduce Nancy Fraser's argument about equality of sharing childcare responsibilities. I argue that this theory not only disregards different people's preferences, but also takes women's solely workload during pregnancy and childbirth for granted. In the last, it is ambiguous and cannot provide a guideline for gender justice. In section 1.2, I introduce another theory of equality of capabilities. According to this, gender justice is about a comparison between men and women on the dimension of capabilities—which leads to real freedom to choose the kind of life one has reason to value (Sen, 2004; Robeyns, 2007). However, capability theory is very individual determined which cannot become a normative theory. Besides these two arguments, in section 1.3, a more attractive theory is equality of opportunity, which argues that people with the same ambitions should face the same costs. The father and mother share the same ambition to be a parent, therefore, they should equally share the burdens of having a child. Gender justice in my thesis is based on this theory, which focuses on those disproportionate burdens that fall on women.

1.1 Equality of Sharing Childcare Responsibilities

When thinking about gender justice, the first issue is to figure out “justice for what?”. The empirical literature provides evidence that women are disadvantaged in economics, politics, labour market participation, and top positions when compared with men (Allen, 2008; Becker, 1991; Fraser, 1994; Porter, 2015). As a result, women are suffering child penalties, double shifts, the gender pay gap, and so on. If the purpose is to create a gender—just society, which inequalities among the above should be changed or compensated in the name of justice? Philosophers provide different approaches to solve this problem. Some feminists argue that gender justice is about equal sharing of childcare responsibilities (Fraser, 1994). According to this view, women and men should equally share the paid work and caregiving.

The justice of traditional gender-constructed families has been questioned in the last century. The traditional gender division of labour has been argued in many literatures to be an unjust social norm. Justice should not only be considered in public life, but also within the family because the family is a crucial determinant of each member’s opportunities in life and of what they can become (Okin, 1989). One of the most important inequalities between women and men is the division of labour between breadwinning and caregiving. Traditionally, men are expected to be the primary earners, while women are tasked with unpaid domestic labour and caregiving. This division not only limits women’s economic opportunities but also reinforces a gendered hierarchy that undervalues women’s contributions both in the home and the labour market. Fraser advocates for dismantling this division and ensuring that both men and women can

participate equally in paid work and caregiving roles (1994).

However, this equal-sharing framework has three problems in practise. Firstly, it disregards different people's preferences. If a father happens to enjoy working while a mother enjoys being a full-time mother, then it is difficult to claim that forcing the father to take 50% of childcare work and forcing the mother to go out and find a part-time job is what justice demands. Secondly, this theory did not take into account the biological inequality of the reproductive system between women and men. It only focuses on the childcare workload, while the workload during pregnancy and childbirth which solely belongs to women is taken for granted. Thirdly, what exactly does this equal sharing mean? Does it mean the father and mother should split the childrearing work 50/50, or spend equal time on care work? Both of them may be problematic.

For instance, my partner and I both have a full-time job and we have a child. Suppose I hate to cook but fine with laundry and cleaning, and my partner is fine with cooking. Therefore, it is a *prima facie* equal-split for us that he takes over all the cooking work, and I do all the laundry and cleaning. However, laundry and cleaning can be done at any time in a day, in which I do not have to sacrifice my working time; while cooking for a child has a relatively strict time requirement. In most cases, preparing a proper lunch would interrupt a full-time job work shift and preparing a dinner in time means he cannot work overtime or work in night shift. A trade-off must be made here, either to find a job which is compatible with his domestic duties or if he is not lucky enough, he can only stay at home and be a househusband. The similar workloads to cooking include picking up children from school, sending children to after-school classes, and

telling children bedtime stories, all have high demands for timeliness. Parents who take over these workloads must face the challenge of how to balance their career/own life and childrearing. Considering this, even though we made this decision autonomously and it seems in accordance with our preference, the cooking—laundry arrangement is unfair because one party sacrifices more than another. Therefore, equality of sharing childcare responsibility itself is ambiguous and cannot provide us with a clear and useful tool to analyse gender justice.

1.2 Equality of Capabilities

Another way to approach a gender-just society is the proposal of equality of capabilities. It is not very clear what capability theory is, while Amartya Sen is usually considered to provide a general normative framework for capability theory. According to Sen, the equality of primary goods or resources is not adequate to fulfil justice, since there is arbitrariness of conversion from primary goods into freedom when different people use their resources. Therefore, Sen suggests that a just society must be based on the actual freedom enjoyed by different persons in which they can value their own possible divergent objectives, and he also argues that to practise freedom needs a set of capabilities that can lead to a desirable life (1990). In this view, primary goods and resources are only the means to freedom, only equal capabilities to achieve freedom can lead to justice. In the case of gender injustice, if women are disadvantaged, it is not because they have less income nor fewer opportunities than men, but because they have

fewer sets of capabilities to choose a kind of life they have reason to value. Capabilities, what people are able to do and be according to their choices, are central to assessing quality of life.

However, this interpretation follows with questions: which capabilities matter for justice? Are there any primary capabilities necessary for everyone? Is there a special capabilities list that a just society can make sure all its citizens can reach a minimum level of these capabilities? Martha Nussbaum believes that there is a list with ten capabilities, such as bodily health, imagination, emotions, play, etc., which are basic requirements of a dignified life (2003). On the contrary, Sen hesitates to endorse a specific list of capabilities. His reluctance stems from his belief that the selection of important capabilities should be left to the democratic process within each society. He argues that a predefined list might overlook important local variations and cultural differences (1990, 1992). I subscribe to Sen's argument and suggest it is very difficult to analyse gender injustice by using the capability view.

According to the capability view, gender justice asks for the equality of capability sets between men and women, and both of them should have the same capabilities to do and be what valuable for them. It seems to encourage women and men to develop their capabilities equally but it only works when women and men have the same purpose. For instance, men should develop their childcare skills as good as women, and women should be as professional as men in the labour market.

However, the principle of capabilities theory is based on individual values. Which capability matters depends on individual preference. Some people think the capability

of having children is valuable, and they will be worse off if they lose this capability. While others believe it is a good thing to be infertile. There is no way to generally justify which capability is for justice. Therefore, the equality of capability theory is not suitable for us to analyse gender justice problems.

1.3 Equality of Opportunity

Except the equality of sharing childcare responsibilities and capabilities, another way to approach gender justice is the theory of equality of opportunity. The framework I will use mainly comes from Ronald Dworkin's theory of justice, which emphasizes that individuals should have equal resources and then be free to use these resources as they see fit, rather than merely equal welfare or outcomes (1981). Considering the starting points of each individual are different, Dworkin distinguished "ambitions" and "endowments": the first refers to personal choices and the latter indicates the results of brute luck over which people have no control (1981). It can be justified when the inequality comes from different ambitions, while the inequality caused by different endowments needs to be compensated. As Dworkin rightly asserts: "We must not allow the distribution of resources at any moment to be endowment-sensitive, that is, to be affected by differences in ability of the sort that produce income differences in a laissez-faire economy among people with the same ambitions" (1981, p.311).

Applied this principle to the case of reproduction, the father and mother share the same ambition to be a parent, therefore, people with the same ambitions should face the

same costs. If the father holds the same ambition to have a biological child with the mother, then both of them should fairly share their burdens. However, in reality, because of the different biological reproductive systems, women bear the entire burdens of pregnancy and childbirth and men do not need to make any physical effort to do so. Being a parent is a choice while being a mother is only brute luck, in this sense, women should not take those burdens for granted and the differing disadvantages faced by fathers and mothers are *prima facie* unjust since they both made the same choice. As Kendal claims no one can be directly blamed, but “deliberate attempts to forestall or prevent the development of equalising alternatives can be considered ethically questionable” (Kendal, 2015, p.45). It is morally required to compensate for women’s unjust suffering.

