The Game of Arranged Marriages

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A recent article in the *Times of India* (Desai, 2009) discusses the persistent existence of arranged marriages in India over time. Surprisingly, the educated middle class is experiencing a slightly increasing rate of arranged marriages indicating that it still is a widely accepted way of finding a partner. But the advancement of technology has definitely transformed arranged marriages (CNN, 2008). A common way to find a potential spouse these days is through online matchmaking portals like shaadi.com (14 million profiles) or bharatmatrimony.com (1.5 million profiles).

Relying on romance or love when entering a marriage involves trying to transform a relationship from its present state into a long-term committed union. The problem is that even though romance may facilitate love, it does not necessarily guarantee a long term bond. Arranged marriages, on the other hand, simply try to transform an uncertain future outcome into a secure long-term contract based on specific economic, cultural, educational and social factors associated with the potential partners (Desai, 2009). This paper analyses arranged marriages in the context of game theory, highlighting the principles of utility maximization , principal–agent theory and economies of scale .

The Marriage Game – Love and Arranged Marriages

A game theoretic directed analysis of the marriage market studies strategic behaviours, acknowledging the expected behaviour from others and recognizing the mutual interdependence between players.

The figures below show the payoff matrices for a game analysis of the marriage market within an environment of certainty and uncertainty. The games have two strategies (get

married or stay single) and three possible outcomes - both players can choose to marry, both can stay single or one gets married but the other stays single, thus not resulting in marriage for at least one player. We assume that one of the main objectives of getting married is to increase utility compared to staying single.

FIGURE 1: NO UNCERTAINTY

		Woman	
		Marry	Stay single
Man	Marry	(10, 10)	(-10, 0)
	Stay single	(0, -10)	(0, 0)

In a situation without uncertainty, where both the woman and the man want to get married, staying single has a payoff, of zero. If they both get married, their utility rises by +10. If one stays single and the other plans on getting married, the latter has a utility of 0 whereas the former has a payoff of -10. The reason for this is that the partner wanting to get married places a reasonable amount of effort into his/her strategy and thus is worse off than if he/she would have pursued the "stay single" strategy from the start. In this game, it is evident that getting married is the dominant strategy for both players. The Nash equilibrium is therefore the happy outcome where both players get married, which is also a Pareto optimal decision.

FIGURE 2: WITH UNCERTAINTY

		Woman	
		Marry	Stay single
Man	Marry	(10p, 10p)	(0, 5)
	Stay single	(5, 0)	(5, 5)

If one takes into account the uncertainty of the players around wanting to get married, the game looks slightly different. Now, if both want to stay single, their utility increases by

+5 because they were not certain about the increased benefits of getting married anyway. Strictly speaking, it is not necessary to have this pay off from staying single, but we feel that it reinforces the idea of uncertainty more vividly.

If one player wants to marry whereas the other stays single, the player staying single still receives a payoff of 5, but the player who was unsuccessful in finding a partner suffers a payoff of 0 due to costs incurred in trying to get married unsuccessfully. If they both pursue the 'marry' strategy, their payoff amounts to 10 times the value of p, where p is the probability of the marriage being a success. This parameter represents having a lasting, loving and fulfilling marriage. Assume that α is the probability of getting married and $(1 - \alpha)$ is the probability of staying single. Then, the expected utility of the man ($E(U_m)$) who chooses to marry is:

$$E(U_m) = \alpha \times 10 \times p + (1- \alpha) \times 0 = \alpha \times 10 \times p + 0 = \alpha \times 10 \times p$$

Whereas the expected utility of a man choosing to stay single is:

$$E(U_s) = \alpha \times 5 + (1- \alpha) \times 5 = \alpha \times 5 + 5 - \alpha \times 5 = 5$$

It follows that if $(\alpha \times 10 \times p) < 5$, the man chooses to stay single as this gives him a higher expected utility. If $(\alpha \times 10 \times p) = 5$, the man is indifferent to either marrying or staying single. If $(\alpha \times 10 \times p) > 5$, the man is better off getting married.

With love marriages, attaining a high α value is harder because finding a suitable partner usually demands more personal resources (time, money, commitment) than with arranged marriages. This is due to the lack of elaborate screening processes, helpful agents or dowries. The man or woman looks for a potential partner by themselves and is less likely to be influenced by rational materialistic factors, like the bank account, family history or potential for professional development. The existence of intangible aspects is much more important, for example that 'gut feeling', 'butterflies in one's stomach' or, indeed, 'love at first sight'. Without those, the probability of getting married (α) decreases immensely. If these feelings are mutual and both want to tie the knot, the wedding takes place.

Unfortunately, the size or strength of these emotions does not invariably increase the probability of the marriage being a long-term success. The challenge for love marriages is the transformation of the fleeting concept of love into lasting commitment and caring. In order to achieve this and consequently increase p, the couple discusses future expectations about children, jobs and lifestyle before getting married. In this way, compromises can be struck in advance and an uncertain future can be made a little more predictable, thus increasing p. However, a high risk still exists that some topic has been overseen or not answered truthfully or that opinions will change over time. The man/woman is the only judge of character of the potential partner compared to arranged marriages where a number of family members and matchmakers can voice their opinions about the proposed union.

With arranged marriages, the players try to increase their α by choosing partners with similar educational, family, cultural and religious backgrounds. This might also provide foundations for a successful marriage, thus increasing p.

Factors influencing the size of α include the ability of the matchmaker to find a suitable partner, the amount of dowry and the potential benefits of economies of scale when joining the families.

