

Rent a Womb: Surrogate Selection, Investment Incentives and Contracting

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Abstract

We develop a model of gestational surrogacy, in which a childless couple faces heterogeneous prospective surrogates. High-type surrogates add more value but also have higher outside options. Surrogates can make specific investments for the overall well-being (care) of the unborn child. We show that, under non-contractibility, surrogates invest less (take less care) than the first-best. Couples are also more likely to choose low-type surrogates, who need less compensation for foregoing cheaper outside options. Hence the popular practice of making surrogacy contracts unenforceable might put the unborn child at risk. It might also lead to exploitation of needy women by couples.

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JEL Classification: I11, J13, L14, L24

Introduction

-----Your children are not your children.
They are the sons and daughters of Life's longing for itself.
They come through you, but not from you,
And though they are with you, yet they belong not to you-----

– *The Prophet* (Kahlil Gibran).

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Thousands of babies are born every day in Calcutta, a large city in eastern India. Arjun Banerjee could have been just one of them. Only that he was born to a surrogate mother and the first single father in India, Amit Banerjee. A divorced man, aspiring to be a father, meets two women - an egg donor and a surrogate mother – through an infertility clinic. Arjun is born on the 2nd of October 2005 – out of wedlock, without a rearing mother, in a conservative society (Times of India, 3.10.2005).

Jennifer Rutansky, from Jacksonville, Florida, had always wanted to be a mother. So, when she was diagnosed with Hodgkin's Lymphoma (a form of cancer) in 1997, she chose to preserve thirteen of her eggs before undergoing chemotherapy. Having beaten cancer and married happily, but being too weak to conceive, she found a woman (through an infertility clinic) to carry the embryos created from her thawed eggs and her husband's sperm. The first two attempts failed, but the third paid off. And Jacob Evan Rutansky was born to a surrogate mother on the 3rd of October 2005 (Daily Mail, 5.1.2006).

Call centres and medical transcription are *passé*, as surrogate mothers from India get ready to be outsourced. Reproductive tourism is booming in India today – people are pouring from places like Scandinavia, Singapore, Canada and England. Why spend 2.6-3.5 million rupees in California when it can be done at less than one million rupees in India? Why spend £ 1000 on an advertisement for a surrogate mother in a British daily, when it costs only £ 100 - £ 300 here (Times of India 29.9.2005, Telegraph 22.1.2006, Asian Pacific Post 9.3.2006, Mail & Guardian Online 29.3.2006)?

So, what exactly is surrogate motherhood? Is it a godsend for childless couples or a threat to the very fabric of society? Does it allow fertile women to fulfil a social responsibility or does it exploit them and turn them into commodities? Will a baby be happy with a rearing mother or does it need the birth mother? Should the surrogate give up the child or ask for its custody? Should the payment to a surrogate be banned, so that the service remains altruistic? Or, could the fee be so high that women are attracted to surrogacy for financial benefit?

The existing literature on surrogate motherhood has debated a large number of economic, legal and ethical issues concerning the welfare of women and children. But, to the best of our knowledge, the arguments have not been formalized as yet. So, in this paper, we develop a model to focus on the role of well-defined laws on surrogacy. To be exact, we discuss the need for contractibility of specific investments by a surrogate. We argue that if such investments are not contractible, all surrogates will invest less than their first-best levels¹. We also show that unless surrogates are very altruistic, couples would choose more low-types in the second-best equilibrium.

The first result implies that if surrogacy contracts are not enforceable, the unborn child might be at risk. The surrogate might not take as much care, to ensure the birth of a healthy child, as she would have under a more efficient legal system. This result holds irrespective of her social awareness, education or altruism. When contracts are unenforceable, couples do not pay her as much as she deserves for her optimal care. So,

in anticipation of this ‘exploitation’, she cares only as much as she is paid for. The level of care and the degree of exploitation are intertwined.

Technically speaking, the reason why a surrogate underinvests in the second-best is the standard hold-up problem. When she invests a little more, under non-contractibility, she receives only a fraction of the gains and the couple gets some benefit. However, since she is the only investing party, she should get all the marginal returns from her specific investment and the outside option of the couple should bind. The couple should not bargain away any of the returns on her investments (McLeod and Malcomson, 1993). But in our case, some of the gains are not included in her payment. While maximizing her private surplus *ex ante*, she anticipates this loss and invests less.

Our second result tells us that, with unenforceable contracts, the demand for low-quality surrogates goes up. The reason is that, in the second-best, low-types are less costly. Each type has an outside option, e.g. an existing or a potential job, which has to be foregone because of the investment in surrogacy. *Cet. par.*, a low-type has less valuable outside options and, hence, lower opportunity costs. A high-type will demand more compensation for the loss of better outside options. Choosing the high-type increases the cost of surrogacy for couples. Therefore, they get tilted towards low-types.

It follows from the foregoing discussion that unenforceable surrogacy contracts might be harmful to the unborn child. They might also increase the likelihood of exploitation of needy surrogates. The second observation needs some clarification. First, we know that all surrogates will be underpaid. Secondly, we show that low-type women (with cheaper outside options) are more likely to be chosen as surrogates. In conjunction, these results suggest that more financially constrained surrogates are more likely to be exploited. But the fact is that contracts for surrogate motherhood are unenforceable in most countries.

In our paper, we have focussed only on the contractibility of specific investments. Another way of making surrogacy contracts unenforceable might be to ban all payments to surrogates. No couple can then go to court and claim that the surrogate had not taken adequate care, despite being paid for it, because such payments cannot be written into a contract. On the other hand, no surrogate can claim that she had not been paid enough, for her care, because she has nothing to show.

In fact, most countries do propose that all payments to surrogates be banned (e.g., www.laws.justice.gc.ca/en/A-13.4, Spar 2006). This is to prevent exploitation of needy women, who might not fully realize the risks involved. Since their consent is not well-informed, it puts the unborn child at risk as well. Further, both the child and the surrogate are treated like commodities with market prices. In fact, the child might be hurt when it comes to know that somebody was paid money for its birth. In short, most policy-makers want a surrogate to be motivated by altruism – a service out of love and a sense of social responsibility - rather than a profit motive (Brazier *et. al.* 1998).

As we have seen, making contracts unenforceable might have the same results, which policy-makers want to avoid. This holds even when all surrogates are extremely altruistic,

so that high types are chosen. In our model with non-contractible investments, high levels of type-independent altruism make better types invest more, without asking for more money (in lieu of better outside options). Even then, the payment and the level of investment are suboptimal. The risk to the unborn child persists, despite highly altruistic surrogates. The implication is that, if payments are banned, the deals might be driven underground – where those in need conduct socially harmful trades.

We can also throw some light on the possible reasons behind a growing demand for surrogates from countries like India. In the second-best, we find that higher the success probability, higher is the benefit for couples from surrogacy. The probability of success refers to the chance of carrying a baby till term. It is exogenous to our model and related to the degree of medical sophistication in a country. We also show that couples benefit more if the value of the outside option, for a surrogate, falls. This is because such an option adds to their costs of surrogacy.

So, countries like India might fit the bill for two reasons. First, by choosing locations with advanced medical technology, Western couples ensure that the chance of successful gestation is high. Secondly, they might also get relatively low-cost surrogates without compromising on quality. This happens if women from developing countries have cheaper outside options, *cet. par.*, than their counterparts in the West. The alternative in such cases (for a comparable cost saving) might be to go down the quality ladder in their own countries.

In short, we perceive surrogacy as a case of subcontracting. We consider a couple who cannot have a child because, for reasons specified later, the wife is unable to conceive. However, it wants a child who is genetically related to (preferably) both the partners. So, it outsources the jobs of carrying the child till term and delivering it to a second woman who becomes a surrogate. After external fertilization of the wife's ovum, the embryo is transferred into the surrogate's uterus. Barring a mishap, she is expected to carry the child till term, deliver it and hand it over to the couple.