Burdens of reproduction for women are reflected in both childbearing and childrearing. It is obvious that during the process of pregnancy and childbirth, men and women submit unequal physical and psychological risks to be biological parents. A man can become a father while maintaining complete bodily integrity, physical health, freedom of movement, and privacy. It makes no sense to use nature or biological determinism to justify this inequality. The impact of the burden during childbearing continues until childrearing, which reflects on the inequality of opportunities, including but not limited to the opportunity to return to the workplace, the opportunity for promotion, the energy used for work, and the income in the same position. After a child is born, women’s career opportunities also decrease accordingly. Their competitiveness in the workplace and their promotion opportunities will significantly decrease

compared to men. The worldwide fact is that “women’s social, educational and occupational development are often de-prioritised as a result of their reproductive capacity” (Kendal, 2015, p.113). Actually, not only men but society as a whole benefit from women’s reproductive labour, yet the individual woman bears the burdens alone. A gender-just society must require fair sharing of reproductive burdens, which means being a parent should not be disadvantaged just because of her biological sex.

Maybe one more thing that needs to be mentioned is that someone may argue that although one partner put her career on the back burner to raise children, while the other one has a good career, it is just as long as both members of the couple share equally the benefits of the flourishing career. Many philosophers have responded to this statement: it may lead to a “downward spiral of asymmetric vulnerability” (Okin, 1989; Fraser, 1994; Gheaus, 2011). The vulnerable side will be completely economically dependent on her/his partner and this economic dependence will cause powerlessness in major decision-making. It will give the economically dominating side some unacceptable control over his/her partner’s life. Okin suggests that one possible way to solve the vulnerability of housewives is that 50% of the husband’s income can go directly to the wife’s bank account. It seems that the wife can share their family’s financial benefits equally, but the truth is, this equality is temporary and in the condition of their marital relationship. Once the husband files for divorce, the wife will immediately lose her income and, due to her lack of work experience, she is in a very disadvantaged position in the job market. Their vulnerability is reflected in their reliance on savings and lack of competitiveness in the labour market. I will illustrate this point later in Chapter 2,

and the point here is that those burdens coming from the female reproductive system caused fewer opportunities for women compared with men. It is easier for a man to withdraw from his job and go back to rear his child than a woman to step out of her family and find a job in the labour market.

Therefore, I argue to reach a gender-just society, the very least requirement is that the cost of being a biological parent should be equally separated for both mother and father, nobody has to take on more burdens than the other. Society as a whole benefiting from women's reproductive ability is actually systematically overburdening women, which needs proper compensation to make sure they have the same opportunities as men to develop their professional skills, participate in public life and flourish.

Chapter 2 Why Pregnancy and Childbirth Unfairly Disadvantage Women

In this chapter, I investigate three burdens that pregnancy and childbirth bring to women. Now when we examine the division of child-related workload within a family, a prominent phenomenon is that women solely take all the workload of childbearing. Women will experience inherent risks, financial vulnerability and unequal opportunities once they decide to give birth to a biological child. Section 2.1 is about inherent risks, which are vastly unequal for women and men. Section 2.2 is about financial vulnerability, since the natural way of childbearing takes women away from the labour market inevitably and causes a worldwide child penalty for women. In section 2.3, I introduce women's reproductive capacity is usually associated with opportunity inequality. Women have a much higher opportunity cost for having a child, while men barely have any.

All the above three burdens are borne solely by women, It is a biological fact that fetuses can only be gestated in women's bodies. However, to have a biological child, the father basically does not need to put any effort into it except the sexual intercourse. Normally, after the baby is born, the father is assumed to have the same parental right to the child as the mother, without suffering or taking any risks. In this sense, pregnancy and childbirth are unjust since they lead to physical, financial and opportunity burdens only for women while men naturally escape from all these sufferings. Given these considerations, it is reasonable to incorporate the biological realities of childbearing into the framework of gender justice.

2.1 Inherent Risks

The widely recognized physical risks of pregnancy and childbirth for women include gestational diabetes, hypertension, pre-eclampsia, postpartum depression, autoimmune disorder, ectopic pregnancy, caesarean section risks, and high maternal mortality in some undeveloped areas. Not to mention that all women may experience a variety of common bodily changes during the process: nausea, fatigue, frequent urination, melasma, varicose veins, stretch marks, swelling, back pain, joint and ligament pain, hormone changes, vaginal tearing, and labour pains. On the contrary, Fathers can still keep healthy, body integrity, and have freedom of movement.

Some may argue that giving birth to a child is a voluntary choice for women instead of a forced one. If it is true, that women choose to accept the risks involved by themselves should not be complained about. Gheaus claims that “in a just society nobody has to systematically take on more burdens than others — unless they freely choose to and are offered proper compensation” (2011, p.5). To respond to this objection, first of all, we don’t have proper compensation for the above risks until now. Even though pregnancy is not considered an illness or disability, the discomfort symptoms, high risks to health, and pain it brings still make it a special physical condition. While our modern medicine can release pain and decrease the risks to a certain extent, however, it is still far away from “proper” compensation: it cannot remedy the fact that “these processes impose risks on women that far exceed the risks of normal day-to-day living” (Smajdor, 2007, p.340). Compared with men’s zero risk of reproduction, women’s risks are still significantly high.

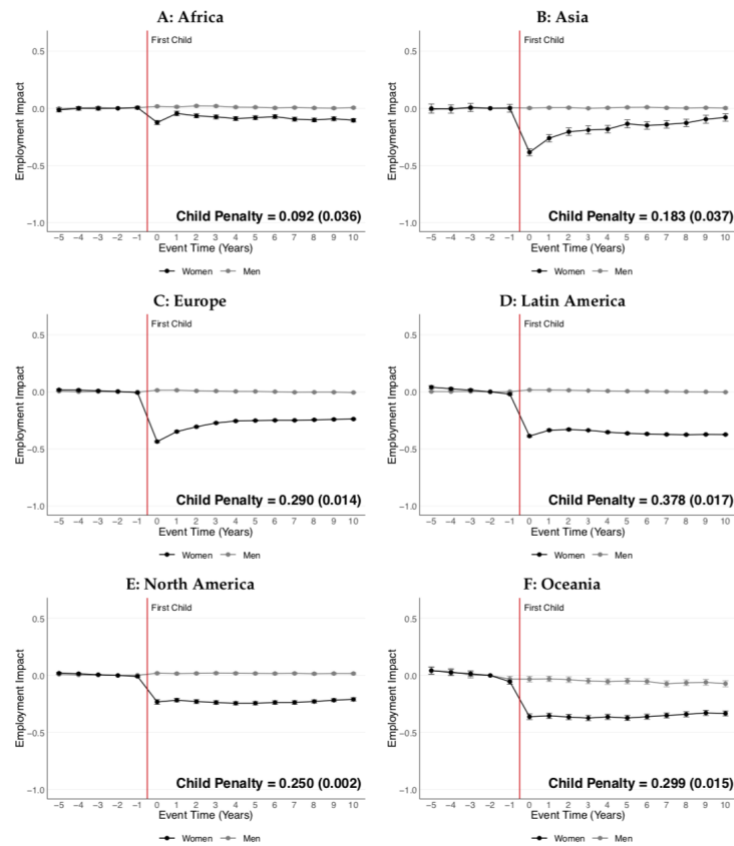
Secondly, voluntary risk cannot justify unequal burdens. In the case of deciding to have a biological child, it is not that a woman chooses to be a mother, therefore she must accept the risks involved; but she had brute luck and became a woman, therefore she has no choice but to take over all the risks as a mother. I will provide an example to illustrate the difference here.

