

***DADS, YOUR TIME MATTERS: AN ECONOMIC ANALYSIS OF THE
IMPORTANCE OF FATHER INVOLVEMENT***⁺

Jose Miguel M. Abito*
Department of Economics
National University of Singapore
u0206495@nus.edu.sg

February 2005

Abstract

This paper proposes a simple microeconomic model of father involvement decision-making. The model developed is based on the Dynastic Utility Framework with a human capital technology that reflects recent changes in perceptions, expectations, and knowledge regarding the increasingly important role of fathers in child development. Using the model, the optimal child rearing time decision is derived and its properties examined. The model shows that endowed education and past child rearing decisions have no structural effects on optimal child rearing time, and that the optimal child rearing time is fully dependent on the minimum required time for child rearing and on technological constants that reflect the relative importance of certain factors on the accumulation of human capital. It is suggested that the most important factor to encourage greater paternal involvement is fathers' perception with regards to their parenting skills, responsibilities, and role. Work-related policies that aim to promote greater involvement would be ineffective if fathers are not aware of their important role in their children's development.

⁺This paper was presented at the 85th Annual Meeting of the Southwestern Economics Association in New Orleans, Louisiana (March 2005)

* I am a 3rd Year Undergraduate at the National University of Singapore (NUS). Partial travel subsidy was provided by the Dean of the Faculty of Arts and Social Sciences, NUS. This research also benefited from a grant awarded by the Singapore Children's Society. I would like to thank Asst. Prof. Kong Weng Ho and Visiting Prof. Ngo Van Long for useful comments. All errors are mine.

“The gender-based division of family and employment responsibilities not only constrains women’s lives but deprives men of the emotional rewards resulting from the care and development of children.” (EC, 1993)

1. Introduction

Since the first edition of Michael Lamb’s *The Role of the Father in Child Development*, perceptions, expectations and knowledge concerning the role and importance of paternal involvement have been changing (Lamb and Tamis-Lemonda, 2004). Expectations on the role of the father have been evolving from a view that fathers are relatively detached providers to a “new nurturant father” (Lamb and Tamis-Lemonda, 2004; Pleck and Pleck, 1997). This change in perception and expectation is encouraged by the accumulation of knowledge regarding the importance and benefits of active fathering. Numerous studies have documented the benefits of paternal involvement on different aspects of child development primarily cognitive, emotional, and social development. Allen and Daly (2002) provide an excellent summary of research evidence on the effects of father involvement in these dimensions. Notable findings from their survey include better quantitative and verbal skills (Bing, 1963; Goldstein, 1982; Radin, 1982) and better performance in school (Astone and McLanahan, 1991; Blanchard and Biller, 1971; Cooksey and Fondell, 1996; Feldman and Wentzel, 1990; Goldstein, 1982; Gottfried, Gottfried and Bathurst, 1988; National Center for Education Statistics, 1997; Shinn, 1978; Snarey, 1993; Wentzel and Feldman, 1993), greater tolerance for stress and frustration (Mischel, Shoda and Peake, 1988), superior problem solving and adaptive skills (Biller, 1993), greater ability to take initiative (Amato, 1989; Pruett, 1987), higher chance of succeeding in work (Heath and Heath, 1991), better social competence (Amato, 1987; Forehand and Nousiainen, 1993; Gottfried, Gottfried and Bathurst, 1988; Krampe and Fairweather, 1993; Mischel, Shoda and Peake, 1988; Parke, 1996; Snarey, 1993), longer successful marriages (Franz, McClelland and Weinberger, 1991; Lozoff, 1974), and finally, less substance abuse (Coombs and Landsverk, 1988) and delinquency (Zimmerman, Salem and Maton, 1995). Despite these benefits, some still believe that the current level of paternal involvement is not enough (Lamb and Tamis-Lemonda, 2004; Bowers, 2004) and that policy intervention is needed in order to encourage fathers to be more involved¹. Recent attempts to encourage greater paternal involvement such as paternity leave and flextime work hours have not been successful. In a study of OECD countries, Stancanelli (2003) observes that take up rates of these programs have been low with the exception of Scandinavian countries.

