Review of International Economics, 21(3), 387–400, 2013
DOI:10.1111/roie.12043

"Womb for Rent": International Service Trade Employing Assisted Reproduction Technologies (ARTs)

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Abstract

Infertility affects approximately 2–3 million married couples in the USA and a larger cohort of unmarried men and women. For those not inclined to adopt, science has provided another option, one based on assisted reproduction through artificial insemination, commonly known as *in vitro* fertilization (IVF). Under this framework a woman, designated as a "surrogate", bears a baby on behalf of the intended parents with the objective of relinquishing her rights to the child after birth. The subcontract for the services of a "surrogate" or more specifically for the use of her "womb" can be viewed as part of the literature on outsourcing of production by a vertically integrated family. The lack of universal enforcement of "surrogacy" contracts in the USA creates a demand for outsourcing of surrogacy services. One beneficiary of this uncertainty in enforcement is India which provides gestational services to intended international parents.

1. Introduction

In 1998 the New York Task Force on Life and the Law brought a number of leading scientists, physicians, lawyers, theologians, and public policy analysts to discuss many of the current legal, medical and bioethical issues concerning assisted reproduction. Their report presented a collection of appraisals of existing problems in assisted reproduction, including clinical practice, patient screening and selection issues, informed consent and counseling, gamete and embryo donation, storage concerns, the assignment of parental rights and responsibilities, children's claims to information, research, outcomes reporting, certification and licensure, and such commercial issues as advertising and marketing, payment, and insurance. It did not, however, address the international dimension of assisted reproduction and the regulatory issues that must be addressed once assisted reproduction involves international service contracts (Pande, 2008, 2009a,b, 2010). This paper will attempt to fill this void in the literature.

The starting point in any economic discussion of assisted reproduction is to point out that there is a viable demand for producing genetically linked offsprings. Approximately 7.1% of US married couples with wives of childbearing age were infertile, in 1995, meaning that they had not conceived after at least 12 months of unprotected intercourse. Approximately 12.9% of married couples reported some form of impaired fecundity, i.e. problems in conceiving or carrying a pregnancy to term. It is estimated that on a global level some 10–15% of couples face infertility. Similar statistics on the demand from non-traditional families is unavailable.

This infertility, once thought of as a permanent barrier to having genetically linked offsprings, has been resolved by medical and scientific advancements. Assisted repro-

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ductive technologies (ARTs) are medical interventions that involve formation of a fertilized embryo with the intention of producing a genetically linked live birth (ABA (American Bar Association), 2008). The literature on ARTs has focused on transactions involving reproductive services such as surrogacy arrangements and compensation for egg donors (Andrews, 1986, 1987, 1988, 1995); questions about parenthood, rights of custody and inheritance; the control over frozen embryos; the prospect for posthumous conception; and the genetic engineering of offspring (Bailey, 1998; Cohen, 1996; Coleman, 1999; Daar, 2001; Dolgin, 1998; Guzman, 1997; Huang, 1999; Jones, 1993; Palmer, 1994; Robertson, 1996, 2001; Rothman, 1988, 2000; Schiff, 1994, 1995; Shapo, 1997).

Although state legislatures and judges have attempted to clarify some of the legal issues raised in the above literature, state-by-state variations in statutory language and judicial precedent have caused confusion and contradictions. Consequently, the process of gestational surrogacy has evolved over time to resemble a traditional unregulated market place.

The focus in this paper is on *in vitro* fertilization (IVF) and the resulting surrogacy arrangement that it includes. As India and other developing countries acquire ARTs technology and IVF, surrogacy firms enter their market and introduce a viable alternative to developed country infertile clients. What would be the welfare distribution effects of this new competition? What would be the quality outcomes? Is there room for international regulation of these ventures and would they be welfare augmenting?