Our paper is related to the theoretical literature on property rights and incomplete contracting (Hart 1995, Grossman and Hart 1986, Hart and Moore 1988). In our setup, only the surrogate undertakes investments. We focus on surrogate heterogeneity, type-specific investments and problems of surrogate selection and underinvestment faced by childless couples, rather than on optimal ownership. Also, our work is closely related to the literature on asset specificity and its implications for the nature of contracting (for a review of the issues, *see* Tirole 1999)².

Our model is based on a paper by Andrabi, Ghatak and Khwaja (2005, henceforth AGK), which studies how tractor parts are subcontracted in Pakistan. AGK analyzes how much relationship-specific investment each supplier makes for the buyer, who gets higher and more stable orders and at what price. The main results in AGK are due to four factors: (a) suppliers are of different qualities or types; (b) when a supplier makes an investment, he gets (partly) locked into a relationship with the buyer; (c) every supplier has an outside option of selling generic parts to the market and (d) demand is uncertain.

We incorporate all these features in our model. In other words, a surrogate can be of different types depending on attributes like educational qualification and income. Secondly, as soon as the embryo is implanted and the surrogate starts taking care of an unborn child, she is locked into a relationship, with a couple, till delivery. Thirdly, every woman has access to an outside job market, i.e., she loses actual or potential income by committing to surrogacy. Fourthly, the probability of success is less than unity. In line with AGK, we assume that higher types have better outside options, e.g. those with better educational qualifications and income have better job opportunities.

There are two crucial differences between our model and AGK. The first is that, in AGK's joint surplus function within a relationship, supplier type and investment level are additively separable. So, the marginal benefit from investment is independent of type. Since the marginal cost (value of outside option) rises with type, higher quality suppliers will, *cet.par*, invest less. But, in our model, there is a complementarity - surrogate types and investment levels are multiplicative in the joint surplus function. Not only does a high-type earn more outside, but she also creates more surplus within a relationship. So, it is not clear, *ex-ante*, whether she invests more or less.

Such complementarity also implies that, if a surrogate does not invest, no value is added for the couple. This means that there is no incentive to choose a high-type, if she does not invest enough. In AGK, because type and investment are additively separable, a high-type supplier adds some value, even without investment. The distinction bites in our second-best where low investment by a high-type surrogate adds only to a couple's costs (higher outside options), but not to value. So, while a couple benefits from a type effect in the first-best, it might lose in the second-best. Unless a high-type invests enough in the second-best, low-type surrogates will be preferred.

Secondly, we introduce the concept of altruism. In our model, altruism is assumed to be additively separable in type and a constant factor. Our basic idea is that attributes like social awareness do not depend entirely on a woman's type. Because of type-independent altruism, the benefit from investment rises but compensation (for outside options) does not. Given the complementarity between type and investment levels in our model, it is not always clear, *ex ante*, which type will be chosen. Then, the level of type-independent altruism decides, in the first and the second-best equilibria, the surrogate type preferred by couples.

We divide the paper into Six Sections. In section I, we provide a non-technical introduction to surrogacy. In section II, we develop the basic model. In section III, we analyze the choice of surrogates, under complete contractibility. In section IV, we study the effects of non-contractibility on investment levels and choice of surrogates. In section V, we discuss various issues related to enforceability of surrogacy contracts. In section VI, we conclude with directions for further research.

I A Primer

According to the Merriam-Webster online dictionary, a surrogate is a *substitute*. So, loosely speaking, a surrogate mother is one who carries a baby and gives birth, for

another woman who cannot conceive. The husband and wife, who need a genetic child, are known as the intended parents or the commissioning couple (ACOG, 2004). There are two kinds of surrogacy: (i) straight (natural/traditional) and (ii) gestational (or host).

In a straight surrogacy, the sperm of the intended father is used to inseminate the surrogate. Therefore, the surrogate becomes both the genetic and gestational mother. While the intended father is also the genetic father, the intended mother is only a rearing mother (ACOG, 2004)³. In gestational surrogacy, the egg and sperm of intended parents are fertilized externally and the embryo transferred to the uterus of the surrogate. This process is known as In-Vitro Fertilization-Embryo Transfer (IVF-ET). Here, the surrogate is only a gestational carrier and the intended parents are the genetic parents as well^{4,5}.

Surrogacy contracts are difficult for both parties. The expenses for intended parents can add up to £ 17000 in UK (Brazier *et. al.* 1998, www.cots.org) and around \$ 59000 in the US (Spar 2006). It might also be hard to accept the fact that their child is being carried by someone else. Their frustration grows if multiple attempts, stretching over years, are needed. At the end, there is also a chance that the surrogate might decide to keep the baby. On the other hand, surrogates might find it difficult to carry someone else's child. They might develop a bond with the child, during gestation, and find it very hard to give it up (COTS, 2005).

Surrogates also face health risks like ectopic (outside uterus) pregnancy, multiple pregnancies and ovarian hyperstimulation⁶. These might lead to problems like diabetes, miscarriage, haemorrhage, kidney damage and high blood pressure. These risks pose a threat to the unborn child as well. With ectopic pregnancy or ovarian hyperstimulation, the foetus might die or pregnancy might be terminated. In multiple pregnancies, there is a higher risk of pre-term delivery, low birth weight, stillbirth, neonatal death and subsequent problems like cerebral palsy ([www. ivf-infertility. com](http://www.ivf-infertility.com), ICMR, 2004).

From the foregoing discussion, we realize how unpredictable the outcomes of surrogacy procedures can be. We also see that such uncertainty might not depend on the level of care by a surrogate. Indeed, it is clear that her risks are quite high and she needs to be adequately compensated. Then, it is not surprising that, in our setup, both the parties prefer a high probability of success, which is often beyond their control, and related more to the degree of medical sophistication in a country. With this background, we move on to a detailed discussion of our model.

II The Model

We analyze the relationship between a childless couple (intended parents) and a potential surrogate, who is willing to bear their child through IVF-ET. We discuss the case where the intended parents are also the genetic parents and the surrogate is only a gestational carrier^{7,8}. Alternatively, they can choose to adopt, if they do not want to remain childless. To focus sharply on surrogacy, we make a simplifying assumption that the intended

parents prefer a genetic child to an adopted one. This does not affect our qualitative results. We also assume that both parties are risk-neutral.

After the IVF-ET, the surrogate starts taking care of the unborn child. This might entail everything from consuming good food to remaining healthy and cheerful. In many cultures, there is a belief that the mother's mental state, during pregnancy, has a strong effect on the unborn child⁹. We denote all these actions by x . Also x might include non-consumption of alcohol and cigarettes, non-indulgence in strenuous work or even moderately strenuous work, non-indulgence in sexual intercourse during pregnancy and many more. To be precise x is a specific investment, by a surrogate, towards the overall well being of the child. We assume x to be non-contractible.¹⁰

We assume that a surrogate can be of two types, high or low, i.e., $\theta_i \in \{\underline{\theta}, \bar{\theta}\}$ where $1 \geq \bar{\theta} \geq \underline{\theta} \geq 0$. Without loss of generality, we use the normalization $\underline{\theta} + \bar{\theta} = 1$. A type can be interpreted as an index of a surrogate's educational qualification, financial status, health, knowledge, social awareness and attitude towards health and child welfare - in short, it reflects her ability to take proper care. In general, a more educated surrogate is expected to take better medical and psychological care of the unborn child. We assume that surrogate types are known and observable to all parties. In other words, there is no adverse selection in this model.

We justify this assumption on the ground that Intended parents meet the prospective surrogate repeatedly, before the contract is signed¹¹. The Intended parents can also check her financial status and educational qualifications, to get a fair idea of her type. This means that, if background information is scarce, e.g. in countries like India, close relatives are more likely to act as surrogates^{12,13}. But we focus on those cases where the surrogate is not related to the intended parents.

We assume that there are many prospective surrogates, of both types. We also assume that a high-type surrogate can create more surplus (value) within the relationship. As already noted, she can also seek some other job, in the outside market. We assume that a high-type surrogate has better outside options, i.e., better job opportunities in the outside market *vis-à-vis* the low type surrogate if she doesn't decide to enter a contract.