According to Palkovitz (2002), the relation between paternal involvement and men’s adult development has been largely ignored by social scientists. An interesting chapter in Palkovitz (2002)

¹ Some examples are George W. Bush’s “Promoting Fatherhood” Initiative (<http://fatherfamilylink.gse.upenn.edu/policy/recent/2007/2007.htm>) and Bill Clinton’s Fatherhood Initiative (National Institute of Child Health and Human Development, 1998).

explores the possible effects of fathering on work and career development through a series of interviews of current fathers. Though the fathers interviewed were aware of the time costs associated with co-parenting, most of them believed that being more involved in child rearing actually had work-related benefits such as gaining work-enhancing skills learned through their fatherhood experiences and having greater motivation to work, advance their careers, and maintain job stability. If there were indeed positive effects of paternal involvement on the fathers themselves, then awareness of these effects gives fathers a greater incentive to be more involved and therefore possibly address the problem of inadequate fathering.

Explicit modeling of father involvement virtually does not exist in the economics literature specifically in the time allocation and human capital research area. In an attempt to explain American and Israeli time use data (Gronau, 1976), Gronau (1977) extends Becker's (1965) well-known time allocation framework to reflect the fact that work at home should be separated from leisure (Mincer, 1962), at least for mothers.² Though Gronau's (1977) model can be used to explain data during the 1970s, it seems that his model needs to be updated to reflect improvements in collection of richer time allocation data and recent trends regarding the role of the father in the family.

Lack of models explaining father involvement in the household, particularly in child rearing, is expected since paternal involvement is often dwarfed when compared to the importance of maternal involvement and this somehow reflects the antiquated but still persistent view that fathers' *sole* responsibility is the provision of material resources. Even empirical work exhibits this gender bias though recent papers have been exploring the role of fatherhood in children's outcomes (Ruhm, 2000; Yeung, Duncan and Hill, 1999; Gustafsson and Kjulin, 1994) and on family life in general (Joshi, 1998). As greater interest in the role of fathers develops in empirical work in economics, traditional theoretical models of fertility, population dynamics, demography, or any topic related to the family need to be updated to reflect the changing perceptions, expectations and knowledge of fatherhood. Establishing the microeconomics behind involvement decision-making of fathers is a fruitful first step.

This paper attempts to build a microeconomic model of father involvement. We create a simple model based on constrained utility-maximization within an altruistic setting that incorporates the belief that paternal involvement benefits both the child and the father. We derive the optimal level of involvement and examine its properties in order to rationalize why the current level of paternal involvement have been only slowly rising despite policies such as paternal leave and flextime work hours (Stancanelli, 2003). We also determine the effects on the optimal child rearing time of variables such as the past level of paternal involvement received by the current father, endowed formal schooling, wife's labor participation, availability of alternative sources of child care, and finally, belief and confidence in own child rearing skills.

² Becker (1991a) provides a more explicit model of household production and time allocation. However, he tends to overlook the role of the father in the household, specifically in child rearing.

The paper is structured as follows: Section 2 introduces the model and sets up the father's optimization problem. In section 3, the model is solved and examined. A brief discussion vis-à-vis the issues raised in the previous paragraphs will be provided. The last section presents some limitations of the model and finally concludes.

2. The Model

We assume a representative father who lives for only one period. At the beginning of each period, a father decides on how his limited time will be divided between market work and child rearing, and how much of his income earned from market work will be for his own consumption and for formal schooling of his children. Note that, contrary to most family models of altruistic behavior, fertility decisions are excluded from our model. The father takes as exogenous the number of children and considers them as one group, hence normalizing the quantity of children to unity³. What our main concern is father involvement decisions and not fertility.

Our model's predictions are derived from utility-maximizing behavior constrained by time, budget and human capital technology. For the rest of this section, we briefly discuss the dynastic utility framework used, followed by a more in depth discussion of the human capital technology implemented. The section ends with the presentation of the dynastic father's optimization problem.