2. Assisted Reproductive Technologies

Assisted reproductive technologies involve combining sperm with eggs that have been surgically removed from a woman's body and returning the fertilized eggs to the woman's body or to a surrogate (US Congress, Office of Technology Assessment, 1988a,b). IVF involves the combination of the egg and sperm to achieve fertilization outside of the woman's body. The fertilized embryo is then placed in the uterine cavity for implantation. Gamete intrafallopian transfer (GIFT) is a variation of IVF that involves placement of the egg and sperm in the fallopian tubes, instead of the uterus. In GIFT, unfertilized eggs and sperm are placed in the fallopian tube and fertilization occurs inside the body. In all of these cases the services of a surrogate is becoming more prominent.

Surrogacy itself has two forms: traditional and gestational. Traditional surrogacy, also referred to as donor egg or embryo IVF, requires an egg donor, inseminated with the intended father's sperm, to carry the pregnancy. In gestational surrogacy, the focus of this paper, the gestational mother carries a donated, fertilized egg (Penn Pregnancy Health Center, 2009).

It is patently obvious that science has provided individuals and traditional couples with an alternative mechanism to conceive a genetically linked offspring. In providing these new advances, science has complicated our traditional notion of an integrated family unit. It has made it possible for economists and lawyers to consider the process of child bearing in a world of outsourcing, with a production function with the standard inputs, production environment and requisite output. In a global trading environment this has also introduced the possibility of outsourcing of certain elements of the child bearing production process.

At first blush "gestational surrogacy" appears to be a straight forward commercial transaction. While this process is technically very simple it alters the household pro-

duction function in that it introduces a third party into the reproductive matrix. Moreover, the production process may involve medical complications to the surrogate. Much of the risks associated with IVFs result from multi-fetal pregnancies. That is, the IVF procedure involves extraction of a number of eggs from the woman. To do this she is usually given a drug that enables her to "super-ovulate," or to produce more eggs in one cycle than she normally does. Since the procedure is so expensive, all of the eggs are fertilized in the laboratory. In this way if none of the fertilized embryos are successfully implanted, re-implantation can occur without much additional cost or lost time, since to extract the eggs would involve waiting until at least the woman's next cycle. Normally, more than one embryo is implanted in the surrogate' uterus, since it is uncertain how many, if any at all, will be implanted successfully. The actual number implanted depends on various factors relating to the condition of the eggs and the health of the woman. It is a generally accepted fact that fertility drugs and IVF increase the incidence of multiple births, which increase risks of morbidity and mortality for both offspring and the surrogate. Approximately 36% of all births resulting from IVF are multiples, which increases the risk of preterm labor. The incidence of preterm labor is 75% for triplets and 99% for quadruplets, as compared with 15% for women with singleton pregnancies. Although advances in science have increased survival rates for premature infants, these infants often face "significant physical and cognitive disabilities" (Noah, 2003; Rosato, 2004; Strong, 2003).

It is not unusual to have some if not all of the embryos spontaneously miscarry. If more than one embryo *does* successfully implant, then the couple may end up with more children than they originally intended. Twins and even triplets are not uncommon for couples who use IVF. To reduce the risks associated with multifetal pregnancies and premature birth, some intended parents opt for a procedure called selective reduction. That is, where the doctors and the intended parents select which fetuses will be terminated. This practice is very simply a form of either abortion or eugenics, a practice that carries with it a whole set of moral issues (Noah, 2003). Despite the controversy surrounding this practice, it has reduced many of the risks associated with multifetal pregnancies. The average success rate is less than 10% of the fertilized embryos actually implanting and developing into a child.

An additional costly complication is introduced when it includes a surrogacy agreement. The agreement involves an infertile couple on one side of the contract who are the intended parents who make an offer to the surrogate (the other party of the contract) who agrees to carry the foreign embryo in her uterus to full term and then give the baby to the genetic parents. With gestational surrogacy, the embryo is not genetically related to the surrogate. In effect this procedure introduces the concept of outsourcing to what has usually been considered a vertically integrated household production. Apart from the contracting issues, there are a number of medical costs associated with gestational surrogacy. These include the costs associated with the preparation of the surrogate and the period after the insemination which involves several injections of hormones, estrogen and progesterone, the taking of pills and a significant change in the surrogate's way of life.