Generally a simple commercial surrogacy contract comprises of a lump-sum payment to the surrogate after the pregnancy is over (*See* footnote 22)¹⁴. Medical expenses are borne by the intended parents. We assume that after the successful birth of the child the surrogate is supposed to hand over the baby to the intended parents. Indian surrogacy law supports this assumption. In case of a dispute we assume that the baby is taken over by the state. Again the example in footnote 22 supports this assumption.

The ex-post joint surplus, from surrogacy, is given by $S(x, \theta) = \alpha + \beta\theta x + (a + \theta)x$ where $\alpha > 0$, $\beta > 0$ and $a > 0$. We assume that the surplus is increasing in the specific investment of the surrogate. This marginal benefit is also increasing in her type. The term

$(a + \theta)x$ denotes the surplus due to altruism from investment by a surrogate¹⁵. We assume that the marginal benefit from altruism is additively separable in type and a constant factor. The constant captures the investment effect, of altruism, that is common to all types.¹⁶ One implication of the above surplus function is that ‘type’ *per se* doesn’t play any role if investments are zero. To put it differently if the surrogate doesn’t invest anything then it shouldn’t matter whether she is a high type or a low type. We assume that the (ex-ante) cost of undertaking this specific investment, for the surrogate, is $C(x) = \frac{1}{2}x^2$.

The outside option, faced by a surrogate of type θ , who is investing x within the relationship, is given by $V(x, \theta) = \lambda\theta(K - x)$.¹⁷ This function tells us that better types also have better outside options. This can be justified by saying that the more educated the surrogate the more likely that she would get alternative job opportunities outside the relationship.¹⁸ The term θ can also capture the probability that the surrogate will get an outside job. Moreover, the functional form suggests that the greater the specific investment by a surrogate, within the relationship, the lower is the outside option. In other words, we assume that the specific investment constrains her from taking alternative jobs and thus, reduces her outside option. Essentially x precludes strenuous and intensive participation in the labour market and thus, reduces her outside option.

We impose the following parametric restrictions:

Assumptions:

- 1) $\lambda < \beta + 1$.
- 2) $K > (\beta + 1)\bar{\theta} + a$.
- 3) $\alpha > \lambda\theta K$.

The first assumption guarantees that marginal benefit from investment is always greater than marginal opportunity (outside option) cost of investment. The second ensures that the outside option is always positive, i.e., even when there is no uncertainty and the surrogate invests under the first best. The third assumption makes intended parents prefer a surrogacy relationship, for all types.

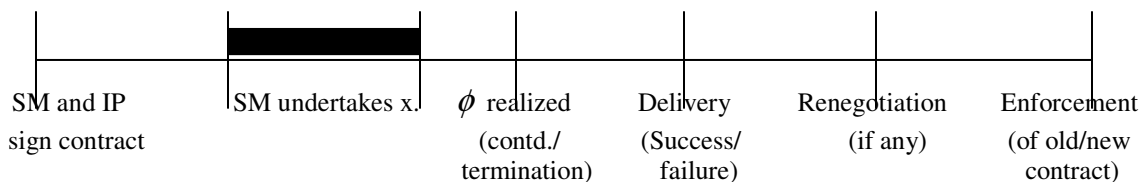
III The First-Best

We first analyze the case where the specific investment is contractible and is chosen to maximize the expected joint surplus of the intended parents and the surrogate. We denote by $\phi < 1$ the *ex-ante* probability that the gestation will culminate in the successful birth of a child. The term $(1 - \phi)$ denotes the probability of the pregnancy being terminated in between, due to some unforeseen problems, which are beyond the control of the parties.

We note that ϕ might also depend on x with $\phi'(x) > 0$. But we assume ϕ to be independent of x , without altering the qualitative results. The logic is as follows: if a rise

in x leads to an increase in ϕ , the weight on the surplus within the relationship goes up and the weight on the outside option falls. In our model, an increase in x does increase expected surplus from surrogacy and reduce the outside option. So, we already capture the effect of a rise in ϕ . An additional assumption will reinforce our results, but make the analysis complicated. Therefore, for simplicity, we assume ϕ to be beyond the control of both parties¹⁹.

If the process is discontinued midway or in other words the foetus is aborted midway due to some medical complications or dispute,²⁰ then the surrogate can take up a job in the outside market. Although this might happen with a time lag, for simplicity we assume the discount factor to be equal to one. Again, this does not affect our qualitative results. If the process is terminated (aborted) midway then the surrogate's investments are sunk and the entire effort is wasted since the foetus has no value outside the relationship.²¹ In fact this accentuates the under-investment problem under non-contractibility. But for the time being, we focus on the full contractibility case. Although the entire process is quite complex, for analytical convenience the timeline of events can be captured as follows:



SM – Surrogate Mother, IP – Intended Parents.

Note that if pregnancy is terminated midway, then we move to the possible re-negotiation point as the delivery stage doesn't arrive at all. The possibility of re-negotiation in case of a dispute, after the investments are sunk, is at the heart of our paper. Under the first best, how the intended parents and the surrogate split the surplus has no allocative implications. Therefore, under the first best, x will be chosen by maximizing the following expected joint surplus:

$$s(x) = \phi[\alpha + \beta\theta x + (a + \theta)x] + (1 - \phi)\lambda\theta(K - x) - \frac{x^2}{2}. \quad \dots(1)$$

The optimal choice of x is given by:

$$x^*(\phi, \theta) = \max\{a\phi + \theta[\phi(\beta + \lambda + 1) - \lambda], 0\}. \quad \dots(2)$$

If $\phi > \frac{\lambda\theta}{a + \theta(\beta + \lambda + 1)} = \hat{\phi}(\theta)$, $x^* > 0$. Otherwise $x^* = 0$. Note that $\hat{\phi}(\theta) < 1$ and it is

increasing in θ . Also x^* increases with θ iff $\phi > \frac{\lambda}{(\beta + \lambda + 1)}$. We denote

$\tilde{\phi} = \frac{\lambda}{(\beta + \lambda + 1)}$. We can now state our first proposition.

Proposition 1: Under full contractibility

- (a) The level of specific investment by a surrogate increases with the probability of success.
- (b) High-type surrogate invests more if $\phi > \frac{\lambda}{(\beta + \lambda + 1)} = \tilde{\phi}$. When $\phi = \tilde{\phi}$, investments are equal for both types. Otherwise the low type invests more.
- (c) With complete certainty high type surrogate invests more than the low type.

Proof: Immediately follows from equation 2.

The first result follows from the fact that with a rise in the success probability, the relative importance of the relationship goes up. This makes both types invest more. The second result follows from the fact that the high-type surrogate also has better outside options. So, the marginal opportunity cost of a relationship is higher for her. Therefore, she will invest more than the low-type only if the probability of success is sufficiently high. Then, the positive effect on the joint surplus will exceed the cost of foregoing her outside option. With high uncertainty, the outside option gets more weight and she invests less. The third result is simple. When there is no uncertainty, the outside option gets no weight. In other words, for a surrogate, there is no opportunity cost of a relationship. So, since the high type generates more joint surplus, she invests more than the low type.

But the issue of surrogate selection, by Intended parents, still remains. We need to analyze why intended parents prefer particular surrogate types. It transpires from the next proposition that such choice crucially depends on ϕ .

Proposition 2

- (a) If $\phi < \hat{\phi}(\underline{\theta})$ high-type surrogate will always be preferred.
- (b) If $\hat{\phi}(\underline{\theta}) < \phi < \hat{\phi}(\bar{\theta})$ then high type surrogate will be preferred iff
- $$a < \tilde{a} = \sqrt{2(1-\phi)\lambda K(\bar{\theta} - \underline{\theta})} + \underline{\theta}[\lambda - \phi(\beta + \lambda + 1)] > 0$$
- (c) If $\hat{\phi}(\bar{\theta}) < \phi < \tilde{\phi}$ then high type surrogate will be preferred iff
- $$a < \tilde{a} = \frac{(1-\phi)\lambda K}{\phi[\lambda - \phi(\beta + \lambda + 1)]} + \frac{[\lambda - \phi(\beta + \lambda + 1)]}{2\phi} > 0$$
- (d) If $\tilde{\phi} < \phi < 1$, high type will always be preferred.