2.1 Dynastic utility and human capital

We assume that fathers are altruistic in the sense that they care about the utility derived from consumption of their direct descendants. Since we normalized the number of descendants, we modify the standard Dynastic Utility Function (Becker and Barro, 1986) by setting the degree of altruism constant ($a < 1$). Because of time-consistency (Becker, 1991b; De la Fuente, 2000), the optimal solution for a father at time $t_1 \rightarrow t_2$ can be recovered by solving the problem of a dynastic father that starts at time 0 until an exogenously given time T if $t_1, t_2 \in (0, T)$ ⁴. Hence, we can interpret the individual problem encountered by successive generations of fathers as a problem of a social planner, which in our case is the dynastic father. The Dynastic Utility Function of our model is given by

$$U = \sum_{t=0}^T a^t u(c_t) \tag{1}$$

where $u'(c) > 0$ and $u''(c) < 0$.

³ Imagine that our fathers are in an economy with a one-child policy that is either enforced legally or "technologically".

⁴ The time horizon is infinite in most models that utilize dynastic utility functions. For this paper, I consider a finite horizon problem. The terminal period is exogenous for every dynastic father.

There are two types of dynastic fathers in our economy corresponding to two types of human capital technologies. Future generations adopt the same human capital technology as their dynastic father.

Human capital evolves through time by following the production function,

$$H_{t+1} = H_t^\alpha e_t^\beta (d_t - \underline{d}_t)^\gamma (1 + d_{t+1})^{\gamma I[AWARE]} \quad \alpha, \beta, \gamma < 1 \quad (2)$$

where α , β , and γ are technological constants that reflect the relative importance of the corresponding factors on the accumulation of human capital, H is the quantity of human capital, e is the educational expenditure, d is the time allocated for child rearing or home-schooling, \underline{d} is the required minimum time for child rearing⁵, and $I[AWARE]$ is an indicator function that equals one if the dynastic father is aware that his involvement in child rearing improves his own human capital and zero if otherwise. According to equation (2), each factor when taken individually exhibits decreasing returns. Furthermore, note that formal and informal schooling are imperfect substitutes which implies that both factors are essential. The technological constants, specifically β and γ measure the relative importance of formal and informal schooling respectively, in the accumulation of human capital⁶. The criticality of both formal and informal education is not uncommon in specifications of human capital technology in altruistic settings (Becker, Murphy and Tamura, 1990; Yang, 2000). What is different with our specification is that the father's explicit awareness of the contribution of his child rearing efforts to the accumulation of *his own* human capital actually allows him to completely account for the benefits of paternal involvement and therefore, presents him with a greater incentive for involvement.

2.2 Father's optimization problem

We first identify the constraints faced by the dynastic head then propose some simplifications in order to make the model tractable. The father faces the following time and budget constraint:

$$1 = l_t + d_t \quad (3)$$

$$H_t l_t = c_t + e_t \quad (4).$$

Based on equation (3), total time⁷ is allocated between market work, l_t , and child rearing, d_t . We normalize wage per effective labor time to one and take this as exogenous. Hence, the father's total

⁵ Factors such as wife's employment status, presence of other (extended) family members to help with child care, *etc.* can be incorporated in \underline{d} . Moreover, \underline{d} can reflect the proportion of "negative" paternal involvement. The father treats this as exogenous and thus no form of bargaining occurs.

⁶ From a father's point-of-view, we expect β to be greater than γ .

⁷ To be more precise, total time here is the amount of time in excess of leisure and general household time (excluding child rearing).

income from market work is $H_t l_t$. He exhausts all of his income by buying consumption goods for his own consumption and by purchasing formal education for his children as can be seen in equation (4).

For simplification, let $u(c_t)$ equal $\ln c_t$ and define a new variable,

$$h_t = \frac{H_t}{(1 + d_t)^{\gamma \mathbb{1}[AWARE]}} \quad (5).$$

Equation (5) allows us to convert the human capital production function to a form that only includes current-valued variables.⁸ Equation (2) becomes

$$h_{t+1} = \left(h_t (1 + d_t)^{\gamma \mathbb{1}[AWARE]} \right)^\alpha e_t^\beta (d_t - \underline{d}_t)^\gamma \quad (6).$$

Incorporating all of the abovementioned simplifications, the father's optimization problem is to choose c_t , l_t , e_t , and d_t for $t = 0, \dots, T$ that maximize equation (1) subject to equations (3), (4), and (6).

