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*Research Article*

## **Children are costly, but raising them may pay: The economic approach to fertility**

**Martin Werding**

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## **Children are costly, but raising them may pay: The economic approach to fertility**

**Martin Werding<sup>1</sup>**

### **Abstract**

#### **OBJECTIVE**

This article provides a non-technical introduction to analyses of fertility which are based on a rational-choice paradigm and which acknowledge that raising children may have a strong impact on the well-being of parents that can be described in terms of costs and benefits. It surveys different types of economic fertility models which can be used to address a variety of research questions, and it also discusses some basic strengths and weaknesses of applying economic analyses in this particular field.

#### **RESULTS**

Starting from a seminal contribution by Becker (1960) which may have been of little use for applied research or for interdisciplinary work, the economic theory of fertility has unfolded a differentiated research programme with indispensable contributions to the broader field of fertility research. Important features are the inclusion of *(i)* different bargaining positions and differing incentives of partners interacting in fertility choices; *(ii)* simultaneous decisions regarding labour force participation (as well as education) and fertility, and the role played by employers, labour market institutions, and other public interventions; *(iii)* the idea that children (or their “human capital”) are investment goods with various kinds of returns that may be dispersed over an extremely long period of time, are subject to enormous uncertainties, and are strongly influenced by the social context and, again, by public policies.

#### **CONCLUSIONS**

Economic aspects and elements of economic models should be included in any large-scale attempt at understanding fertility behaviour through interdisciplinary research. Improvements in the data infrastructure, which are only partly underway thus far, would be an important pre-requisite.

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## 1. Introduction

Population trends and their economic consequences have long been studied by economists, e.g. by Adam Smith (1776: ch. I.viii), Robert Malthus (1803), or John Maynard Keynes (1937). However, attempts at systematically explaining these macro-level trends through economic analyses – based, among other things, on a micro-economic theory of parental fertility choices – are a much more recent phenomenon. What is currently considered to be “the” economic theory of fertility can largely be taken to be a strand of literature inaugurated through a seminal contribution by Becker (1960). Over time, the research programme covered in this literature has grown substantially, not only through a multitude of extensions and adaptations brought forth by Becker and his followers (see, e.g., the contributions collected in Becker 1981, 1991), but also through the integration of alternative ideas developed by a number of independent researchers and critics (probably the most important being Easterlin 1969; Pollak 1985; Rosenzweig and Schultz 1985; or Cigno 1993).

Economists were thus rather late in entering the field of fertility research. Also, when applying their analytical tools to this issue, they tended to ignore most of what other social scientists had done in this area beforehand, potentially offering a first-rate example of what is sometimes called “economic imperialism”. As Leibenstein (1974: 458) put it,

*“to some of those who had been laboring in the vineyards of demography for decades, the efforts of economists in the sixties and seventies to develop a theory of fertility must have appeared like the invasion of a horde of primitives on a technologically advanced community proclaiming loudly their intent to reinvent the wheel.”*

Ironically, this objection was raised by one of the few economists who had been working on fertility even earlier (cf. Leibenstein 1957). Leibenstein’s substantive criticisms were that the new economic theory of fertility was formally rather complex, but at the same time far too rough regarding many details of real-world fertility behaviour to be of any practical value for applied research on this issue, beyond the mere replication of well-known results. Since those early days much of this has clearly improved through more specific research questions, a stronger empirical orientation, and access to better data. Still, Leibenstein may have a fundamental point about the prominent role of modelling strategies, at the expense of empirical richness, which still applies to economic analyses compared to fertility research in other disciplines.

Providing a full-scale survey of the history and current stance of economic fertility theory would be clearly beyond the scope of this article.<sup>2</sup> Rather, it is meant to introduce researchers from other fields to basic features of this particular approach, highlighting potential merits as well as weaknesses (Section 2); to point to developments which appear to be particularly important for current research on fertility done by economists (Section 3); and to make suggestions for an agenda for future research which could become increasingly interdisciplinary in its nature (Section 4). Section 5 concludes the article.

Before going into detail, it is important to note that the economic theory of fertility does not provide a particular explanation for why people may want to have children. Nor does it necessarily yield a consistent set of results when addressing important sub-issues such as the desirable number, timing and spacing of births, that is, how many children parents may wish to have, at what stage of their life cycles, at which intervals, etc. Rather, economic theory provides a generic, but distinct approach to analysing relevant motives and outcomes. It rests on a uniform paradigm with potentially differing specifications which can be brought to bearing on various dimensions and aspects of actual fertility behaviour.

## **2. The economists' contribution to explaining fertility behaviour**

At the core of contemporaneous, mainstream micro-economics is the idea that agents are constantly making “rational” choices in order to maximize their well-being (“utility”), as perceived by themselves, under the conditions (“constraints”) of scarce resources, limited capacities, limited financial budgets, limited information and, ultimately, limited time to relax any of these restrictions.<sup>3</sup> While prices, production technologies, and constraints may vary over time, economists are usually reluctant to assume that individual preferences change. The main reason is that preferences are not easily observable, so this assumption could be used for explaining anything that happens (Stigler and Becker 1977). However, methodological strictness is one thing, the realism of the assumption that relevant individual preferences are entirely stable is another, as has been acknowledged in a number of relevant contributions (e.g., Easterlin, Pollak, and Wachter 1980; see also Pollak 1970).