Proof: See the appendix.

There are two effects that we should consider here. First is the type effect and the second is the investment effect. When $\phi < \hat{\phi}(\underline{\theta})$, both types invest nothing. There will only be a

type effect. Since the high type generates more joint surplus, it will be preferred. In the second case when $\hat{\phi}(\underline{\theta}) < \phi < \hat{\phi}(\bar{\theta})$, the low-type surrogate's investment is positive but the high type doesn't invest anything. Therefore, there is a trade-off between the investment effect and the type effect. Now if the type effect dominates the investment effect, then the intended parents will choose the high-type. The parameter 'a' captures the effect of type-independent altruism on investment. When a is sufficiently low, investment effect is dominated by type effect and the high type will be preferred. Otherwise the low-type will be preferred.

If $\hat{\phi}(\bar{\theta}) < \phi < \tilde{\phi}$, both types invest, but the low-type invests more. Again, the same trade-off between the investment effect and type effect exists and the high type will be selected if a is sufficiently low. Lastly, if $\tilde{\phi} < \phi < 1$, the high type invests more than the low type. Thus, the investment effect reinforces the type effect and the high-type surrogate mother will be unambiguously chosen.

The upshot is that, under full contractibility, the choice of surrogates crucially depends on the uncertainty parameter ϕ and the type-independent altruism parameter a . For moderate success probability, the higher is a , the greater is the investment effect and the greater the possibility that low-types might be chosen (cases 2 and 3). In the next section, i.e., under non-contractibility of investments, we find that the role of a - type-independent altruism - changes completely.

IV The Second-Best

From the world of perfect contractibility, we now turn to the case where x is subject to transaction costs. Following the Grossman-Hart-Moore property rights framework, we assume that x is observable but not verifiable. There is a chance that the intended parents think that the surrogate has not fulfilled her contractual commitment and deserves a lot less. If the pregnancy is terminated in between, they might refuse to pay the requisite fees out of frustration. If there are any problems with the child after delivery, they might also put it down to the underinvestment of the surrogate and refuse her due remuneration²². All these possibilities give rise to the hold-up problem.

If the pregnancy is terminated midway, a surrogate can walk out of the relationship (with some lag) and earn her ex-post outside option. Then, the intended parents have to search for another surrogate. This might entail a huge cost for them, since the entire process has to be repeated. Here, we do not model such costs²³. The surrogate's fees are re-negotiated after the investments are sunk, i.e., post-delivery, and the parties are assumed to adopt a Nash bargaining solution.

The gross ex-post surplus within the relationship, if a baby is born, is given by $S(x, \theta) = \alpha + \beta\theta x + (a + \theta)x$. Using a standard Nash bargaining approach, the surrogate's share of the ex-post surplus, conditional on the contract being signed (which can be interpreted as the price), will be

$$\pi^S = \frac{\alpha + \beta\theta x + (a + \theta)x + \lambda\theta(K - x)}{2} \quad \dots(3)$$

where the superscript ‘S’ denotes ‘surrogate’. The IP’s share of the ex-post gross surplus in this relationship, contingent on the trade taking place, is:

$$\Pi^P = \frac{\alpha + \beta\theta x + (a + \theta)x - \lambda\theta(K - x)}{2} \quad \dots(4)$$

The superscript ‘P’ denotes ‘parents’.

The surrogate will choose x to maximize:

$$\Pi^S = \phi\pi^S + (1 - \phi)\lambda\theta(K - x) - \frac{x^2}{2}. \quad \dots(5)$$

The surrogate’s optimal choice of x under non-contractibility will be:

$$x^{SB}(\phi, \theta) = \max \left\{ \frac{a\phi}{2} + \theta \left[\frac{\phi}{2}(\beta + \lambda + 1) - \lambda \right], 0 \right\} \quad \dots(6)$$

It is evident that $x^{SB} > 0$ if and only if $\phi > \frac{2\lambda\theta}{a + \theta(\beta + \lambda + 1)} = 2\hat{\phi}(\theta)$. Otherwise $x^{SB} = 0$.

We use the following notations: let $\phi_0 = 2\hat{\phi}(\underline{\theta})$, $\phi_1 = 2\hat{\phi}(\bar{\theta})$. One can easily check that $\phi_0 < \phi_1 < 1$ since $\lambda < \beta + 1$ (see Assumption 1). This implies that the high-type surrogate will invest a positive amount if uncertainty is very low, i.e., the success probability is very high. It is easy to note that x^{SB} increases with θ iff $\phi > \frac{2\lambda}{(\beta + \lambda + 1)} = 2\tilde{\phi} = \phi'$ (let).

Therefore, if $\phi < \phi_0$ investments by both types are zero, for $\phi_0 < \phi < \phi_1$, investment by the high type is zero, but that of the low type is positive. For $\phi_1 < \phi < \phi'$, investment by both types is positive. It is interesting to note that, at $\phi = \phi'$, both types invest equal amounts. Therefore, we can state our next propositions:

Proposition 3: Under non-contractibility

- (a) Given any level of uncertainty, both types of surrogates invest less than under perfect contractibility.
- (b) If $\phi < \phi_0$ the investment levels of both the high and low type are zero.
- (c) The high type surrogate invests more than the low type iff $\phi > \phi'$. When $\phi_0 < \phi < \phi'$ the low type invests more than the high type. If $\phi = \phi'$, both types invest positive and equal amounts.
- (d) The level of investment increases with the success probability ϕ (probability of continuation) for both types.

Proof: See the appendix.

The first result is the underinvestment consequence of a hold-up problem. Under non-contractibility, a surrogate under-invests because she expects that, with *ex-post* bargaining, a fraction of the surplus from her investment will be appropriated by the

intended parents. Also, her investment directly reduces her outside option, increases her costs and reinforces the underinvestment result. The second result is straightforward. It says that the success probability needs to be sufficiently high, for both the high and the low types, to invest positive amounts.

The third result can be explained as follows: as in the first best, the cost of getting locked into surrogacy is higher for the high type. Higher investment leads to a greater fall in the outside option for a high type than the low type. The ‘outside option’ effect creates an incentive for the high type to invest less. But there is a ‘surplus’ effect as well. An increase in investment creates more value within the relationship for the high type. The surrogate also gets a share of this (Nash-bargained) *ex-post* surplus (*see* eqn. 5).

As already mentioned, ϕ is the weight of the surplus component in a surrogate’s payoff. Similarly $(1 - \phi)$ is the weight of the outside option in her payoff. When ϕ is not too high i.e., $\phi_0 < \phi < \phi'$ then the ‘outside option’ effect dominates the ‘surplus’ effect and the high type will invest less than the low type. But when ϕ is sufficiently high in the sense $\phi > \phi'$ then the ‘surplus’ effect dominates the ‘outside-option’ effect and the high type surrogate invests more. This insight also leads us to the fourth result. If ϕ increases, the weight on the surplus component increases and that on the outside option falls. Therefore, as ϕ increases, the incentive to invest goes up for both surrogate types.

We now analyze the choice of surrogates by intended parents. While choosing a surrogate, the intended parents will maximize their expected private surplus $\phi \Pi^P$, not the expected joint surplus as in the first best. The following proposition characterizes the choice of the surrogate by the intended parents under non-contractibility:

Proposition 4

- (a) If $0 < \phi < \phi'$ the low type surrogate will be preferred.
- (b) If $\phi' < \phi < \phi'R$ where $R = \frac{(\beta + \lambda + K + 1)}{(\beta + \lambda + 1)} > 1$, the high type will be preferred iff

$$a > \frac{\left[\lambda(\beta + \lambda + K + 1) - \frac{\phi}{2}(\beta + \lambda + 1)^2 \right]}{[\phi(\beta + \lambda + 1) - \lambda]} = \bar{a}. \text{ Otherwise the low type will be}$$

preferred.