3. Model Results and Implications

Two complementary approaches are used to solve the optimization problem. The first approach entails solving the dynastic father's problem using the Lagrange method for times t and $t+1$, deriving general (time t) analytical forms of the variables of interest by using the first order conditions, and finally using these analytical forms to run simple numerical simulations to have a glimpse of the behavior of the optimal child rearing decision. The main objective of this approach is to compare type I and II fathers. The second approach is more explicit. We solve the finite horizon dynamic program by backward induction and derive feedback rules for education and child rearing. Because explicit-form solutions cannot be derived for type II fathers ($AWARE = \text{True}$), we shall concentrate on type I ($AWARE = \text{False}$).⁹

3.1 Comparison of the two types of fathers

Formally, the Lagrangean¹⁰ of the dynastic father's maximization problem is given by

⁸ If $AWARE = \text{False}$ (Type I), then h_t is simply equal to H_t .

⁹ Nothing much is lost from concentrating on type I fathers since the effect of being a type II father can be incorporated in the technological constants (particularly γ) and also because feedback rules for type II fathers exhibit the same behavior as for type I, though a closed-form equation for the optimal d_t cannot be derived.

¹⁰ This is not entirely the Lagrangean in the complete sense since we left out constraint (6). However, when first order conditions are derived, (6) is taken into consideration. It is simpler to do this than to formulate a full resource constraint because of the nonlinearity in (6).

$$L = \sum_{t=0}^T \left[a^t \ln c_t + \lambda_t \left(h_t (1 + d_t)^{\gamma 1^{[AWARE]}} (1 - d_t) - e_t - c_t \right) \right] \quad (7).$$

If *AWARE* is False (Type I), first order conditions are

$$\frac{c_{t+1}}{ac_t} = \frac{\lambda_t}{\lambda_{t+1}} \quad (8)$$

$$\lambda_t = \frac{\lambda_{t+1} \beta h_{t+1} (1 - d_{t+1})}{e_t} \quad (9)$$

$$\lambda_t h_t = \frac{\lambda_{t+1} h_{t+1} (1 - d_{t+1}) \gamma}{d_t - \underline{d}_t} \quad (10).$$

Optimality implies the following¹¹: equalization of the marginal rate of intertemporal substitution of consumption with the ratio of marginal utilities of income for the corresponding time periods (Equation (8)), equalization of the current-period marginal cost of education and its next-period marginal benefit (Equation (9)), and finally, equalization of the current-period marginal cost of child rearing time and its next-period marginal benefit (Equation (10)).

The first order conditions for the case that *AWARE* is True (Type II) are similar to the above first order conditions except for the condition with respect to child rearing time. What differs is the additional current-period benefit derived from child rearing which is the first term on the right hand side of this equation:

$$\lambda_t h_t (1 + d_t)^\gamma = \lambda_t h_t (1 + d_t)^{\gamma-1} (1 - d_t) \gamma + \lambda_{t+1} h_{t+1} (1 + d_{t+1})^\gamma (1 - d_{t+1}) \gamma \Psi \quad (11)$$

where

$$\Psi = \left(\frac{\alpha}{1 + d_t} + \frac{1}{d_t - \underline{d}_t} \right) \quad (12).$$

Upon solving the two systems (for each type) of first order conditions, the main optimality condition is the equality of the intertemporal MRS, the ratio of next-period marginal benefit and current marginal net effect (cost) of child rearing, and finally the ratio of next-period marginal benefit and current marginal cost of education. The main optimality condition reflects the tradeoff between current consumption and investment in the form of child rearing and expenditures on education for future (indirect) consumption.

To see the difference between the optimal child rearing decisions of the two types of fathers, we parameterize the first order conditions and run simulations based on these. For both types, we use

¹¹ Shadow prices are accounted for in these equations.

two sets of parameters.¹² Assuming increasing returns to scale in human capital production, each set of parameters refers to a specific situation in the economy. The first set of parameters (see Figure 1) depicts a “growth” economy where the levels of human capital and education are high and continuously growing. The second set of parameters (see Figure 2) refers to a “decay” economy with low human capital and education. Human capital in this case decays to the origin through time. In both situations, the optimal child rearing time corresponding to each type of father remains relatively stable at almost the same value (0.37 and 0.43 for types I and II respectively). As can be seen from the graphs and ignoring the transient period, type II fathers have higher optimal involvement compared to type I. This is as expected since the former type has more incentive to be involved compared to the latter.