In the USA the cost of a surrogate's services begins at US$15,000 for a novice surrogate mother and can go up to US$25,000 for an experienced surrogate. Therefore, the total cost to the intended parents can be substantial (ranging from US$100,000 to US$250,000). In India and other parts of the third world these prices can be reduced by as much as 80% (Daniluck, 1988).

The practice of surrogacy, however, is deeply disconcerting for traditional conceptions of the family and women (Crockin and Jones, 2010). The literature on surrogacy,

can be broadly classified into three groups based on how authors frame the subject: legal and feminist works that debate the ethics or morality of surrogacy (Andrews, 1987; Anderson, 1990; Ragoné, 1994; Raymond, 1993) radical feminist literature that views surrogacy as the ultimate form of commodification, and technological colonization of the female body (Dworkin, 1983; Corea, 1986; Neuhaus, 1988; Raymond, 1993; Rothman, 1988) and more recent research that focuses on the impact of surrogacy legal framework on the cultural meanings of motherhood and kinship (Franklin and Roberts, 2006; Markens, 2007; Teman, 2006; Thompson, 2005).

With the exception of Israel, where surrogacy is tightly controlled by the state, (Teman, 2006), the rest of the world is the wild-wild-west. In *The Mother Machine*, Gena Corea (1986, p. 276) describes a reproductive brothel. In *Women as Wombs*, Janice Raymond (1993, pp. 143–44) discusses the growth of reproductive clinics specializing in sex determination in developing countries, which foreshadows the use of third-world women as gestational surrogates. Finally, Barbara Katz Rothman (1988, p. 100) asks, "Can we look forward to baby farms, with white embryos grown in non-white young and Third World women?"

3. ARTs and the Law

Ownership or Control of the Embryo

IVF involves the fertilization of an egg outside of a woman's body to create an embryo. As part of this procedure extra embryos are created and frequently cryo-preserved (frozen) pursuant to an agreement between the intended parents and the fertility clinic. In the event that no such agreement was signed or that the court invalidated the agreement, the legal system must determine the disposition of remaining embryo left within that jurisdiction. The ABA's Model Act (2008) suggests the use of binding agreements executed prior to creation of embryos that spell out the intended use and disposition of embryos in the event of divorce, illness, death, or other changed circumstances (Kindregan and Snyder, 2008, pp. 212–16). While pre-existing agreements are helpful they do not eliminate the possibility that contractual agreements remain subject to state statutes and adjudication proceedings. The legal status of the *in vitro* fertilized ovum was substantially addressed by the Louisiana Human Embryo statute, enacted in 1986, which designated the embryo as a juridical person. To date, the Louisiana state statute presents one of the most comprehensive approaches to IVF (*Louisiana Revised Statutes, Annotated* §§9:126–133).

The approach taken by other states such as Florida is to avoid addressing frozen embryos in a comprehensiveness manner, indicating their reliance on contract theories for the proper determination of the disposition of frozen embryos. In cases where no written contract exists many disputes concerning frozen embryos are resolved through adjudication (Petralia, 2002–03).

Under the approach used by courts in Tennessee, New York, and Washington, "agreements between progenitors . . . should generally be presumed valid and binding." In both of the guiding New York and Washington cases, the couples signed disposition agreements that stated their intent and the courts, interpreting the agreement, enforced the agreement as a manifestation of the parties' intent. After finding an original agreement invalid for lack of mutual intent the Tennessee court in *Davis v. Davis* (1992) balanced the "relative interests of the parties" against the potential burdens imposed by different resolutions. The court stated that, "ordinarily, the party wishing to avoid procreation should prevail." In *J.B. v. M.B.* (2001) the New Jersey

court rejected the sufficiency of a valid disposition agreement arguing that disposition agreements would be valid, "subject to the right of either party to change his or her mind up to the point of use or destruction of any stored pre-embryos." At the end of the day the New Jersey court agreed with the Tennessee Supreme Court that "ordinarily, the party wishing to avoid procreation should prevail."