- (c) If $\phi'R < \phi < 1$ the high type will always be preferred.

Proof: See the appendix.

Corollary 1: *If $\phi'R > 1$, then the high type surrogate will be preferred iff*

$$a > \bar{a} \quad \forall \phi \in (\phi', 1].$$

To explain these results we need to consider two effects again. One is the ‘investment effect’ and the other is the ‘compensation effect’. When ϕ is sufficiently low, i.e., when $\phi < \phi_0$, both the types invest nothing. Therefore, the investment effect is zero. But the intended parents need to compensate the high type surrogate more than the low-type, since the high type has greater outside options. So, it is optimal for the intended parents to hire a low-type surrogate. When $\phi_0 < \phi < \phi_1$ the low type’s optimal second best investment is positive but still the high type invests nothing. Here, the investment effect reinforces the compensation effect for the low type and the intended parents optimally choose a low-type surrogate.

Again, when $\phi_1 < \phi \leq \phi'$ the second best investments are positive for both types but the low type invests more than the high type. Using similar logic, as above, we conclude that the intended parents optimally choose the low-type surrogate. When ϕ is sufficiently high i.e., $\phi > \phi'$, the high type invests more than the low type and we have a trade-off. The high-type now adds more value within the relationship, by her investment, but needs to be compensated more than the low type. If the investment effect dominates the compensation effect, then the high type will be preferred. As already mentioned, the parameter a captures the ‘type-independent investment’ effect in the surplus function. If a is sufficiently high, the high type surrogate will be the optimal choice.

It is interesting to note how non-contractibility tilts the choice towards low types. The upshot is that institutional imperfections, legal loopholes and, hence, absence of well-defined contracts will push the system towards low-type surrogates who are more susceptible to exploitation (although we do not model exploitation here). Against this backdrop, we now discuss a number of complex issues related to surrogacy.

V Issues in Surrogacy²⁴

Surrogate motherhood is a difficult topic for discussion, because it has so many – ethical, religious, psychological, social and legal – dimensions. In our model, we have analyzed the need for well-defined surrogacy laws. In this section, we try to relate some emotive issues to the enforceability of surrogacy contracts. In what follows, we restrict ourselves to three issues: (i) the welfare of children born of surrogates; (ii) the welfare of other children and (iii) the welfare of surrogates and intended parents.

We start by recognizing the fact that we have made a partial equilibrium analysis, so far. Surrogacy contracts can affect several other parties, besides intended parents and potential surrogates. These include the unborn child, the families of surrogates and other unwanted children in society, who might have been adopted, had surrogacy contracts not existed. We have not indicated how enforceable surrogacy contracts affect their welfare. It might be that their welfare losses are greater than the gains outlined so far. In such cases, surrogacy contracts might be Pareto-inferior in a general equilibrium sense. In what follows, we discuss this possibility in some detail.

Children born of surrogate mothers can be at high emotional risk. This might be because they are removed from their birth mothers and handed over to rearing mothers. If association with genetic parents has a positive effect on psychological development, then children born of straight surrogacy might be hurt by the loss of genetic mothers. They might also suffer from identity crises, because they might not be able to decide who their real mother is – the women who gave the eggs, the women who bore them or the women who are rearing them. These questions become more important during adolescence, when they begin to develop a sense of identity.

Although few systematic empirical studies have been conducted on such children, a parallel has been drawn with adopted children, who are also removed from their birth parents. It has been found that adopted children do exhibit relatively more behavioural problems. However, such complications are more probable in families with low-quality parenting and a lack of communication, between parents and children, regarding the facts of adoption. Moreover, a growing body of research suggests that children born of other assisted reproduction techniques are functioning well, even when donated gametes were used in their conception (Brazier *et. al.* 1998).

If separation from birth mothers is thought to be emotionally difficult for children, then their proximity can also cause problems. It is not clear whether surrogates should be encouraged to stay in close contact with the children they carried. We still do not know how children might feel towards the mothers who gave them away after birth. On the one hand, they might benefit from a clearer understanding of their conception. On the other, if they are hostile towards their intended parents or they come to know that their birth mother had borne children for other couples as well, their sense of self-esteem and identity might be hurt (Brazier *et. al.* 1998).

But the question is whether these losses are high enough to justify unenforceable surrogacy contracts? Do these children derive a net disutility from life, so that they would prefer not to be born? Posner (1989) responds in the negative, for two reasons. According to him, it is highly unlikely that these children are so miserable that, left to themselves, they would rather not be born. As already noted, the available evidence suggests that the extent of losses depends more on the quality of parenting than genetic links. Since they do not suffer a net loss from being born, enforceable surrogacy contracts lead to a Pareto-superior equilibrium.

Moreover, even when such children come to know that their conception had come at a price, they are no different from those who are adopted or conceived by donated sperms. Even adoption and sperm donation agencies receive a lot of money and trade in many more babies than in surrogacy. Since these contracts are enforceable, so should be those ones in which a surrogate receives a payment. The point is that, there is a need for systematic empirical studies on the psychology of children who are adopted or created by artificial techniques. This does not mean that, *a priori*, surrogacy contracts should be made unenforceable (Posner, 1989).

Another possible objection is that there might be an excess supply of unwanted children in the adoption market – e.g. coloured or physically challenged – if surrogacy contracts are enforced. While this might well be true, it remains a social problem and calls for a different remedy. Since the intended parents are not at fault for the glut, forcing them to adopt less preferred children would amount to taxing them and distorting their choice. The upshot is that, making surrogacy contracts unenforceable, in order to boost the demand for unwanted children in the adoption market might reduce aggregate social welfare (Posner, 1989).

The most common argument against the legality of surrogacy contracts is that, at the time of signing the contract, the surrogate's consent is not well-informed. It is her financial desperation which drives her into the contract. For instance, she might not want to give up the baby after it is born. Or, intended parents might get divorced, while she is pregnant, so that she might be left with an unwanted child²⁵. Her *ex-post* distress should also be factored in the *ex-ante* social welfare calculus.

However, as Posner observes, this aspect is not unique to surrogacy. All contracts, e.g. for surgeries, are subject to such *ex-post* regret. This is because contracts are signed prior to performance. In the *Baby M* case, the surrogate (Mrs. Whitehead) did develop a bond with baby Melissa, and fled with her, to avoid handing her over to the intended parents (Mr. and Mrs. Stern)²⁶. But, refusal to surrender custody is quite rare in surrogacy. COTS (2005) reports that the incidence is about one per cent. Most surrogates have had children, are above 20 years of age and hence are assumed to be able to calculate the psychological costs of surrendering a baby (Posner, 1989). To set the record straight, surrogates have returned not only the baby, but also part of their payments to intended parents (Brazier *et. al.* 1998)²⁷. Therefore, distress costs should not be exaggerated.

Moreover, there are other ways of avoiding such incidents. For instance, COTS (2005) suggests that a surrogate should have already had children of her own, preferably of both genders, so she knows how childbirth feels and does not bond with a baby of any sex. She should also be extensively counselled. In other words, a surrogate with healthy children signals her ability to sign and honour a contract, when information costs are high. By counselling before and after the contract, her commitment to a relationship is raised. Signalling and commitment are two important tools of contract enforcement in Economics. Moreover, it is not clear who is distressed, *ex-post*. Even intended parents will be badly hurt if the surrogate does not give up the baby (COTS, 2005). The solution is to make contracts enforceable – with appropriate damages on a breach (Posner, 1989).

The next issue is that of exploitation. It is argued that needy women might be enticed by high fees into surrogacy and so such contracts should not be enforceable. There is indeed some evidence that “most surrogate mothers earn just above the poverty line, and less than four per cent of surrogate mothers are reported to have received graduate school education. Over 40 per cent of surrogates are unemployed, receiving financial assistance, or both” (Williams-Jones, 2002). But, as Posner (1989) and Hatzis (2003) point out, making surrogacy contracts unenforceable is the wrong answer.