Matchmaking and the Practice of Dowry

Handing over the search for a potential spouse to an intermediary can be analysed by using the idea of a principal–agent relationship. The principal, for example the man, hands over the task of looking for a bride to his intermediaries – people he trusts will be able to find a suitable match. These most likely include parents, grandparents and other close relatives. They swarm out and try to gather as much information as possible about the potential brides and, after rejecting unsuitable prospects and investigating promising ones more carefully, present the principal with their findings. He then can choose whom he wants to pursue. Problems arise during the search process as the principal can not be sure as to whether the agents will place the same emphasis on certain values as he would have done

in arriving at the final list of prospects. There is a certain degree of self interest of an agent which might result in the prospective bride possessing personality traits or values the agent likes but the principal does not appreciate or value quite as highly. A mother might look for a complacent, quiet daughter-in-law whereas her son might not fully agree to this. As a result, α decreases as the guy will not marry a woman who does not possess his ideal attributes.

In order to minimize this problem of self interest, mechanisms could be designed to induce agents to act in their principal's interest, for example by introducing incentives. In an arranged marriage it should be incentive enough to have a son's best interest and happiness at heart. In reality though, the amount of dowry offered plays a crucial role in the selection process.

Both α and p are influenced by the amount of dowry offered by the bride's family for the groom. This was not always the case. During the times of the existence of Swayamvara ceremonies[1], the choice of husband did not depend on the amount of dowry but fell upon the potential grooms themselves who had to successfully complete tasks laid upon them by the girl's father.

The dowry system developed because the groom was more and more looked upon as an asset, generating capital and support for old age, whereas the bride was looked upon as a cost, consuming additional resources. She would be a home carer and not generate future tangible capital. Therefore an arranged marriage was looked upon as a barter system where each family has a good to exchange. In order to have a balanced exchange the bride was married to the groom based on an agreed payment. This is called the dowry system. Since the bride was considered a cost she had no bargaining power when it came to choosing her future husband.

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[1] During the era of kings and Queens, Swayamvara's were held where the daughter's father called princes from neighbouring kingdoms to try to win his daughter's hand in marriage.

The dowry actively influences the level of α as the amount of dowry might compensate for the lack of personal attributes of the potential spouse: the higher the dowry, the higher the probability of them getting married. However, the effect on p is questionable. The emergence of websites like idontwantdowry.com shows the increasing resentment of dowries. For this set of people, the acceptance of dowries might decrease the success of a marriage, thus reducing p.

Modernization has empowered women through education, legal reforms, political power and personal autonomy (Kumari, 2004). More women are now working in high positions and supporting their families, this bargaining power has shifted in favour of the bride. This trend increases the α value from the bride's perspective. A recent example is Nisha Sharma (The Economist, 2003) who called off her wedding after the groom's family demanded an extra dowry on the wedding day.

A form of dowry practice where the groom pays dowry exists in some countries and is called 'Bride Service'. It is the net transfer of labour from a man to his prospective father-in law in order to obtain permission to marry his daughter. This can be looked at as a man's daughter being used 'as bait' in order to obtain the services of the son-in law, implying that the daughter is an economic asset controlled by the father, that can be released for a certain quantity of labour (Bossen, 1988). The man provides services in order to influence the potential bride's α which would result in them getting married.

Economies of Scale in Marriage

Another factor that has an influence on α and p is the potential benefits associated with an arranged marriage that are generated by economies of scale. In general, the gains of marrying compared to staying single depend positively on the partners' incomes and the relative difference in wage rates (Becker, 1973). This means that the higher the difference in income levels and wage rates, the more likely they are to gain extra profits from getting married because of the benefits of specialization and the ensuing economies of scale. In general, marriage encourages the division of labour on principles similar to comparative

advantage and gains from trade. Whitehead and Popenoe (The Economist, 2007) put it like this: "Individuals can develop those skills in which they excel, leaving others to their partner."

   On a micro-level, or the husband-wife household unit, the husband is usually the main income earner and the wife is responsible for the household and caring for the children. Thus, they specialise in certain tasks which results in an economy of scale, as the husband saves time not doing household work and the woman does not have to earn an extra income. They are better off together than they would be by themselves, based on the assumption that the wife chooses to stay at home. This applies not only to arranged but also to love marriages.

   Additionally, arranged marriages experience economies of scale on a macro-level. An arranged marriage is not merely the joining of two individuals but of two families, extending to family networks and offering salient support in professional development, finances, household and relationship issues. It also results in the development of new alliances and a redistribution of power amongst families. It is a mentality based on the assumption that 'the sum is better than its parts'. The more people in the couples' family network, the higher their economic, financial and emotional stability which is seen as the basis of a successful marriage. Thus, an increase of the economies of scale effect positively influences p.

Concluding Thoughts

To sum up, the game of arranged marriages is such that α and p are influenced by the expertise of the agent, the prospect of dowry and the other benefits marriage entails. A high α is the prerequisite of experiencing a high p resulting in a successful marriage in addition to the role of compatibility, mutual respect and appreciation. Consequently, the way a marriage is arranged and created, influences the probability of a successful lasting bond.

   Arranged marriages try to influence α and p values more aggressively than love marriages. By meticulously planning and selecting the future partner (high α), families want to ensure that the couple can achieve the highest p possible. To the extent that the principal-agent relationship this form of marriages creates has fewer contradictions the probability of genuine marital success becomes higher. On the other hand, love marriages include a high degree of uncertainty about the long-term success of the union (p) which is also reflected in the high divorce rates of this kind of marriage. However, initial happiness is higher than in arranged marriages due to the completely voluntary character of the bond. It seems there might be a trade-off between short-term happiness and long-term success. Men and women agreeing to an arranged marriage seem to have recognized this trade-off and accept the fact that they might not attain a high level of happiness at the beginning but continue to place their trust in the institution of arranged marriage hoping for the future to be one of security and stability.

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