3.2 Properties of the optimal policy

In solving the dynamic program, we only consider type I fathers. Furthermore, we take the terminal period as exogenously given and solve the dynamic program by backward induction. As a boundary condition, we set $H_{T+1} = 0$ and also assume that $\underline{d}_T = 0$ since the dynasty ends at time T . Therefore in time T the Bellman Equation is simply¹³

$$V_T = \max_{c_T} \ln c_T$$

subject to

$$\begin{aligned} c_T &= H_T(1 - d_T) - e_T \\ H_{T+1} &= 0 \end{aligned}$$

It is easy to see that the agent in time T will choose to consume all of his income and therefore optimally set $d_T = e_T = 0$. Furthermore, $V_T = \ln H_T$.

Using these results, we move back in time and solve the respective Bellman Equation. In general, the Bellman Equation at time t is given by

$$V_t = \max_{c_t} \ln c_t + aV_{t+1} \tag{BE}$$

subject to

¹² For both “growth” and “decay” economies, the following parameters were used: $a = 0.2$, $\alpha = 0.8$, $\beta = 0.7$, $\gamma = 0.3$, $\underline{d}_t = 0.1$. Initial conditions for the “growth” economy are $d_{-1} = 0.3$, $e_{-1} = 2$, and $H_{-1} = 16.23$ while for “decay” economy, $d_{-1} = 0.3$, $e_{-1} = 0.9$, and $H_{-1} = 5.05$.

¹³ We do not have a salvage function since we restrict the state, H_t to be zero at time $T+1$.

$$c_t = H_t(1 - d_t) - e_t$$

$$H_{t+1} = H_t^\alpha e_t^\beta (d_t - \underline{d}_t)^\gamma$$

Upon solving for several periods, one can notice that (BE) can be rewritten as

$$V_t = \max_{d_t, e_t} \ln (H_t(1 - d_t) - e_t) + \Phi_t \ln (H_t^\alpha e_t^\beta (d_t - \underline{d}_t)^\gamma) + \Omega_t \quad (\text{BE}^*)$$

where Ω_t and Φ_t are functions of parameters only. Furthermore, it can be proven quite tediously that Φ_t is concave and monotonically decreasing in time.¹⁴ The following are the feedback rules for (BE*):

$$d_t = \frac{\gamma + \left(\beta + \frac{1}{\Phi_t} \right) \underline{d}_t}{\gamma + \left(\beta + \frac{1}{\Phi_t} \right)} \quad (13)$$

$$e_t = \frac{\beta H_t(1 - \underline{d}_t)}{\gamma + \left(\beta + \frac{1}{\Phi_t} \right)} \quad (14)$$

$$c_t = \frac{H_t(1 - \underline{d}_t)}{\gamma + \left(\beta + \frac{1}{\Phi_t} \right)} \quad (15).$$

Notice that the optimal d_t is independent of past levels of child rearing time and educational expenditure, unlike (14) and (15) which depend on the level of human capital of the current father. This can imply that the current decided level of child rearing is not structurally dependent on the amount of child rearing that the agent received from his father. This observation is consistent with the results found in McBride *et al.* (2004) whereby the authors analyzed PSID-CDS data and found out that own father's involvement has only a significant effect on parental monitoring and control and not on other measures of paternal involvement. Furthermore, the model predicts that educational attainment does not structurally affect the level of paternal involvement as observed by Coverman (1985).¹⁵ Feedback rule (13) also shows that paternal involvement is dependent on the technological constants. More specifically, optimal d_t increases as $\gamma \rightarrow 1$. The technical constant γ reflects the

¹⁴ $\Phi_T = 0$ is the lower bound.

¹⁵ Though educational attainment does not affect the level of involvement according to (13), the latter affects the former as can be seen in (14).

relative importance of informal schooling on human capital production *as perceived by the father*. Since as mentioned, optimal child rearing time increases with γ , this implies that belief and confidence in one's informal schooling and child rearing skills increases paternal involvement. Lack of confidence in parenting skills has been recognized as an important barrier to increasing father involvement and might be the key solution to the persistently low levels of involvement (Andrews, *et al.*, 2004).