First, these women are so desperate to enter surrogacy contracts, at some risk to themselves, because there is no government safety net to fall back upon. Secondly, in the absence of such nets, when they get into surrogacy, they essentially use an imperfect market safety net, to sustain themselves and their families²⁸. The optimal intervention would be to create adequate safety nets for these women. Otherwise, it is unfair on the part of the government to stop them from such contracts. They are being taxed for a social problem, not of their making, and this reduces social welfare.

Moreover, there is some anecdotal evidence that even if surrogacy contracts are unenforceable, exploitation will continue. For instance, a girl was sold off twice in three years, by her orphanage in Haryana, India, to bear children for two childless couples (Times of India, 17.2.2005). Allen (1991) also observes that “southern black mothers were in a sense surrogate mothers because they knowingly gave birth to children understanding that those children would be owned by others”.

The point is that exploitation stems from limited bargaining power, which arises from low economic or social status. Legal validity of surrogacy contracts does not make the situation any worse. This logic also brings us to the issue of payments for surrogates. This has been equated to commodification, baby selling, prostitution and discrimination (against poor infertile couples)²⁹. But, does it mean that payments be banned? First, all surveys have found a consensus in favour of making payments to surrogates (Stumhcke, 1995; Brazier *et. al.* 1998). This is prompted by a feeling that surrogates should be paid, for their services, an amount which includes at least their actual loss of earnings.

Secondly, as already mentioned, not paying surrogates the fee which they deserve also amounts to exploitation. Thirdly, the inability of poor couples to afford surrogacy cannot be removed by banning payments on surrogacy. The distortion lies elsewhere and should be handled in the manner suggested by ICMR (2004), i.e., by public efforts to make artificial reproductive techniques affordable for low-income classes.

We close this section by pointing out that cases like *Baby M* will happen once in a while – they occur in all contracts. The solution is to make contracts more, and not less, enforceable. If the rights, obligations, rewards and penalties for each party are specified more clearly (Hatzis, 2003; ICMR, 2004) and if contractual payments are listed in greater detail (Brazier *et. al.* 1998), the non-contractible elements will be reduced. As our analysis also shows, this will benefit both surrogates and intended parents and raise social welfare.

VI Conclusion

In the previous section, we have examined the arguments for and against enforceability of surrogacy contracts, in some detail. Our own analysis reinforces the case for contract enforcement in two ways. First, we show that, unlike in the existing literature, the unborn child is not a third party to the contract. Its welfare depends on the level of investment (care) by a surrogate. Since all surrogates underinvest (take suboptimal care) when contracts are unenforceable, we can say that non-contractibility leads to a Pareto-inferior equilibrium.

Secondly, it has been suggested that enforcement of surrogacy contracts would lead to the exploitation of low-types, because needy women will choose to be surrogates for financial benefit. In contrast, we show that when such contracts are unenforceable, low-type women will be more preferred by couples. The intuition behind this demand-side argument is that these women have to be compensated less for their outside options. By making contracts unenforceable, policy-makers might want to reduce the supply of low-type surrogates. But, we suggest that, when demand for surrogates is driven by cost considerations, couples are more likely to choose low-types. Equilibrium choice depends not only on supply, but also on demand.

We have set aside some important issues for future research. First, we have not examined the debate on altruistic *versus* commercial surrogacy. Very briefly, from a legal perspective, surrogate motherhood can be subdivided into two identifiable categories – ‘altruistic’ where no money is paid to surrogates for their ‘services’ (mainly in excess of necessary medical expenses) and ‘commercial’ where money is paid in lieu of services (in excess of medical expenses). Some countries and states ban commercial surrogacy but allow altruistic surrogacy³⁰ on the ground that commercial surrogacy is potentially degrading for women. It might lead to baby selling and commodification of women and motherhood at large. Others point out that “whether surrogacy is commercial or altruistic may be an ironic self deception” (Radin, 1987) and altruistic surrogacy can be more oppressive than commercial surrogacy. We abstract from a detailed discussion here and deal with it in our next paper, where we try to endogenize the optimal form of surrogacy contract under moral hazard.

Second, we need to address the effects of surrogacy on marriage. The conditions under which it strengthens the bond between husbands and wives, who get a genetically related baby, have to be studied. A priori, it might also weaken their ties because a wife might later resent the fact that her husband had artificially inseminated another woman. Moreover, if gay and lesbian couples can become parents by hiring surrogates, will the number of marriages decline? In sum, we will try to examine whether surrogacy can pose a competitive threat to the social institution called marriage.

The third issue is the restoration of first-best equilibrium. Given that surrogacy arrangements are a reality, we need to induce all surrogates to make optimal investments. Whether this is better done by subsidies alone, or by a combination of subsidies and legal reforms, remains to be seen. We need to identify appropriate laws and rank them in terms of welfare effects. While prescribing subsidies, we also have to note that governments in developing countries typically have hard budget constraints. So, the amount of subsidies might depend on the weight of surrogacy contracts in a government’s objective function. It might have to balance the budgetary cost of subsidies with the administrative costs of legal reforms.

The fourth issue is the involvement of middlemen. Though we discuss bilateral contracting between surrogates and intended parents, the role of infertility clinics and support groups is very important. In particular, they can motivate women to become

surrogates and childless couples to think of surrogacy as an alternative. The cost of their services also needs to be brought down, to make them available to economically weaker classes. The role of middlemen and the design of such subsidies remain open questions.

In an age of rapid medical advancement, about 15 per cent of Indian couples (ICMR, 2004) are deemed to be infertile. This could be an important issue for many developing countries, especially if they already have an ageing population. Moreover, there is often a social stigma attached to infertility. That is why we need to examine unorthodox solutions like surrogacy in detail. We have to consider the various complex arguments around such arrangements and analyze potential welfare effects, to suggest what could be done to make people reap the benefits of medical technology.

Appendix

Proof of Proposition 2

We consider the following four cases one by one.

Case 1: $\phi < \hat{\phi}(\underline{\theta})$

It can be easily verified that when ϕ is sufficiently low, $x_H^* = x_L^* = 0$ where subscript 'L' and 'H' stands for 'low' and 'high' respectively. Therefore, we get $S(\theta) = \phi\alpha + (1-\phi)\lambda\theta K$ for all $\theta \in \{\underline{\theta}, \bar{\theta}\}$. Accordingly we can calculate $S(\bar{\theta}) - S(\underline{\theta}) = (1-\phi)\lambda K(\bar{\theta} - \underline{\theta}) > 0$. Thus, the high type surrogate will be preferred in this situation. Since the investments are zero for both types only the type effect determines the choice of surrogate and thus, the high type will be chosen in this case.

Case 2: $\hat{\phi}(\underline{\theta}) < \phi < \hat{\phi}(\bar{\theta})$

In this situation one can verify that $x_L^* > 0$ but $x_H^* = 0$. Therefore, the surplus of the high type is given as $S(\bar{\theta}) = \phi\alpha + (1-\phi)\lambda\bar{\theta}K$ and the surplus of the low-type will be

$$S(\underline{\theta}) = \phi \left[\alpha + \beta \theta x_L^* + (a + \theta)x_L^* \right] + (1-\phi)\lambda\theta(K - x_L^*) - \frac{x_L^*}{2}.$$

Putting $x_L^* = a\phi + \theta[\phi(\beta + \lambda + 1) - \lambda]$ in the above expression we can calculate the following:

$$S(\bar{\theta}) - S(\underline{\theta}) = (1-\phi)\lambda K(\bar{\theta} - \underline{\theta}) - \frac{[\phi a + \theta\{\phi(\beta + \lambda + 1) - \lambda\}]^2}{2}. \quad \text{Now } S(\bar{\theta}) - S(\underline{\theta}) > 0 \quad \text{iff}$$

$$a < \sqrt{2(1-\phi)\lambda K(\bar{\theta} - \underline{\theta})} + \theta[\lambda - \phi(\beta + \lambda + 1)] = \tilde{a} > 0 \quad \text{since } \phi < \phi' = \frac{\lambda}{(\beta + \lambda + 1)}.$$