In contrast, the Iowa court in *In re the Marriage of Witten* (2003) rejected both the contract-based and balancing test approaches in favor of a "contemporaneous mutual consent" rule. Rather than solving the dispute between the parties the Iowa court opted to permit the parties to continue negotiating the issue indefinitely. For the jurisdictions that have not addressed these issues the approaches taken by these courts do not provide sufficient clarity.

Surrogacy Contracts

A second major issue in IVF is the employment and use of surrogates and the uncertainty surrounding the contractual agreements made between the intended parents and the surrogate. Without an enforceable legal contract, the use of surrogacy in the USA can have high risks for intended parents because they are at the mercy of the surrogate's discretion and that of the courts. At least 17 states and the District of Columbia have passed laws regulating surrogacy contracts; 11 allow some form of contract, while six states and the District of Columbia ban certain surrogacy contracts.

In Virginia, Utah, and New Hampshire the intended parents must acquire a "judicial preauthorization" before a surrogacy contract can be enforced. These jurisdictions by adding a certain prophylactic component into the surrogacy agreement may in fact increase the transaction costs for the intended parents to the point that they are priced out of the market.

Florida, Nevada, New Hampshire, Tennessee, Texas, Utah, and Virginia, require the intended parents in a surrogacy contract to be married. Arkansas and Washington, representing the minority jurisdictions, do not require the intended parents to be married in order to obtain surrogacy contracts. Arkansas goes the furthest in protecting unmarried men by giving the surrogate no parental rights and makes a child born as a result of a surrogacy arrangement "the child of the biological father only," if that father is unmarried.

In the absence of clear statutory language, whether surrogacy contracts will be enforceable in a given jurisdiction is left to the discretion and bias of the judiciary. The most widely recognized surrogacy case in US history was *In re Baby M.* where the Supreme Court of New Jersey (1988) decided not to enforce a surrogacy contract. The Court awarded custody of the child to the intended parents, but invalidated the surrogacy contract. The court determined it was in the child's best interests to live with her father and his wife. In fairness to the surrogate the court did, grant the surrogate mother visitation privileges while terminating the surrogate's parental rights. The court, in articulating its view on surrogacy contracts, stated that the payment of money to a surrogate mother was illegal and that surrogacy contracts conflict with the law and public policy of the state.

In *Johnson v. Calvert* (1993) the California Supreme Court was confronted with two main issues: (1) whether the genetic mother or the birth mother was the child's "natural mother" under California law; and (2) whether gestational surrogacy contracts violate the public policies and constitutional guarantees embodied in California's statutes. In answering the first question the California Supreme Court looked to

the state's Uniform Parentage Act (California Civil Code, 1994). The court recognized that both the genetic mother and the gestational surrogate had presented acceptable proof of maternity.

With respect to the second question, the court concluded that whereas Mark and Crispina Calvert were to supply the genetic material to Anna Johnson who would act as a surrogate and be compensated for the "rental of her womb" and the intended goal was for the genetic parents to bring a child into the world and not to donate a zygote to the surrogate, the husband and wife were the child's natural parents. Based on its determination that Anna was not the child's "natural mother" under California law, the Johnson court found that any constitutional interests that Anna claimed, including her rights to substantive due process, privacy, and procreative freedom were less than those of a mother.

Other courts in similar cases, such as *In re Marriage of Buzzanca* (1998) have approached the surrogacy contract question in a similar manner. In that case, neither the intended mother nor the surrogate was biologically related to the child. However, the court held that the intended goals mattered. In this case, the woman who entered into the contract, not the surrogate, was the legal parent of the child.