Suppose David and Jenny are on an island. David was born knowing how to swim, while Jenny does not know how to swim. They discover that there are many coconut trees on the other side of the island, and both of them want to eat coconuts, so they decide to go to the other side of the island together. However, to reach the coconut grove, they must cross a river. For David, swimming across the river is as easy as walking; he effortlessly swims across the river. But for Jenny, she needs tools, such as a life buoy, to help her cross the river. Even so, she might still choke on water. There is no doubt that the danger of crossing the river is entirely different for David and Jenny. It seems that picking coconuts is Jenny's decision, so she should be responsible for the risk of crossing the river. But if swimming is an inherent skill that cannot be learned later, would we still think Jenny should bear the responsibility? Since she does not get to choose whether or not she can be born with the skill, it is only a matter of brute luck whether she becomes David, who can swim, or Jenny, who cannot. In this situation, Jennys have fewer personal resources holding, which systematically puts them at a disadvantage. In the context of being a parent, the inherent risks are vastly unequal for women and men.

2.2 Financial Vulnerability

The financial vulnerability stems from temporary withdrawal from the labour market for the sake of childbirth and the possibility of extending maternity leave in order to childrearing. In the current situation, several months' leave due to childbirth is necessary, there is no option to avoid it. Kendal notes that “any length of time spent away from work impacts financial security and independent, however briefly” (2015, p.14). Recent empirical data shows that in 134 countries which cover 95% of the global population, there are “clear and sizable child penalties in which men and women follow parallel trends before parenthood, but diverge sharply and persistently after having children” (Kleven & Landais & Mariante, 2023). The graphic below presents that in all 134 countries, women's salaries have sharply dropped from the moment of pregnancy and fell to the lowest point at the moment when the child is born, then women start to catch up but unfortunately, they cannot eliminate the child penalties in the next 10 years.

FIGURE 5: CHILD PENALTIES BY CONTINENT



(from Kleven & Landais & Mariante, 2023, p.28⁸)

In this graphic, the vertical red line is the moment of pregnancy of the first child, and numbers on the horizontal axis indicate the age of the first child. Zero means the moment of the first child's childbirth. It is not difficult to notice that in the whole world, women and men have equal income before they have children, even in Latin America and Oceania, women earn a little bit more than men. However, once they decide to have children, the pay gap between men and women starts. It comes out several months before the moment of pregnancy and rapidly drops to its lowest point at the moment of parturition, and then slightly rebounds but never catches up. The

⁸ All data can be seen Kleven, H., Landais, C. and Mariante's paper, *The Child Penalty Atlas*, 2023.

very impressive fact is that there is no exception. No matter in North Europe or East Asia, no matter in developed countries or less developed countries, all women suffer child penalties, and for most of them, once the gender pay gap begins, it lasts until at least 10 years as the survey covers.

Child penalties made women financially vulnerable. Although many people insist that child penalties for women are due to childrearing rather than pregnancy itself, it is the gender norm, social expectation or women's own choices cause the long-term penalties. I argue that pregnancy and childbirth lay down the foundation for the gender division of labour. The natural way of childbearing takes women away from the labour market inevitably. No matter how short this period is, it will leave women lagging behind, compared with men who can still work in full-time shifts. Moreover, the ability to become pregnant makes it "easier for them to slip uncritically into domesticity after childbirth, perpetuating an unequal distribution of the burdens of childrearing" (Kendal, 2015, p.15). Only women can pregnant reinforces the stereotype that women should be the primary caregivers, and as a primary caregiver, it further exacerbates women's financial vulnerability. Because time and energy are limited resources, once women take on more childcare and domestic work, they have less time and energy to invest in paid employment (Allen, 2008; Becker, 1991).

The fact that having a child will greatly increase the amount of domestic workload is not a problem, as long as it is equally distributed to both the father and mother. The problem is that the mother must take all the workload of childbearing, and they cannot allocate their time and energy in the labour market the same as the

father during this time. Therefore, they face the risk of losing opportunities and promotions which will have a lasting impact on women's financial potential.

2.3 Inequality of Opportunity

Women's reproductive capacity is usually associated with opportunity inequality. First of all, the pronatalist culture encourages women to "postpone or entirely abandon other life goals in order to devote themselves to achieving the socially condoned ideal of motherhood" (Kendal, 2015, p.9), regardless of their personal preference. Under this pressure, women either obey social expectations to pursue motherhood but limit their future opportunities, or choose to postpone childbearing which may higher the risks or elect to remain childless. Both choices provide fewer opportunities for a human to flourish.

Secondly, the ability of pregnancy "has historically been an excuse for denying women equal employment opportunity" (Kendal, 2015, p.16). Each woman is seen as a potential mother, regardless of their own intention. In the eyes of the employers, each woman may take years break due to maternity leave. In this sense, the labour market prefers to hire a man, especially in some important positions.

Thirdly, pregnancy as a physical burden leads to different opportunity costs between women and men. As an economic terminology, opportunity cost refers to the value of the best alternative abandoned options. Because resources are limited, such as time and money, if one person spends time on a certain thing, she cannot use this time

to do other things. The value of other benefits is opportunity cost and needs to be assessed in the overall decision-making process. The inequality of having a biological child between the father and mother reflects on the different opportunity costs. Specifically speaking, women have to give up the freedom of their bodies, the flourishing of their careers, and lifestyles in terms of the fetus's benefits. On the contrary, men's opportunity costs of having a biological child are significantly lower than women's.

For example, except for physical pain and risks, women are also expected to change their diet and lifestyle once they are pregnant. Smoke, alcohol, caffeine, and sashimi are strongly suggested to be avoided, while some vegetables and fruits that are good for the fetus are recommended for women, regardless of their preferences. The loss of utility caused by not being able to eat the food a woman likes is her opportunity cost, since she sacrifices her utility for the sake of her child's benefit. On the contrary, the child's father can still have the freedom of diet to eat whatever he likes. In a word, women have a much higher opportunity cost for having a child, while men barely have any.

Some egalitarianists may argue that fathers should also stop smoking or drinking while their wives are pregnant. They should also adapt their lifestyles with their wives. Luck egalitarianism requires fathers to share these burdens with mothers. It is true, if there is no alternative option, otherwise, it is only levelling down, because men decreased their utility while no one benefited from it.

Until now, three burdens associated with childbearing have become evident: one

pertains to the intrinsic risks of gestation and parturition, another reflects on the significant pay gap between the mother and father, and the third one involves the unequal opportunities in career, life, and childcare disadvantages that women encounter. Although these three types of burdens have had a significant impact on women's lives over the past decades and disadvantaged women's flourishing as human beings, it has still been taken for granted as women's fate just because nature creates women in this way. However, this biological fact cannot justify itself in the name of nature. The significance of civilization and development is to compensate those who are not treated equally in nature.