Case 3: $\hat{\phi}(\bar{\theta}) < \phi < \tilde{\phi}$

This is the case when both the high type and the low type invests positive amounts but the low type invests more than the high type i.e., $x_L^* > x_H^* > 0$ since $\phi < \tilde{\phi}$. One can calculate

$$S(\bar{\theta}) - S(\underline{\theta}) = \phi(\beta + 1)(\bar{\theta}x_H - \underline{\theta}x_L) + a\phi(x_H - x_L) + (1 - \phi)\lambda K(\bar{\theta} - \underline{\theta}) - (1 - \phi)\lambda K(\bar{\theta}x_H - \underline{\theta}x_L) - \frac{1}{2}(x_H^2 - x_L^2) \quad \dots(A1)$$

The following three expressions can be calculated as follows:

$$x_H + x_L = 2\phi a + \phi(\beta + \lambda + 1) - \lambda \quad \dots(A2)$$

$$x_H - x_L = [\phi(\beta + \lambda + 1) - \lambda](\bar{\theta} - \underline{\theta}) \quad \dots(A3)$$

$$\bar{\theta}x_H - \underline{\theta}x_L = [\phi a + \phi(\beta + \lambda + 1) - \lambda](\bar{\theta} - \underline{\theta}) \quad \dots(A4)$$

Using (A2), (A3) and (A4) in (A1) we get

$$S(\bar{\theta}) - S(\underline{\theta}) = (1 - \phi)\lambda K(\bar{\theta} - \underline{\theta}) + \frac{(\bar{\theta} - \underline{\theta})}{2}[\phi(\beta + \lambda + 1) - \lambda]^2 + (\bar{\theta} - \underline{\theta})a\phi[\phi(\beta + \lambda + 1) - \lambda] \quad \dots(A5)$$

The above expression is positive iff $a < \frac{(1 - \phi)\lambda K}{\phi[\lambda - \phi(\beta + \lambda + 1)]} + \frac{[\lambda - \phi(\beta + \lambda + 1)]}{2\phi} = \tilde{a} > 0$

where $[\lambda - \phi(\beta + \lambda + 1)] > 0$ since $\phi < \frac{\lambda}{\beta + \lambda + 1}$. Therefore, if the investment effect (due to altruism) is sufficiently lower then the type effect will dominate the investment effect and the high type will be preferred.

Case 4: $\phi \geq \tilde{\phi}$

We do the proof in two steps. First when $\phi = \tilde{\phi}$, $x_H^* = x_L^* > 0$. Therefore, the investment effect is the same for both the types. Therefore, the high type will be chosen in this situation. Technically put, $S(\bar{\theta}) - S(\underline{\theta}) = (1 - \phi)\lambda K(\bar{\theta} - \underline{\theta}) > 0$. Second, when $\phi > \tilde{\phi}$, $x_H^* > x_L^* > 0$ and since the high type invests more than the low type, the investment effect reinforces the type effect and therefore, the high type will be preferred. This is evident from (A5) as $S(\bar{\theta}) - S(\underline{\theta}) > 0$ since $\phi(\beta + \lambda + 1) - \lambda > 0$.

Proof of Proposition 3

- (a) Can be easily verified by comparing (2) and (6).
- (b) Evident from equation (6).
- (c) We can calculate the difference between the high type and low type second best

optimal investments are as $x_H^{SB} - x_L^{SB} = (\bar{\theta} - \underline{\theta}) \left[\frac{\phi}{2}(\beta + \lambda + 1) - \lambda \right]$. Now if

$$\phi > \phi' = \frac{2\lambda}{(\beta + \lambda + 1)} \text{ then } x_H^{SB} > x_L^{SB}. \text{ If } \phi_0 < \phi < \phi' \text{ then } x_H^{SB} < x_L^{SB} \text{ and for}$$

$$\phi = \phi' = \frac{2\lambda}{(\beta + \lambda + 1)} \text{ we get } x_H^{SB} = x_L^{SB} = \frac{\phi a}{2} > 0.$$

(d) From (6) we can easily see that $\frac{\partial x^{SB}}{\partial \phi} = \frac{a}{2} + \frac{\theta}{2}(\beta + \lambda + 1) > 0$.

Proof of Proposition 4

The intended parents will maximize their expected payoff $\phi \Pi^P$ and accordingly select a surrogate mother. Therefore, for given ϕ we can compare $\Pi^P(\bar{\theta})$ and $\Pi^P(\underline{\theta})$. We analyze by considering the following four cases one by one.

Case 1: $\phi < \phi_0$

When ϕ is sufficiently low both the high type and the low type investments are zero, i.e., $x_H^{SB} = x_L^{SB} = 0$. Therefore, the investment effect is absent in this situation. But because of non-contractibility during ex post bargaining the intended parents need to compensate the high type surrogate more than the low type. Therefore, it is optimal for the intended parents to hire a low-type surrogate *vis-à-vis* a high type. Technically $\Pi^P(\bar{\theta}) - \Pi^P(\underline{\theta}) = -\frac{\lambda}{2}(\bar{\theta} - \underline{\theta}) < 0$. Also note that $\Pi^P(\theta) > 0 \forall \theta \in \{\bar{\theta}, \underline{\theta}\}$ given assumption 3.

Case 2: $\phi_0 < \phi < \phi_1$

Here $x_L^{SB} > 0$ but $x_H^{SB} = 0$. So the low type invests positive amount but the high type's investment is zero. The investment effect works in favour of the low type. Again during ex post bargaining the intended parents have to pay the high type surrogate mother more than the low type since the high type has a greater outside option. Therefore, both the investment effect and the bargaining effect works in favour of the low type surrogate and the intended parents will optimally choose a low type surrogate mother. This can be shown from the following expression:

$$\Pi^P(\bar{\theta}) - \Pi^P(\underline{\theta}) = -\frac{1}{2} \left[\theta x_L^{SB} (\beta + \lambda + 1) + a x_L^{SB} + \lambda K (\bar{\theta} - \underline{\theta}) \right] < 0.$$

Case 3: $\phi_1 < \phi \leq \phi'$

This is the case where both the low type and the high type surrogates invest positive amounts but the low type invests more than the high type except at $\phi = \phi'$ where both the low type and high type investments are the same. Using the same logic as of the previous case the intended parents should optimally choose a low-type surrogate since the compensation effect is being reinforced by the investment effect. We prove that technically in the following way. Putting optimal x_L^{SB} and x_H^{SB} , we calculate the following:

$$\Pi^P(\bar{\theta}) - \Pi^P(\underline{\theta}) = \frac{1}{2} \left[\phi a (\bar{\theta} - \underline{\theta})(\beta + \lambda + 1) + \frac{\phi(\bar{\theta} - \underline{\theta})(\beta + \lambda + 1)^2}{2} - \lambda(\bar{\theta} - \underline{\theta})(\beta + \lambda + 1 + a + K) \right]$$

From the above expression we get

$$\frac{\partial(\Pi^P(\bar{\theta}) - \Pi^P(\underline{\theta}))}{\partial \phi} = \frac{1}{2} \left[a(\bar{\theta} - \underline{\theta})(\beta + \lambda + 1) + \frac{(\bar{\theta} - \underline{\theta})(\beta + \lambda + 1)^2}{2} \right] > 0 \quad \forall \phi \in (\phi_1, \phi'] . \text{ Thus,}$$

$\Pi^P(\bar{\theta}) - \Pi^P(\underline{\theta})$ is monotonically increasing $\forall \phi \in (\phi_1, \phi']$. Therefore, the maximum is reached at $\phi = \phi'$ and after some calculation that maximum value turns out to be

$$\left(\Pi^P(\bar{\theta}) - \Pi^P(\underline{\theta}) \right)_{\phi=\phi'} = \frac{\lambda(\bar{\theta} - \underline{\theta})(a - K)}{2} < 0 \text{ since } a < K . \text{ Therefore, } \Pi^P(\bar{\theta}) - \Pi^P(\underline{\theta}) < 0$$

for all $\phi \in (\phi_1, \phi']$. This proves that the intended parents will indeed optimally select a low type surrogate. Therefore, combining the previous three cases we conclude that the low type surrogate mother will be preferred for all $\phi \in [0, \phi']$.