Since the wage rate is assumed¹⁶ to be a function of H_t , Feedback rule (13) implies that changes in the wage rate has no effect on paternal involvement¹⁷, contrary to Gronau's (1977) model. One fundamental difference between his model and the model presented is the assumption regarding the substitutability of inputs from the household and the market¹⁸. Recalling the human capital technology employed in our model, formal and informal schooling are imperfect substitutes and both are necessary in the production of human capital. Empirical support for the model's findings can be found in Gustafsson and Kjulín (1994) whereby marginal net wage does not affect the father's allocated time to both active and passive child care (Miller and Mulvey, 2000).

As the minimum required child rearing time increases (*e.g.* wife's employment, unavailability of child care services, presence of infants and very young children, *etc.*), optimal child rearing time rises though this increase is negatively related to γ which means that for fathers who are strongly confident of their child rearing skills, increase in actual paternal involvement due to an increase in the minimum required time is smaller than for a father who lacks confidence. However, this should not be disturbing since as we have noted earlier, high γ already implies greater paternal involvement. As a corollary, fathers faced with high \underline{d} but low γ does not necessarily manifest greater involvement.¹⁹

Since Φ_t appears in all of our feedback rules, it is prudent to examine it more closely. Recall that Φ_t is monotonically decreasing and concave in t . A consequence of this is that for a dynasty with a longer time horizon, "early" levels of Φ_t are higher compared to a dynasty with a shorter planning horizon. Also since the optimal child rearing time is strictly increasing with respect to Φ_t , dynasties with longer time horizons tend to have greater levels of paternal involvement early in the dynasty. This can explain why matrilineal societies tend to have extremely low paternal involvement (Pleck and Pleck, 1997).

¹⁶ Recall that the effective wage rate is assumed to be equal to unity. Hence, wage rates *per se* can be interpreted as a function of human capital. In our case, the relationship is linear.

¹⁷ The model does not necessarily imply that fathers will not react to higher wage rates. Time allocated to other household activities or even leisure can be substituted away for market work.

¹⁸ Gronau (1977) assumes goods produced at home and goods that can be purchased in the market are perfect substitutes. These goods contribute to the "production" of a commodity Z that the agent maximizes. This commodity can be thought of as the human capital of children and the two inputs are educational expenditures (from the market) and child rearing (produced at home).

¹⁹ A good extension of the model is to incorporate marriage and fertility decisions of potential fathers since expectations of high \underline{d} might discourage them from getting married and having children. Furthermore, using a Nash Bargaining framework, \underline{d} can be endogenized through bargaining between potential fathers and mothers.

3.3 Implications

Based on our model, elimination of barriers to father involvement such as inflexible working hours would allow fathers to choose what they perceive as the optimal amount of involvement. If the previous barrier prevents the father from being more involved, then we expect a “self-correcting” rise in paternal involvement. However, if the barrier is non-binding, then there will be no rise in paternal involvement and therefore, paternal leave and flextime arrangements would be deemed as ineffective.

What is actually more crucial is the perception and belief of fathers themselves regarding their parenting skills. If fathers were aware of their wider role in child development, then we expect them to increase their involvement. Going back to the issue of paternal leave and flextime arrangements, strict working hours and lack of support from the employer can be seen as a manifestation of the persisting belief that fathers have no role in child rearing (Stancanelli, 2003; The Staff of Catalyst, 1988). This in turn will influence their perception of their own parenting skills and hence will lead them to low levels of involvement. Therefore, paternal leave and flextime arrangements, if implemented properly and with complete support of the employer, might change fathers’ beliefs and increase their involvement.

4. Conclusion

Since the model is very crude, it suffers from several limitations. The parameters in the model are not well-defined to correspond to existing data. Also, endogenizing important variables such as the time horizon, minimum required time, and most especially, the perceived importance of child rearing on the production of human capital may very well improve the model. Furthermore, possible attitude transmission mechanisms that affect γ can be modeled. Moreover, the model assumes that marriage and fertility decisions are exogenous and therefore can also be modeled. A richer and more useful model needs to incorporate these.