Modern medicine aims to release bodily pain and reduce the risks, and it "is premised on fighting against our nature and biological shortcomings, particularly our 'natural' susceptibility to disease and the inevitability of death" (Kendal, 2015, p.44). Therefore, practising justice includes helping those biological shortcomings to have equal resources or share equal costs in a certain thing, by medicine, technology or any tool that can achieve our goal. Firestone (1970), Smajdor (2007) and Kendal (2015) expressed the elimination of natural gestation can provide women with completely equal opportunities and keep their bodily integrity as men do.

If having a biological child must take some risks, justice asks for an equal share of risks among people who have the same ambition. In this sense, pregnancy and childbirth are unjust since they lead to physical, financial and opportunity burdens only for women while men naturally escape from all these sufferings. Given these considerations, proper compensation for women is morally required.

Chapter 3 The Existing Care-supporting Policies Are Not Good Enough

In this chapter, I explore the current care-supporting policies from a general perspective. I simplified the existing policies into two categories: 1) medical care and 2) monetary compensation. Medical care can partially compensate for the burden of inherent risks and monetary compensation can partially compensate for the burden of financial vulnerability. However, in section 3.1, I point out that medical care in some sense may face an interests conflict between the mother and the fetus, and common sense is to sacrifice the mother's interests for the sake of the fetus. In section 3.2, I indicate that monetary compensation may work in a short time, while creating negative effects in a long term, which is reflected in the path-dependency and statistical discrimination. I argue that neither of them can provide effective compensation for women's three burdens from childbearing. Therefore, we need an alternative technology which can fully free women from biological inequalities.

3.1 Medical Care

In modern society, more and more women-supported policies have been enacted. To protect women's interest in the labour market, we have laws against gender discrimination, financial support to raise children, stipends during parental leave, and father-involved parental leave. Such gender-egalitarian interventions aim to

compensate and remedy women who suffer disadvantages in the gender division of labour. Leaving aside the significant differences in these policies across different countries, even if we only focus on the most developed countries in Europe and North America, the aforementioned burdens on women still exist. Moreover, the debates on care-supporting policies are intensive, many policies have been criticized for incentivising women to withdraw from the labour market.

Broadly speaking, there are two methods to compensate women in childbearing, medical care and monetary compensation⁹. Medical care during pregnancy and childbirth is designed to support the health and well-being of both the mother and the child, as a basic social welfare, it has been established in many countries. Usually, it includes health monitoring, early detection, nutritional and lifestyle guidance, pain relief delivery and so on. These care measures run through the entire pregnancy period and also postnatal. It must be admitted that modern medical technology has greatly alleviated the risks and pain of reproduction for women. The maternal mortality rate has become extremely low, and painless delivery techniques have been widely popularized. These all contribute to reducing the burden of inherent risks on women. However, it must also be acknowledged that no matter how modern medicine develops, it cannot change the tremendous impact reproduction has on a woman's body. For ten months, an alien life grows in a woman's body. It plunders the mother's nutrition, alters

⁹ There are huge variations in childcare policies in the world and I cannot get into details of each of them. Although some countries have policies that help women back to the labour market or try to compensate them in different ways, considering most of them are either medical care or monetary compensation or both of them, I claim that in general, they fail.

her hormones, changes her body shape, disturbs her sleep, brings various discomforts, and comes to this world by tearing the vagina (or having a Cesarean Section).

Medical care can alleviate pain to a certain extent, but it cannot eliminate the existence of the above symptoms. In this sense, medical care cannot effectively compensate for the burdens of inherent risks. Moreover, it fails to resolve the conflict between the interests of the mother and the child. Since the child is conceived within the mother's body, every action of the mother is required to prioritize the child's interests. It is common that when a mother falls ill during pregnancy, she is often prohibited from taking certain medications to avoid harming the child. In some extreme cases, such as when the mother is diagnosed with cancer during pregnancy, doctors may ask the mother to choose between treatment and abandoning the child. This means either allowing the tumour to grow until the child is safely born or opting for an abortion to receive cancer treatment. Unless there is a technology that can remove the child from the mother's body to replace pregnancy, this dilemma will always exist. I am not arguing that mothers should not prioritize their children's interests, but rather, I am trying to point out that modern medicine cannot fundamentally solve the issue of the mother bearing all the reproductive burdens as long as the child remains within the mother's body.

3.2 Monetary Compensation

Monetary compensation includes maternity leave stipend, maternity insurance, parenting allowance, and so on. It can help women avoid worrying about their income during the period of staying at home. Most countries provide monetary compensation for childbirth, which looks *prima facie* a good compensation for women. However, the adverse effects of monetary compensation policies are reflected in the following two aspects: first, it may cause the path-dependency, which leads women to long-term financial vulnerability. The maternity leave stipend makes women feel no financial pressure to stay at home and spend time with their children, who “spend more time with infants, women tend to be more knowledgeable and competent with, and possibly more attached to, their young children than men” (Gheaus, 2020,p.9). The more time women spend with their children, the better they are at childrearing. With great ability comes great responsibility may lead women to put more psychological pressure on themselves to be the ones who choose to be the primary caregivers¹⁰. In some developed countries, such as in Japan, women can receive a three-year parental leave with a 50% stipend.

The longer women leave their full-time jobs, the fewer opportunities and capabilities they have for it, which may lead to the second negative consequence, statistical discrimination. Given that women, on average, exhibit a higher likelihood than men to either resign from their employment or reduce their labour involvement

¹⁰ This psychological pressure may come from social expectations, their own sense of responsibility, and also the best-interest strategy for their family. See Okin, S.M. (1989). *Justice, Gender and the Family*; and Allen, A. (2008). Rationalising Oppression, *Journal of Power*.

upon having children, and considering the financial cost of turnover, “it is economically rational for employers to give preference to prospective male workers” (Gheaus, 2020, p.12). If the majority of women develop path dependency during their maternity leave and tend to spend more time at home, the entire society will form such a stereotype. Consequently, employers will be more reluctant to hire female employees, further exacerbating the unequal employment opportunity for women.

These two negative effects reinforce stereotypes about women/mothers both internally and externally. The path-dependency makes it easier for women to be caregivers, and to be caregivers makes women more knowledgeable of it thereby strengthening their self-identity as caregivers. Meanwhile, the statistical discrimination exacerbates external stereotypes of women as caregivers. The more women are perceived to be more likely to quit in the workplace than men, the more difficult it is for women to obtain equal positions and opportunities in the workplace. Not to mention that in most cases, the improvement of capabilities is closely related to the time invested. The time which women use for pregnancy and postpartum lactating, men use for work. This leads to a further disadvantage of women’s competitiveness in the labour market. From this perspective, although monetary compensation can rectify women’s financial vulnerability in a short term, it actually helps to strengthen the path-dependency and statistical discrimination which damages women’s financial independence in a long run.

Moreover, during their time away from work, women lost the opportunity to develop skills, experience, and knowledge in the labour market, while men were still

working and becoming more competitive than women. Moreover, skills, experience, and knowledge form an integral aspect of individual identity which connects with talents, self-realization, and personal growth. The Aristotelian Principle, as expounded by Rawls, elucidates this phenomenon: “Other things equal, human beings enjoy the exercise of their realized capacities (their innate or trained abilities), and this enjoyment increases the more the capacity is realized, or the greater its complexity” (Rawls, 1971, p.374). People can find enjoyment in exercising their innate or trained abilities. Maternity leave and parental leave actually deprive women’s enjoyment of paid work. This principle also has a companion effect. “As we witness the exercise of well-trained abilities by others, these displays are enjoyed by us and arouse a desire that we should be able to do the same things ourselves” (Rawls, 1971, p.375–376). However, the companion effect may have adverse implications for women, potentially leading to feelings of discontent or depression. This is particularly evident when women witness men’s career success while being unable to pursue similar achievements during periods of maternity or parental leave.