In 1986, in *Surrogate Parenting Associates, Inc. v. Armstrong*, the Supreme Court of Kentucky held that a surrogate mother who changed her mind before completing her contractual obligation stood in the same legal position as a woman who conceived without contractual obligations. In effect her breach of contract forfeited her rights to whatever fees the contract provided. However, the mother, child and biological father were given the statutory rights and obligations that exist in the absence of contract. Therefore, the surrogate motherhood contract was voidable by the surrogate mother.

In the Court of Appeals of Virginia a gestational surrogacy case, *Doe v. Doe*, appeared in 1992. In this case the trial court found clear and convincing evidence that the man and woman whose sperm and ovum were fertilized and implanted in the surrogate were the child's "biological and genetic parents." Consequently the court concluded that they became the baby's true and lawful parents of record, while the surrogate mother's parental rights are terminated.

The appellate court in *Doe* held that under the statute, the parent–child relationship between a child and a woman may be established *prima facie* by proof that the woman gave birth to the child. However, this birth mother–child relationship may also be established by other means, and that relationship is not terminated even if another woman is determined to be a parent. Consequently the appellate court reversed the lower court's decision, and passed the issue of surrogacy contracts to the politicians.

The leading case opposing surrogacy contracts was *Doe v. Attorney General* (1992). This case, decided in June of 1992, involved several infertile couples and their prospective surrogate mothers. These parties brought an action for declaratory judgment against the Michigan State Attorney General regarding the constitutionality of the Surrogate Parenting Act. The Michigan Court of Appeals held that the legislature's interests in preventing children from becoming mere commodities, in protecting the child's best interests, and in preventing the exploitation of women were compelling enough to justify an intrusion into the procreation rights of infertile couples and prospective surrogate mothers, without violating the parties' due process. Ultimately the court held that a "surrogate parentage contract" which involves a voluntary relinquishment, after conception, of the surrogate's parental rights to a child is void and unenforceable.

When intended parents are faced with ever increasing costs of surrogacy contracts in the USA combined with uncertainty of enforcement of these contracts in the

various jurisdictions, they become willing contracting parties' to international outsourcing contracts involving third world surrogacy firms.

4. Surrogacy and Outsourcing

Given the increasing costs of surrogacy arrangements and the uncertainty of contractual enforcement we look to the international trade literature to develop a simple model of international outsourcing between a developed country "principal" and a third world processing plant—the "agent" who is located in a low wage country with a pliable legal system to ensure enforceability of "surrogacy" contracts. In this arrangement the intended parents—the "principal(s)" send the requisite intermediate input to a processing factory, which converts the inputs into finished goods—the "child" and then prepares the "child" for pick up by the developed country "principal." The decisions facing the developed country principal include who should control the quality of processing within the surrogacy factory, who should control the medication and care of the surrogates while at the surrogacy factory and who should control the process to ensure the highest quality output.

The literature on outsourcing contains numerous approaches to draw attention to the numerous spillover effects of outsourcing. There are models with a continuum of (intermediate) goods or production stages in the tradition of Feenstra and Hanson (1996, 2005) and models by Grossman and Helpman (2002, 2005), extending the classic Heckscher–Ohlin theory, models based on standard production functions combined in multiple stages, and there are models based on outsourcing cost considerations. Within the group of models with a continuum of (intermediate) goods, Wang (2006) develops a model of choosing between vertical integration and outsourcing depending on cost differentials, transport costs and costs of searching for intermediate good trade. Kohler (2004) models the reaction of a multi-stage industry with outsourcing to changes of the final good price and fragmentation costs. Mitra and Ranjan (2005) extend the outsourcing and FDI literature to dynamic behavior with externalities and firm heterogeneity. Grossman and Rossi-Hansberg (2008) propose a new conceptual framework of the global production process focusing on tradeable tasks.