Most often, economic models are too simplified for quantitative results to be completely credible. Though these models lack in the aforementioned aspect, they can provide interesting and important qualitative results and insights. The model has given us some interesting insights regarding father involvement. Notable are i.) the lack of structural effects on father involvement of received child rearing, education and level of human capital, ii.) the behavior of the optimal child rearing decision with respect to minimum child rearing time and perceived contribution of informal schooling on human capital accumulation, and finally iii.) the importance of attitudes, confidence, and belief on the wider role of fathers in the family. Though these insights have somehow been articulated in the empirical literature, the model in this paper has served the purpose of updating our *homo economicus* to reflect changes in perceptions, expectations and knowledge on fatherhood.

In conclusion, a critical lesson from the model is that policies which aim to promote involvement among fathers will not succeed if fathers are not aware of their greater role in child development. This calls for more education regarding the role of fathers and a change in the antiquated belief that fathers are *mere* breadwinners.

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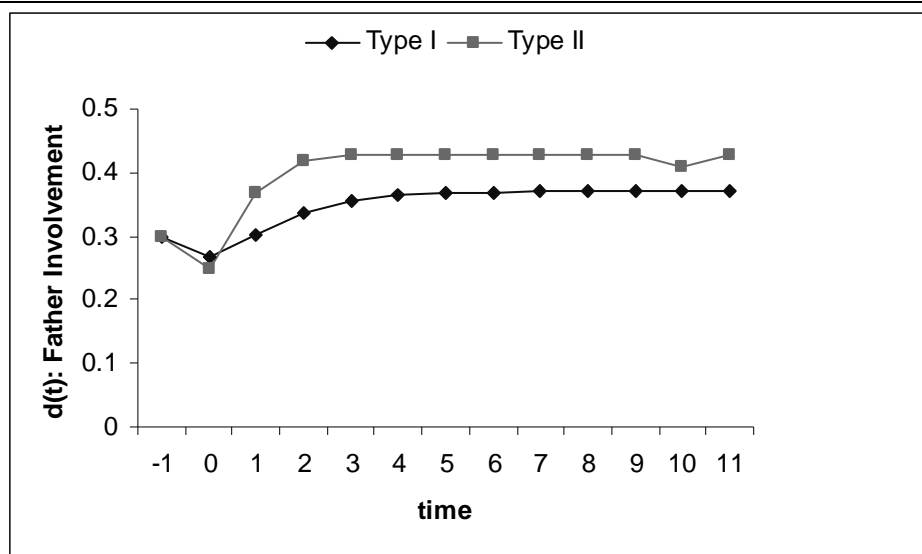


Figure 1: Growth

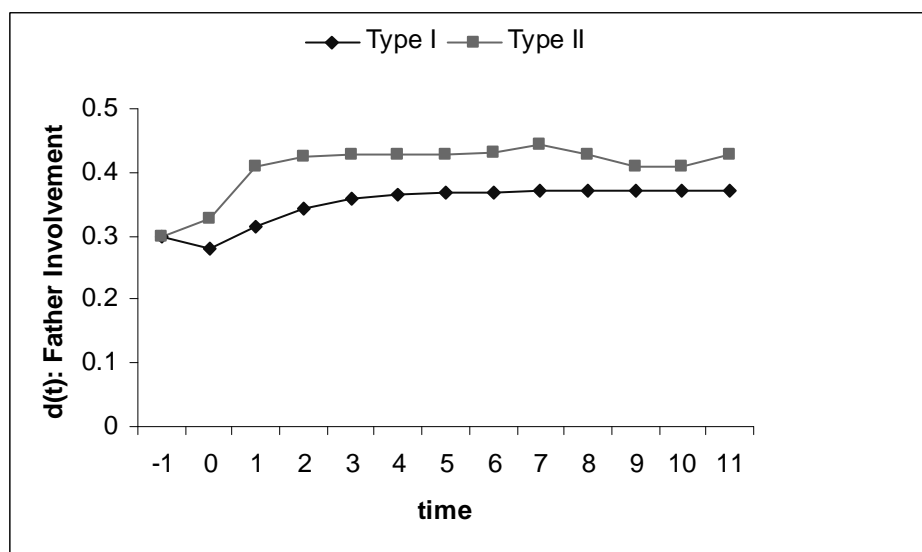


Figure 2: Decay