Some may argue that pregnancy and childbirth can also bring skills, experience and knowledge to parents, and it is also true that parental leave can allow the enjoyment of exercising parenting abilities and enable the enjoyment of this type of work. The point here is not the value of pregnancy and childbirth, or even maternity leave, as I discussed before, since the capability view is very individually determined, the skills in childcaring may be valuable for some people but not necessary for others. The point here is that regardless of which lifestyle is more valuable, fathers and mothers should

have the same opportunity to approach the life they choose. The current care-support policies make it easier for women to stay at home, while men are more likely to stay in the labour market.

All of the above indicates that existing policies cannot provide effective compensation for the opportunities, experiences, and skills lost by women. Moreover, none of those policies compensates for the childbearing risks women take. As the fact that women are still the only ones who are available to conceive, gestate, and give birth to children, if the process significantly disadvantages women, preventing them from pursuing other meaningful activities, and limiting their opportunities to flourish, it may not be fair to expect women to endure adverse effects of pregnancy if there is an alternative available. Therefore, the primary demand for gender justice is to free “women from the tyranny of their reproductive biology by every means available, and the diffusion of the childbearing and childrearing role to the society as a whole, men as well as women” (Firestone, 1970, p.13). A promising proposal for effective compensation is a state-sponsored ectogenesis, which can provide technical alternatives to replace childbearing and will not be compromised for women from low socio-economic status. In the next chapter, I will investigate why ectogenesis works.

Chapter 4 To What Extent Ectogenesis Can Improve the Injustice

In this chapter, I argue for the conclusion that ectogenesis can fully compensate for those burdens women suffered: the inherent risks, financial vulnerability, and unequal opportunities. I will provide three benefits which ectogenesis can bring to women. Each corresponds specifically to one burden of gender justice in our society.

The way to imagine ectogenesis is to picture a fish tank where a fetus can grow inside. This innovative incubator can be transported to the home and placed in the bedroom, allowing parents to observe the fetus's growth and movements. The fish tank could feature a soft cover on one side, enabling parents to interact and touch the developing fetus. The artificial womb can not only provide the same nutrition and the same fetus growth trajectory as a natural womb but also reduce the risk of miscarriage since it is more stable and controllable.

In this world, external artificial wombs are capable of the entire childbearing process, from conception to delivery. Each spouse who wants a child only needs to use around 20 minutes to collect their sperm and eggs at a special institution for ectogenesis. Their gametes will be placed in a specialized container for fertilization. Once the zygote develops into an embryo (typically within 5-10 days), it will be transferred to an artificial womb, which looks like a fish tank and the fetus will undergo development for the next 9 months. The spouse can bring this fish tank back home and they can watch the growth of their baby day by day until the delivery time. Each artificial womb

can automatically control its foetal temperature, nutrient intake, and growth cycle. It can monitor the development of the fetus in real-time, evaluate the foetal health status, and ensure that everything goes smoothly. The point here is to solve the problem of unequal reproductive capability distribution, I will suppose the technology of ectogenesis is safe and fully state-sponsored which will not become a privilege for rich people.

4.1 Complete Elimination of Inherent Risks

There are many benefits that ectogenesis can bring, such as providing further options for the wombless and those who cannot gestate; boosting the survival rates of premature infants; creating better healthcare (more controllable and stable nurturing environment) for the fetus that can be watched and interacted with; the transgender and non-binary couples would have more choice except surrogacy; even quell the debate about surrogacy, as with this technology, there is no need for a surrogate mother; etc. All of them can significantly improve human well-being. However, this essay focuses on how this technology can affect gender justice and I will only emphasize those relevant aspects.

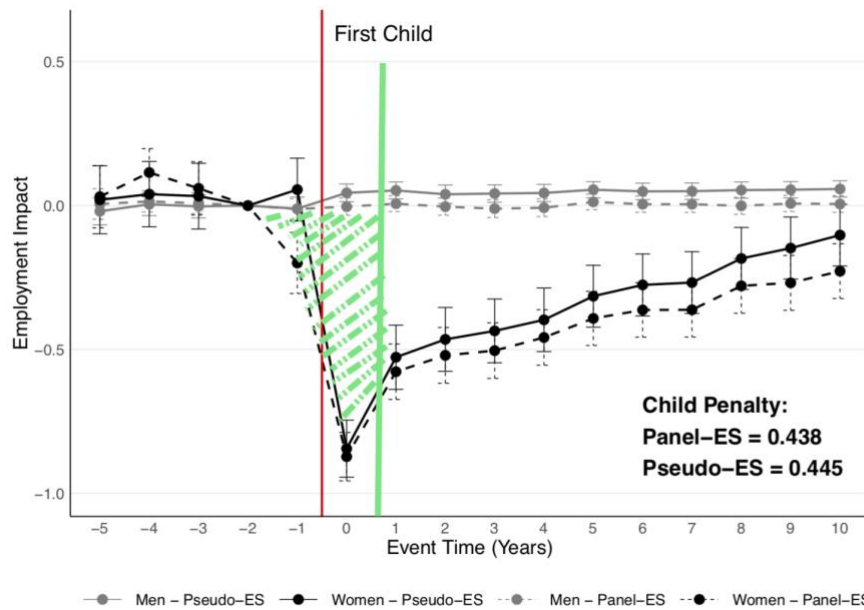
It is a world where women can be free from 9 months of gestation, parturition, and also breastfeeding. The dependence on the uterus and breast milk is eliminated. Becoming a mother no longer means experiencing physical pain or facing the risk of complications, and the obligation to feed the child can be equally shared by both father

and mother through formula milk.

Ectogenesis can completely avoid reproductive risks and prevent mothers from facing various health threats: maternal mortality kills around 280,000 women every year; pregnant women often suffer pains, exhaustion, and nausea; urinary incontinence and insufficient sleep usually extend for six months to one year after delivery; some women may experience postnatal depression (Smajdor, 2007, Takala, 2009, Unno, 2000). In a word, what women experience during the reproductive period is a dual burden on physical and mental well-being. From this perspective, rather than seeing pregnancy as a capability, it is more accurate to view it as chains. Women can only truly be liberated from inherent risks when children no longer need to grow inside women's bodies. In this sense, ectogenesis is an effective alternative method to compensate for women's biological inequality in reproductive function.

4.2 Free Women from Financial Vulnerability

Ectogenesis can provide women equal free time and working hours as men. By applying ectogenesis, women are free from nine months of pregnancy and childbirth, which means they do not have to withdraw from the labour market during the ectogenic gestation period and they would not affect work efficiency due to poor physical condition. To be a biological mother means they do not have to sacrifice extra time and energy when compared with a father. In this way, the disadvantage associated with child penalties would be significantly reduced.



As depicted in the graphic, the vertical green line indicates the time when women finished their maternity leave (usually 4 to 6 months in most countries). With ectogenesis, newborn babies come out from artificial containers, therefore, parental leave will replace maternity leave which parents can share equally. Once women are not biological-determined to leave the labour market, all green—shaded areas of child penalties can be eliminated. Women can have an equal income with men.