$$\text{Case 4: } \phi > \phi' = \frac{2\lambda}{\beta + \lambda + 1}$$

In this situation $x_H^{SB} > x_L^{SB} > 0$. Putting optimal x_L^{SB} and x_H^{SB} we get the following:

$$\Pi^P(\bar{\theta}) - \Pi^P(\underline{\theta}) > 0 \text{ iff } a > \frac{\left[\lambda(\beta + \lambda + K + 1) - \frac{\phi}{2}(\beta + \lambda + 1)^2 \right]}{[\phi(\beta + \lambda + 1) - \lambda]} = \bar{\bar{a}} . \text{ The denominator of}$$

$\bar{\bar{a}}$ is positive since $\phi > \frac{2\lambda}{\beta + \lambda + 1} = \phi' \Rightarrow \phi > \frac{\lambda}{\beta + \lambda + 1}$. Now the numerator will be

positive iff $\phi < \frac{2\lambda}{(\beta + \lambda + 1)} \times \frac{(\beta + \lambda + K + 1)}{(\beta + \lambda + 1)} = \phi' \times R$ where $R = \frac{(\beta + \lambda + K + 1)}{(\beta + \lambda + 1)} > 1$.

Therefore, a positive $\bar{\bar{a}}$ exists for all $\phi \in (\phi', \phi'R)$. So, high type surrogate mother will be preferred iff $a > \bar{\bar{a}} \forall \phi \in (\phi', \phi'R)$. If $1 > \phi > \phi'R$ then $\bar{\bar{a}}$ is negative and high type will be preferred always. Now in case $\phi'R > 1$ then a positive $\bar{\bar{a}}$ exists $\forall \phi \in (\phi', 1]$ such that the high type surrogate mother will be preferred if $a > \bar{\bar{a}}$. That is $\Pi^P(\bar{\theta}) - \Pi^P(\underline{\theta}) > 0$ iff $a > \bar{\bar{a}} \forall \phi \in (\phi', 1]$. This completes the proof.

Endnotes

1. In essence, we focus on ‘commercial surrogacy’, not ‘altruistic surrogacy’ (a definition is provided in the conclusion). It is not that we are in favour of commercial surrogacy. We only look at the contractibility aspect, recognizing the fact that monetary transfers are possible either legally or otherwise. We analyze the choice of surrogates and their investment levels in this structure.

2. For detailed coverage of these topics, *also see* books by Salanie (1997) and Bolton and Dewatripont (2005). Mcleod (2006) reviews the literature on the enforcement of incomplete contracts.
3. For more details, *see* ICMR 2004, [www. ivf-infertility. Com](http://www.ivf-infertility.com)
4. For more details, *see* ICMR 2004, www. ivf-infertility. Com
5. We ignore the case where donor sperm is combined with donor or surrogate eggs because the child is not genetically related to intended parents.
6. For more details, *see* COTS 2005, www. ivf-infertility. com
7. The other forms of surrogacy can be easily accommodated in our model with slight modification.
8. For those intended mothers with problems like (i) hysterectomy; (ii) absence or malformation of uterus, since birth; (iii) diabetes, multiple sclerosis, heart and kidney diseases; (iv) repeated miscarriages (www. ivf-infertility. com, Stuhmcke 1995).
9. Evidence on this is mixed. Some studies report that prenatal stress might lead to low birth weight, reduced motor skills in infants, behaviour problems for children or psychiatric disorders in adults (DiPietro, 2002). Others contend that moderate stress might actually boost mental and motor development, but severe stress does hurt the child (DiPietro, 2004).
10. Some part of x might be contractible, i.e., can be medically verified and proved in court. But in our model we can define x to be the non-contractible part of the investment and our analysis goes through.
11. Before embryo transfer or insemination, potential surrogates have to undergo frequent scans and blood tests, to rule out the possibility of passing on sexually transmitted diseases like AIDS and Hepatitis B and C. They also have to be vaccinated against diseases like Rubella (COTS, 2005).
12. With slight modification, our model can be used to analyze a situation like this.
13. Even within a family, those with less power and money are more likely to be exploited. Alejandra Munoz, a poor illiterate Mexican woman, was brought illegally to the US on the understanding that when she became pregnant, the embryo would be transferred to her infertile cousin. But later she was forced to continue the pregnancy. She wanted an abortion, but was kept under house confinement, with the threat that she would be exposed as an illegal alien (Stainsby, 1993; Stuhmcke, 1995).
14. Often there are disputes regarding payments after the pregnancy is over
15. Altruism implies utility from giving the baby to the genetic parents, not the state
16. We could well have assumed the altruism function to be ax , since we already have $\beta\theta x$ in the surplus function. But we choose such a functional form to bring out the type dependence in altruism. This addition doesn't complicate our analysis in any way.
17. A similar type of function was used in AGK in a different context.

18. The outside option can be interpreted as alternative pool of job opportunities that the surrogate has in the outside market. Generally the quality of jobs (in terms of remuneration) available to the high type will be better than that available to the low type.
19. Refer to the health risks faced by surrogates in section I.
20. There are many such instances like this in reality. Sometimes there are risks to the surrogates life or the intended parents advocate abortion and stops further medical treatment because USG reports show abnormalities in the baby. An example of one such dispute of the second type mentioned is given in footnote 20.
21. One might assume that the surrogate might develop a bonding with the baby and decide to keep it in case of a dispute. But for simplicity we assume that the surrogate prefers to walk out of the relationship and have her (discounted) outside option in case of a dispute. Footnote 20 supports this assumption. Also the surrogate might not have the funds to finance the continuation of the pregnancy since the entire process is very costly and many LDC surrogates are poor.
22. An example is the 1983 'Baby Doe' case. Mrs Judy Stiver, a Michigan housewife, agreed to bear a child for Alexander Malahoff and his wife for a fee of \$10,000. When the child was born, it was discovered that he suffered from microcephaly - a condition whereby the child has an abnormally small head and often turns out to be mentally retarded. Mr Malahoff no longer wanted the child and told the hospital to withhold treatment - Mrs Stiver also rejected the child, saying that she had been no maternal bonding. The hospital went to court and won permission to care for the child and the Michigan Department of Social Services fostered the child out. For more *See* Stuhmcke (1995).
23. If intended parents go for adoption, by our assumption, they get zero utility. Since our focus is on the surrogacy relationship we abstract from these issues.
24. The material in this section is based on Posner (1989), Stuhmcke (1995) and Brazier *et. al.* (1998).
25. In *Buzzanca v. Buzzanca*, the intended parents (John and Luanne Buzzanca) got separated during the pregnancy of their gestational surrogate. The embryo had been created from donor eggs and sperm. A California court ruled that the child, Jaycee, was legally parentless. But, this was reversed by the appeals court which concluded that the Buzzancas should be deemed as the legal parents, since they had consented to and initiated the medical process (Annas, 1998).
26. For more details, see [womenshistory.about.com, biotech.law.lsu.edu/cases/cloning/baby_m.htm](http://womenshistory.about.com/biotech.law.lsu.edu/cases/cloning/baby_m.htm)
27. in *Re an Adoption Application ((Surrogacy) [1987] Fam 81)*.
28. When asked what they want to do with their fees, surrogates give standard answers – e.g. new homes, better future for children (Posner, 1989; Williams-Jones, 2002; Times of India 11.2.2006).
29. For excellent discussions on these issues, *see* Posner, 1989; Stuhmcke, 1995.

30. e.g. In Australia (Tasmania, Victoria, Queensland) all kinds of surrogacy contract is void and unenforceable but commercial surrogacy is considered to be a criminal offence whereas altruistic surrogacy is not considered to be a criminal offence!

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