A reformulation of the four basic theorems of the Heckscher–Ohlin theory allowing for offshoring (fragmentation) is provided by Baldwin and Robert-Nicoud (2007). Markusen (2005) numerical simulations suggest welfare gains for the South and the global economy, while the outsourcing country (the North) may lose if it is large. Munch and Skaksen (2005) point out that outsourcing may worsen the wages for unskilled workers. Furthermore, Senses (2006) illustrates how the wage elasticity of low-skilled labor demand increases in heavily outsourcing industries and how a decline in the share of unskilled labor at home lowers the elasticity. Bandyopadhyay and Wall (2005a) add to the outsourcing literature by considering the optimal amount of outsourcing for a given immigration level. Bandyopadhyay and Wall (2005b) consider an outsourcing tax within an oligopolistic export sector. Egger and Egger (2004) include multinational firms' competition in quantities and price–cost margins. Egger and Egger (2007) consider the price setting in a spatial world. Bartel et al. (2005) show how technological progress lowers firms' adjustment costs of outsourcing. Other formulation of the outsourcing phenomenon include Aghion and Tirole (1997), Antràs (2003), Antràs and Helpman (2004), Feenstra and Hanson (2005), Grossman and Hart (1986), Hart and Moore (1990), Holmstrom and Milgrom (1994), Marin and Verdier (2003), and Puga and Trefler (2002).

The basic outsourcing model developed in the literature noted above can be modified to the current problem of intended parents seeking a surrogacy outcome with minimum of difficulties in enforcing their contract. The simple outsourcing model that we outline encompasses the two major effects of outsourcing as noted in the literature, i.e. the comparative advantage effect and the division of labor effect. Being able to subdivide production into self-contained stages of unique skill intensity is the traditional way of describing outsourcing industries. The simple model presented here focuses on outsourcing of the gestational activities in the womb which are intensive in unskilled labor. Increased globalization corresponds to the intended parents getting access to new labor markets such that the "effective" supply of labor rises.

A Simple Model of Outsourcing the Gestational Surrogacy

In order to allow for the possibility of outsourcing in gestational surrogacy we fragment the traditional household production process by allowing the employment of external unskilled labor to provide the required womb. The production of a single child Y^C involves two complementary production stages. The first stage involves the creation of the fertilized eggs of a woman and the second stage involves the incubation in the surrogate's uterus for the full term. The substitutability of the external unskilled labor for that of the intended parent can be demonstrated in a simple Cobb–Douglas production function. The IVF is assumed to be part of the intended parents' function which is not subject to outsourcing.

$$Y^C = A\left(Y_D^{\alpha} Y_F^{1-\alpha}\right)^{\rho} K^{1-\rho} \tag{1}$$

where $A > 0$ and $\alpha, \rho \in (0, 1)$. Y_D is a measure of the intended mothers' services, Y_F is a measure of services by the foreign unskilled worker who is renting her womb, and K is capital. Borrowing from Munch and Skaksen (2005), one can model the input of services produced by Y_D and Y_F in the following CES formulations:

$$Y_D = \left[L_D^{\gamma} + M_D^{\gamma}\right]^{1/\gamma} \tag{2}$$

$$Y_F = \left[L_F^{\gamma} + M_F^{\gamma}\right]^{1/\gamma} \tag{3}$$

where $\gamma \in (0, 1)$, and $L_D(L_F)$ is the employment of intended mother(surrogate) labor, and $M_D(M_F)$ is a measure of the input of intermediate goods produced by both labor groups. For simplicity assume that both production functions are identical and the inputs of labor and intermediates enter symmetrically. As long as $\gamma < 1$ the inputs are not perfect substitutes.

The wages of the intended mother and the surrogate are simply equal to the marginal product of labor:

$$w_D = \alpha\rho A\left[1+\left(\frac{M_D}{L_D}\right)^{\gamma}\right]^{\frac{\alpha\rho-\gamma}{\gamma}}\left[1+\left(\frac{M_F}{L_F}\right)^{\gamma}\right]^{\frac{\rho(1-\alpha)}{\gamma}}\left(\frac{L_F}{L_D}\right)^{\rho(1-\alpha)}\left(\frac{K}{L_D}\right)^{1-\rho} \tag{4}$$

$$w_F = (1-\alpha)\rho A\left[1+\left(\frac{M_D}{L_D}\right)^{\gamma}\right]^{\frac{\alpha\rho}{\gamma}}\left[1+\left(\frac{M_F}{L_F}\right)^{\gamma}\right]^{\frac{\rho(1-\alpha)-\gamma}{\gamma}}\left(\frac{L_D}{L_F}\right)^{\rho\alpha}\left(\frac{K}{L_F}\right)^{1-\rho} \tag{5}$$