Ectogenesis can free women from breastfeeding as well. To breastfeed a child means the mother must wake up every two hours during the night, and also cannot leave the child during the daytime. What ectogenesis can do is take over the ability that only mothers can breastfeed but provide all babies with formula milk. In this case, the father and mother have equal access to feed the baby in which they can split this job in practice and take turns waking up to feed their child. Fathers can no longer escape the responsibility of feeding the baby for biological reasons. I will discuss the breastfeeding example in the next chapter again, since some may argue that breast milk is much better

than formula milk.

This technology actually offers women the possibility of avoiding pregnancy, like men do, while still being able to have their biological children. With ectogenesis, for both men and women, holding an ambition of being a parent, can share the same burden of being a parent, regardless of their sex.

4.3 Break the Stereotype and Provide Equal Opportunities

Ectogenesis can defuse one intensive debate that women are naturally more suitable to take care of children. Biological inequality cannot be used as an excuse anymore. Throughout our history, women have been seen as the primary caregivers. Due to the fact that women are no longer the sole carrier of reproduction, their instrumental attributes regarding reproduction may disappear. Some argue that an era of “womb technology” dawns will liberate women because “reproduction will no longer be something necessarily confined to the female body” (Romanis et al., 2021). Women’s bodies are no longer a method of reproduction. Women can no longer appear as fertility symbols, so metaphors like “Mother Earth” or “Mother Nature” may fade away. The disappearance of metaphors implies a change in our understanding of women. “If a teenage girl thinks that she needs to become a mother in order to become a woman, there is something seriously wrong with the role models we are giving to the younger generations” (Takala, 2009, p.189). After women break free from the label of fertility carriers, it is possible for them to escape the traditional gender division of labour in

daily life. For some radical feminists, ectogenesis can disrupt the male-dominated structure not only in the family, but also spread in work, education, cultural production, and so on (Firestone, 1970).

This technology could make a considerable contribution to improving the situation of many women. It protects women's privacy, to be a parent should be a private thing, but pregnancy makes it public for women, while men still have their privacy. It can also reduce the pressure on older women to have children. The so-called "biologically optimal time for motherhood" creates huge pressure on older motherhood, either on physical risks or societal expectations. I cannot name all the benefits of this technology, but this essay is mainly focused on how ectogenesis can provide equal opportunities to all genders, with the background that nature does not distribute human reproductive capability equally. Considering this biological inequality leads to the inequality of opportunity, ectogenesis would create a new possibility for our society never feasible before. To be a mother is not doomed to give birth to a child herself. With ectogenesis, the mother and father contribute equally to reproduction, and what remains in the notion of "mother" is indifferent to gender identity.

Chapter 5 Objections

In this chapter, I consider three objections against my proposal. The first one is about the best-interest strategy of children, which believes that parents' behaviour should be guided by the best—interest of their children. I argue that the trade-off between parents and children is acceptable, as long as children's benefits are above the threshold. The second objection is the concern of the value of bonding between children and mothers, I argue that it is not necessary nor irreplaceable to build a bond during physical pregnancy, considering bonding between parents and children is not a scaled good. The third objection is a worry that ectogenesis might lead to new injustice between women who use ectogenesis and those who do not use it. I argue that women who choose natural reproduction will only be seen as choosing a specific lifestyle, society should still provide sufficient compensation for her choice. Therefore, they will not be disadvantaged.

Objection 1 Best-Interest Strategy of Children

A quite large number of people believe that pregnancy fits the best interests of children and a good parenthood asks for a child-centered approach (Leif, 2013; Gheaus, 2021). Although it is debatable why biological gestation and childbirth can maximize the children's benefits, my point here is that even if it truly represents the baby's best interest, given the injustice that women suffered during pregnancy and childbirth, the

best-interest strategy of children cannot justify itself and we have enough reason to use ectogenesis instead.

It is true that parents have a general duty to benefit their children, since parents create their children coming to the world. However, having a duty to benefit their children does not mean having a moral duty to do each and every act that would benefit their children (Woollard & Porter, 2017, p.1). In the relationship between parents and children, parents are also important and should not be used as mere instruments for optimizing children's interests. The mother is first an independent agent who has her own interests to fulfil and it is questionable for women to curb their interests under the duty of mother in order to increase any tiny benefit for their children. If an action can benefit the child with no cost to the mother, it is morally required for the mother to do it. When an action can benefit the child but decrease the mother's interests, a trade-off between the children's benefits and the mother's interests is acceptable.

One strong argument from Brighouse and Swift is to claim that concerning parents' interests is precisely relational and educational benefit their children, which helps them to become someone who respects others, have empathy and are not selfish (2016, p.121). Gheaus also mentioned that "good child-rearing teaches children how to balance their own interests against other people's. Parents have to look after themselves well enough to ...model for their children behaviour that harmoniously respects children's parents' and third parties' rights" (2021, p.433). Therefore, to a certain extent, deviating from a child-centred approach and caring about the interests of the mother is beneficial for both parties.

Another way to respond to this objection is to illustrate the complexity of children's "best interests". There are long-term interests and also short-term interests, and sometimes these two types of interests conflict with each other. To maximize the fulfilment of a child's short-term interests might be called spoiling the child. Considering children will become parents in the long run, prioritizing the mother's interests can also benefit the children after they become parents. If we scrutinize the benefits of children from a long-term perspective, many temporary benefits are insignificant. For instance, breastfeeding is considered better than formula milk feeding. Many experts argue that breast milk contains more nutritious than formula milk powder, and it can provide immune protection for children. However, a lot of children didn't grow up with breast milk, they still grow up healthy and flourishing in their lives. We cannot distinguish one adult who was raised with breast milk and the other who was raised with formula milk. The impact of different types of milk is not significant enough to affect their income, social status, interests, or personality. We can also assume that in a world with ectogenesis, the same case should be made for natural gestation and artificial gestation. Children who grow up in artificial wombs would not have a significant, fundamental impact on their future growth compared with natural birth children. Those women who choose to use ectogenesis will have a great enhancement in their benefits. At least, they will not suffer physical pain, aches, nausea, fatigue, postnatal depression, and even child penalties. In a word, the benefits for children of natural birth are teeny tiny, while the loss for mothers of natural birth is significant.

Considering this situation, let's assume both the father and mother have 100

unities of well-being at the initial status and they decide to give birth to a child. In a gender-just society, a traditional distribution might be like this:

Distribution 1		
Parents	Mother	Father
	50	50
Children	100	

Both mother and father sacrifice 50 unities of their well-being equally and the children can receive 100 unities of well-being. But with the biological inequality of reproductive abilities, in most cases of our society, it is closer to the following distributive scheme (Distribution 2), where the mother sacrifices 80 of her unities while the father only sacrifices 20 of his. In the end, the children still have 100 unities of well-being, but at the cost of the mother's significant unjust contribution.

Distribution 2		
Parents	Mother	Father
	20	80
Children	100	

To against the best-interests strategy of children, I argue that the following distributions are also acceptable (Distribution 3,4,5). Parents do not need to satisfy their children's best interests, as long as children have sufficient well-being which above the threshold.

Distribution 3		
Parents	Mother	Father
	60	60
Children	80	

Distribution 4		
Parents	Mother	Father
	65	65
Children	70	

Distribution 5		
Parents	Mother	Father
	66.6	66.6
Children	66.8	

Distribution 5 might look like a little bit extreme. I must admit that it is very difficult to identify a clear threshold of the trade-offs between parents and children, and there are different views about where the threshold should be. I will leave the dispute here since the point here is only to show that a certain extent concern for parents is reasonable and should be accepted. If the best interest of children means that any benefit of children matters more than any sacrifice of parents, then we must accept the distribution 6 as below:

Distribution 6		
Parents	Mother	Father
	0.1	0.1
Children	199.8	

It shows that parents sacrifice almost all of their well-being to provide their children with the maximum welfare. With distribution 6, becoming a parent means giving up almost everything, which may lead to fewer and fewer people choosing to become parents. Parents are liable to some loss, but not liable to loss of all their well-being. Therefore, it is true that parents have a moral duty to benefit their children, but it does not mean parents should sacrifice as much as they can to improve their children's interests. Parents' interests also matter, especially when we only focus on women, who are biologically determined to sacrifice more. In the case of breast milk, the child may have a better immune system in his childhood, but makes no difference after he grows up, while the mother may experience child penalties, earn a lower salary and be economically dependent on her husband. This will put her in a very vulnerable position if she encounters divorce or other accidents.

The proportionality of sacrifice between father and mother asks for an equal distribution. The point here is not only about how to justify parents' sacrifice to their children, but also whether mothers suffered injustice in childbearing compared with fathers. Ectogenesis can solve the proportionality problem and significantly reduce mothers' sacrifice at the cost of a little bit of children's well-being.

Objection 2 The Value of Bonding Between Children and Mothers

Many philosophers believe that bonding between child and mother is valuable and it starts from pregnancy and deepens in breastfeeding (Ber, 2000). From this perspective, the process of pregnancy and breastfeeding is necessary to build bonding. Therefore, ectogenesis will eliminate the opportunity to build the bonding for the fetus, at least in the first nine months.

I agree that gestational bonding is good for both mother and child from an individual perspective, however, I doubt whether it is necessary or sufficient for the development of a loving parental bond. It is clear that some mothers do not love their children even though they experienced pregnancy, and in other case fathers can bond with their children as deeply as mothers. For adoptive parents, there is no evidence that the relationship between biological parents and their children will be better or deeper than adoption families. The bonding that comes from pregnancy is no different from the bonding that comes from playing with a child.

Someone may claim that the above argument sounds like levelling down. Ectogenesis can only make sure mothers have less bonding with their children, but cannot make sure fathers will have more bonding. For a father, the opportunity to bond with his child during the gestation period, either in a woman's body or artificial womb, is the same.

My response is that bonding between parents and children is not a scaled good, which means bonding as an emotional attachment has no upper limit. Specifically speaking, there are many ways to connect a bond between parents and children, such as

telling stories, taking them to Disneyland, or buying ice creams for them. Any form of companionship and communication can create and deepen this connection. The more companionship and communication, the deeper the bonding will be formed. Because there are too many ways to bond with children, it is difficult to name a specific one that is necessary or irreplaceable. For example, bedtime stories are very important, but we cannot conclude that children who have bedtime stories may have better bonding with their parents compared with children who have not. In a word, considering parents have hundreds of alternatives to build bonding with their children, losing one of the options such as pregnancy is not a big issue.

Moreover, eliminating bonding through pregnancy might have two by-product benefits. First, Firestone claims that ectogenesis would free children from their mother's over-possessive which can lead to a healthier relationship between them, because "without the nine-month pregnancy, discomfort and painful delivery, women could no longer claim that the child somehow 'belonged' to her" (1970, p.72). Secondly, the special bonding between mother and child actually hinders the father's participation. The biological fact makes the mother the only agent who can build a bond through pregnancy and breastfeeding. Therefore, in divorce cases, mothers are more likely to get the children's custody, and the younger the child is, the more chance the mother has, which is unfair to the father (no matter whether getting custody is a benefit or not). Fathers should have the same rights and same opportunities to build their bond with their children. Considering there are many ways to build a bond between children and parents, we should exclude privileged options and ensure both father and mother have

the same opportunity to build a bond. It is ectogenesis that can provide fathers with the same opportunities as mothers to connect with their children.

Objection 3 Injustice for Women Who Do Not Use Ectogenesis

Someone may worry about the application of ectogenesis. If this technology is widely used, then women who still choose natural birth will suffer injustice. If a woman is willing to pursue physical pregnancy, and when natural pregnancy becomes a minority, is it an expensive taste, and should society still compensate for this taste? If not, will she suffer discrimination and be disadvantaged by an ectogenic social expectation?

First of all, expensive taste can be understood as personal preferences and choices that require additional resources beyond basic living needs to be realized (Cohen, 1989). It is expensive because the demand for resources exceeds the fair share provided by society. With this definition, I argue that physical pregnancy cannot be seen as an expensive taste, therefore, society should still compensate for all the disadvantages resulting from natural childbirth.

Expensive taste asks for using extra public resources, while being pregnant mainly consumes a woman's body, which includes personal resources. As I mentioned above, it brings certain health risks and burdens to women who might need extra medical resources during the process. However, the demand for medical resources varies significantly among different women. Some may only require simple examinations,

while others may require full intervention in the process. Pregnancy is actually more like choosing an unhealthy lifestyle for nine months. Think about people who smoke, they are more likely to suffer from lung cancer and require more medical resources. But we do not claim that people who choose to smoke have an expensive taste. Because the price for buying a pack of cigarettes is the same as ordering a drink, buying a hamburger, and a bouquet of flowers. Smokers will not demand additional resources from society due to the cost of buying cigarettes. Society did not differentiate them based on their smoking preferences. Medical insurance does not reject people who smoke.

Similarly, women who choose to pregnant by their own bodies are only choosing a less healthy lifestyle, which may ask for extra medical resources, but won't interfere with other people's fair share, since each different lifestyle may require additional resources to some extent. In this sense, society should provide whatever resources pregnant women need, including but not limited to medical resources and maternity leave.

In a society where ectogenesis is already prevalent, women who choose natural reproduction will only be seen as choosing a specific lifestyle. Just like in today's society, smokers and non-smokers can coexist, and people with tattoos will not conflict with people without tattoos. Therefore, a woman can freely choose ectogenesis or natural gestation as she likes. Neither of these choices will involve discrimination.

Conclusion

Let me recapitulate what I have argued so far. I have illustrated three approaches to understanding gender justice and pointed out that gender justice from the equality of opportunity perspective asks for an equal share of burdens among people who have the same ambition. Considering the natural fact that women are the only bearers of the burden of childbearing, it is unjust for women to take over all risks and child penalties because of their biological gender. Moreover, the whole society took a huge benefit from women's personal sacrifices alone but took it for granted. Therefore, it is morally required to compensate for women's brute luck. Following this, I argue that a state-sponsored ectogenesis is a promising technical alternative to replace childbearing.

The technology of ectogenesis is not a distant dream. It originated in the 1920s and underwent significant development in the 1950s. However, ethical dilemmas block its path. The good news is that in Japan, Australia, Canada, and the Netherlands, recent experiments show that mice and lamb embryos have been cultured in artificial wombs. The argument of this thesis is constructed based on the assumption that the technology of ectogenesis has become medically safe and maturely developed. Most researchers propose a prudent attitude to ectogenesis, for financial, ethical, religious and conventional reasons. I hope this essay can provide a strong reason to promote ectogenesis, for the sake of gender justice.

There are many related topics worth discussing around ectogenesis, for instance, what kind of moral status for a fetus in an artificial womb? Will ectogenesis cause more

abandoned babies? How can we distinguish “father” and “mother” if the mother is not the fetus carrier anymore? As far as this essay is concerned, it is only from an egalitarian perspective that why promoting ectogenesis is necessary and morally required. It can effectively improve gender justice and liberate women from traditional motherhood.