The elasticity of substitution is given as $\sigma = 1/(1 - \gamma)$. Wages of the surrogate to increase as more and more activity is shifted overseas occurs if the elasticity of substitution of unskilled labor and the outsourced surrogacy is sufficiently low. That is $\sigma < (1/[1 - \rho(1 - \alpha)])$.

Despite the fact that the interdependence between wages and outsourcing is fully determined by (4) and (5), the wage differential is not the only driver for surrogacy outsourcing. As noted above, the uncertainty in contract enforcement may be the determining factor.

The Question of Effort

Consider a domestic representative of the intended parents, denoted by d, transacting with a foreign surrogacy firm owner in a third world country, denoted by f. The project requires the domestic representative to provide the fertilized embryo to the foreign surrogacy firm as an input, to process the input into one unit of a final product—the baby, and then to deliver the child to the intended parents or their developed country representative. Timing is as follows: in period 0 the intended parent(s) choose their legal and medical, developed country, representatives. In period 1 the intended parent(s) along with their legal and medical advisors choose the raw material for the embryo. The developing country surrogacy firm who takes possession of the fertilized embryo in period 2 undertakes the processing of the fertilized embryo in a developing country surrogate.

The efforts undertaken in period 1 to acquire the requisite raw material and the medications involved are as follows: e_1 is the effort devoted to searching for a low-priced genetic material by d. In period 2, e_2 is the effort devoted to searching for a low-priced surrogate and the effort devoted to care of the surrogate to assure a healthy final product by f.

The price of the input in period 2 is given by the linear function $P \cdot (1 - e_1)$, $P > 0$; $0 \leq e_1 \leq 1$. P is the marginal product of the domestic representative of the intended parent's effort investment in input search (the genetic material). As P rises, it becomes important to obtain good effort investments e_1 in the search. That is, the more search effort undertaken to acquire the genetic material the lower the input price. The cost of processing the fertilized embryo in period 2 is given by $\phi \cdot (1 - e_2)$, $\phi > 0$; $0 \leq e_2 \leq 1$. That is, effort e_2 devoted to processing lower costs and ϕ is the marginal product of surrogacy firm's processing effort e_2. The revenues earned by the developing country surrogacy firm based on the delivery of the new born child at the end of period 2, are given by e_2. Combined end of period 2 profits equal:

$$\pi = e_2 - P(1 - e_1) - \phi(1 - e_2) > 0. \tag{6}$$

Since this is an on-demand production there is no need for sales or marketing on the part of the foreign surrogacy firm. The foreign surrogacy firm, nevertheless, must provide evidence on prior e_2. Unless there is negligence on the part of the foreign surrogacy firm, the risks of multiple births and/or end product quality problems are born by the intended parents. Unlike Feenstra and Hanson (2005) we do not allow the domestic parties to acquire ownership of the foreign surrogacy firm and do not allow the foreign surrogacy firm to have any role on the choice of genetic material provided.

The cost of providing effort for the domestic parties supplying the genetic material is: $C_d(e_1) = \psi_d e_1$ and the cost to the surrogacy firm is: $C_f(e_1, e_2) = \psi_f(e_1 + e_2)$ where ψ_d and ψ_f represent the disutility for effort for each party. The total surplus from the project equals:

$$W = \pi - C_d[e_1] - C_f[e_1, e_2]. \tag{7}$$

If there was a perfect contract written between the domestic and foreign parties the "best" efforts would be given by: $e_1^* = \max(P/\psi_d)$ and $e_2^* = (\phi + \gamma\lambda)/\psi_f$. If there is any likelihood that the parties could not structure a perfect contract than as Feenstra and Hanson (2005) suggest one may consider the possibility of a Nash bargain.