Reference

- Allen, A. (2008) Rationalizing Oppression, *Journal of Power*, Vol. 1 (1), pp. 51-65.
- Becker, G. (1991) *A treatise on the family*, Enlarged Edition. Cambridge, MA:
Harvard University Press.
- Ber, R. (2000). Ethical issues in gestational surrogacy. *Theoretical Medicine and Bioethics*, 21(2), pp.153–169.
- Brighouse, H. and Wright, E.O. (2008). Strong Gender Egalitarianism, *Politics & Society*, Vol.36 No.3, pp.360-372.
- Brighouse and Swift, (2016) *Family Values: The Ethics of Parent-Child Relationships*,
Princeton University Press.
- Cohen, G.A., (1989) On the Currency of Egalitarian Justice, *Ethics*, Vol. 99, pp. 906-44.
- Dworkin, R. (1981). *What is Equality? Part 2: Equality of Resources*, *Philosophy & Public Affairs*, Vol.10, No.4, pp.283-345.
- Firestone, S. (1970). *The Dialectic of Sex: The case for Feminist Revolution*. New York:
William Morrow and Company.
- Fraser, N. (1994). After the Family Wage: Gender Equity and the Welfare State,
Political Theory Vol. 22(4): pp. 591-698.

-
- Gheaus, A. (2011). Gender Justice, *Journal of Ethics & Social Philosophy*, Vol 6, No.1
- Gheaus, A. (2018). Sufficientarian Parenting Must be Child-Centered. *Law, Ethics and Philosophy*, 5(0).
- Gheaus, A. (2020). The Feminist Argument Against Supporting Care, *Journal of Practical Ethics*, Vol 8, No. 1.
- Gheaus, A. (2021). The best available parent. *Ethics*, 131(3), pp.431–459.
- Gheaus, A. (2023). Political Liberalism and the Dismantling of the Gendered Division of Labor, forthcoming in David Sobel and Steven Wall (eds), *Oxford Studies in Political Philosophy*, Vol. 9.
- Hammond-Browning, N. (2018) A New Dawn: Ectogenesis, Future Children and Reproductive Choice. *Contemporary Issues in Law*, 14 (4), 349-373.
- Harris, J. (1998). *Clones, Genes and Immortality*. Oxford: Oxford University Press.
- Kendal, E. (2015). *Equal opportunity and the case for state sponsored ectogenesis*. In Palgrave Macmillan UK eBooks.
- Kendal, E. (2017). The perfect womb: promoting equality of (Fetal) opportunity. *Journal of Bioethical Inquiry*, 14(2), pp.185–194.
- Kleven, H., Landais, C. and Mariante, G.L. (2023). The Child Penalty Atlas, *National Bureau of Economic Research*, Vol. 13.
- Kymlicka, W. (2002). *Contemporary Political Philosophy: An Introduction*, Oxford

University Press.

MacKay, K. (2020). The ‘tyranny of reproduction’: Could ectogenesis further women’s liberation? *Bioethics*, 34(4), pp.346–353.

Nussbaum, M. (2003). Capabilities as Fundamental Entitlements: Sen and Social Justice, *Feminist Economics*, Vol. 9, pp. 33-59.

Okin, S. M. (1987) Justice and Gender, *Philosophy & Public Affairs*, Vol. 16, No. 1 pp. 42-72

Okin, S.M. (1989). *Justice, gender, and the family*. New York: Basic Books.

Overall, C. (2015). Rethinking abortion, ectogenesis, and fetal death, *Journal of Social Philosophy*, 46(1), pp.126 -140.

Pence, G. (2006). What's so good about natural motherhood? (In praise of unnatural gestation), in S Gelfand .and JR Shook (eds.) *Ectogenesis: artificial womb technology and the future of human reproduction*

Porter, L. (2015) Gestation and Parental Rights: Why is Good Enough Good Enough? *Feminist Philosophy Quarterly* 1. Vol 1(1).

Robeyns, I. (2007). When Will Society Be Gender Just?, in Jude Browne (ed.) *The Future of Gender*, Cambridge University Press, pp. 54-74.

Rawls, J. (2005). *Political Liberalism*, Expanded edition. New York: Columbia University Press.

-
- Rawls, J. (1971). *A Theory of Justice*. Revised ed. Cambridge, Ma: Belknap.
- Romanis, E. C., Begović, D., Brazier, M., & Mullock, A. (2021). Reviewing the womb. *Journal of Medical Ethics*, 47(12), pp.820–829.
- Schouten, G. (2017) Citizenship, reciprocity, and the gendered division of labor: A stability argument for gender egalitarian political interventions, *Politics, Philosophy & Economics*, Vol.16(2), pp.174-209.
- Sen, A. (1992) *Inequality Reexamined*, Oxford: Clarendon Press.
- Sen, A. (1995) “Gender Inequality and Theories of Justice”, in Martha Nussbaum and Jonathan Glover, *Women, Culture, and Development*, Oxford: Clarendon Press, pp. 259-273.
- Sen, A. (1990). Justice: Means versus Freedoms, *Philosophy & Public Affairs*, Vol. 19, No. 2 (Spring, 1990), pp. 111-121
- Sen, A. (2004). Capabilities, Lists and Public Reason, *Feminist Economics*, Vol. 10(3), pp. 77- 80.
- Simonstein, F., & Mashiach–Eizenberg, M. (2009). The Artificial Womb: A pilot study considering people’s views on the artificial womb and ectogenesis in Israel. *Cambridge Quarterly of Healthcare Ethics*, 18(1), pp.87–94.
- Simonstein, F. (2006). Artificial reproduction technologies (RTs) – all the way to the artificial womb? *Medicine Health Care and Philosophy*, 9(3), pp.359–365.
- Singer, P & Wells, D. (1984). *The Reproduction Revolution. New ways to Making*

Babies. Oxford: Oxford University Press.

Smajdor, A. (2007). The Moral Imperative for Ectogenesis, *Cambridge Quarterly of Healthcare Ethics*, Vol. 16, pp. 336–345.

Smajdor, A. (2012). In Defense of Ectogenesis, *Cambridge Quarterly of Healthcare Ethics*, Vol. 21, pp. 90–103.

Steiger, E. (2010). Not of Woman Born: How ectogenesis will change the way we view viability, birth, and the status of the unborn. *The Journal of Law and Health*, 23(2), 143.

Strong, C. (2002). Overview: A Framework for Reproductive Ethics, in D.L. Dickenson, (ed.) *Ethical Issues in Maternal-fetal Medicine*. Cambridge University Press: Cambridge, pp. 17–36.

Takala, T. (2009). Human Before Sex? Ectogenesis as a way to Equality, in F.Simonstein (ed.), *Reprogen-ethics and the Future of Gender*, International Library of ethics, law, and the new medicine.

Unno, N. (2000). Development of an Artificial Placenta, in G. Stocker and C. Shopf (eds) *Next Sex: Ars Electronica 2000*. New York, Vienna: Springer.

Wellin, S. (2004). Reproductive ectogenesis: the third era of human reproduction and some moral consequences, *Science and Engineering Ethics*, 10(4), pp. 615.

Woollard F, Porter L. J (2017). Breastfeeding and Defeasible Duties to Benefit, *Med Ethics*, 43(8).