Starting with a generalized Nash bargaining game where the domestic parties have a bargaining weight of θ and the developing country surrogacy firm has weight $(1 - \theta)$. The threat-point payoffs can de denoted as $\hat{\pi}_d$ for the domestic side and $\hat{\pi}_f$ for the foreign surrogacy firm. Equation (6) presents the *ex-post* profits.

The domestic party(ies) receive:

$$\pi_d = \hat{\pi}_d + \theta(\pi - \hat{\pi} f - \hat{\pi}_d) = \theta(\pi - \pi_f) + (1-\theta)\hat{\pi}_d. \tag{8}$$

The foreign surrogacy firm receives:

$$\pi_f = \hat{\pi}_f + (1-\theta)(\pi - \hat{\pi}_d - \hat{\pi}_f) = (1-\theta)(\pi - \pi_d) + \theta\hat{\pi}_f. \tag{9}$$

Each side will choose their respective effort levels to maximize the difference between these payoffs and the costs of supplying effort:

The domestic party(ies) solves:

$$\max \pi_d - C_d(e_1). \tag{10}$$

The foreign surrogacy firm solves:

$$\max \pi_f - C_f(e_1, e_2) \tag{11}$$

where the domestic party(ies) choose e_1 and the foreign surrogacy firm chooses e_2.

Are there threat-point payoffs available to the parties? If the Nash bargaining breaks down the foreign surrogacy firm cannot complete the gestation process and must terminate the pregnancy. The domestic party(ies) in this case incurs a substantial costs equivalent to a reduction of their marginal product of their period 1 investment. One can imagine a reduction of $(1 - \mu)$ of their first-best payoff $[0 \le \mu \le 1]$. Another interpretation of μ is that it represents the domestic party(ies) ability (or lack thereof) to contract over their period 1 investments. In effect we may have an imperfect contract whereby the intended parents are limited in their options once they have contracted with the foreign surrogacy firm. If $(\pi - \hat{\pi}_d - \hat{\pi}_f) > 0$ then one can argue that the parties would prefer a Nash bargain. However, this latter possibility would occur if the foreign surrogacy firm had property rights to the end product—the child.

The only way to obtain good effort e_2 by the foreign surrogacy firm is by affecting its reputation effect. That is a poor effort on the part of the foreign surrogacy firm (e_2) may affect their future business contracts. Consequently, to insure "first-best" efforts on the part of the foreign surrogacy firm there has to be a credible threat to future contracts. The "first-best" effort on the part of the intended parents is guaranteed since the outcome of the gestation would be their genetic offspring.

5. Concluding Thoughts

This paper focused on the so-called gestational (full) surrogacy, i.e. the form of artificial insemination which applies the method of IVF, whereby a doctor implants the fer-

tilized eggs of a woman into the surrogate's uterus. As we argue above, the surrogate has no genetic link to the biological parents and is assumed to contractually release the child after birth. The important factor is that the woman, who is designated as a "surrogate", bears a baby on behalf of a couple with the intention of relinquishing her rights as legal mother of the child after birth.

The key element to keep in mind is that IVF surrogacy contracts are not contracts to sell a baby (the final product), since the surrogate cannot sell something she does not have property rights to, namely the newborn. The surrogate is essentially selling her gestational services. These services are similar to other services offered by women in employment contracts including wet nurses, models, and more recently athletes and soldiers. Having said that, it is also very obvious that there is a larger debate in the developed world about the morality of these surrogacy contracts, beyond the legal fine points. Consequently there is a very large uncertainty that these contracts will be enforced. As the list of legal disputes rises, domestic households begin to focus on third world suppliers of surrogacy contracts. The creation of large surrogacy firms in India designed to fulfill this demand has raised the issue of regulation of these transactions. Should this trade fall under the rubric of the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS)?

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