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<sup>2</sup> See Hotz, Klerman, and Willis (1997) for an extensive survey of this kind; Robinson (1997) provides a less technical discussion of achievements and shortcomings of the economic theory of fertility unfolded until then.

<sup>3</sup> To most economists, the notion of “bounded” rationality (Simon 1978), which is seemingly more realistic, is effectively a refinement of this idea, elaborating on way the limitations of information and capacities to obtain and process these are being dealt with, not a deviation. It should be noted, though, that this view is probably based on a mainstream economist's reading (as summarized in Arrow 2004) more than on Simon's original thinking.

The economic theory of fertility basically fits in with this description, giving rise to the fundamental question of whether rational decision making is indeed a meaningful approach to dealing with this specific issue (see Section 2.1). Provided that it is, this generic framework can be interpreted and applied rather flexibly to obtain differing types of models which are suited to address quite a number of specific research questions – although mostly only one at a time (Section 2.2). There may thus be limitations to this approach, especially in capturing the social and societal context of fertility decisions, but in the light of current research these limitations are less tight than one may think (Section 2.3).

## **2.1 Is there room for rational decision making?**

As a generic logic of choice, economic theory is applicable to basically any issue regarding which choice is technically possible and is not socially discouraged or legally prohibited in a binding fashion. These conditions certainly apply to fertility where modern contraceptives are used – although things may not have been entirely different based on many older techniques of controlling fertility. The conditions could be violated, for instance, within populations whose religious convictions lead them to have as many children as biologically feasible or, at least, to stay fully uninformed about fertility control. With an eye on the required freedom of choice, economic theory should thus be clearly suited for addressing some relevant aspects of fertility behaviour in developed countries.<sup>4</sup>

In principle, the various pros and cons or, in terms of economic concepts, the “costs” and “benefits” determining rational decisions in all areas of human behaviour could be defined very broadly. However, applying the economic approach to fertility appears to be useful mainly because parental fertility decisions have a strong economic dimension in a rather narrow sense. It is true that these decisions have a biological background as well. They also have a strong affective dimension – love between partners and towards children – that economics may not be fully suited to get a grip on, and they are deeply embedded in a broader social context than economists are used to deal with (see Section 2.3). But, at the same time, raising children is costly, i.e., it has a strong impact on an average family’s financial situation, so that the desire to do so almost inevitably competes with many other needs and wants of potential parents. One may thus not think that the economic approach explains everything about fertility,

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<sup>4</sup> This statement does not rule out that economic theory is also applicable to fertility choices in developing countries, although the context, hence interesting research questions, may slightly differ there. In fact, much of the recent literature is based on applications of existing theories to data collected in the developing world.

especially with regard to the benefits involved. Yet, it would be highly implausible to discard it as entirely inappropriate for analysing fertility behaviour.

With the fundamental assumption that fertility is, to a considerable degree, the result of rational decision making, economists do not expect couples or individuals to “compute” their optimal solutions, certainly not in the same way as these are formally re-stated in economic models. With some sense of realism, how is rationality then assumed to enter actual fertility decisions? Two answers to this question may be equally important. First, when considering whether to have children – and if so, how many, when, etc. – potential parents are restricted to picking solutions which are economically feasible. So if nothing else, their budget constraints effectively force them to respond to costs and limited resources in a way that looks rational, at least over a larger aggregate of individuals.<sup>5</sup> Second, rationality in a more substantive sense may be at work when, among a broader set of options demonstrated by members of the preceding generation, many young people tend to imitate those lifestyles that appear to be economically more promising, i.e., to bring about a more favourable balance of costs and returns. While this view relaxes the strong demands of rationality for many individuals, it does not remove them with respect to a limited number of “pioneers” who find it worthwhile to reconsider conventional behaviour more quickly than others when they feel that the relevant costs, benefits, and constraints have changed substantially. Fertility choices are clearly a bit special in this respect because of the enormously long time horizon and the numerous uncertainties involved in raising children. Given that, the behavioural changes in this area, which can be explained as rational responses to on-going changes in the environment, have in fact been tremendously rapid in recent decades – much faster, in fact, than could have been brought about by imitation and passive adaptations alone.

While this conjecture may be open to debate, rational-choice models also have an important advantage from a methodological point of view. As they are based on a clear-cut decision rule, they lead to theoretical predictions which can be tested empirically – and can be rejected if they are misguided. With many alternative approaches, this is impossible as long as the sources of limitations of rationality or the decision rules that are assumed to be at work are not stated precisely.

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<sup>5</sup> See Becker (1962a) for a demonstration that the aggregate-level response to increases in the price of a good corresponds to economists’ predictions, even though the reactions of individuals may in fact be either stochastic or governed by strong habits. This is ensured through the law of large numbers and through the fact that, with individual demand tending to move in either direction or remaining constant as long as this is feasible, budget constraints sometimes become binding and sometimes not.

## 2.2 Modelling options for analyzing fertility choices

Another strength of the economic theory of fertility is that, building on a common paradigm, it offers many options for designing different types of models. The types of models which are conventionally employed in this area are mainly distinguished by assumptions regarding who is effectively making fertility choices, how these agents are motivated, and how they are thought to be influenced by their environment or by other agents' decisions. As a result, various elements from the economist's toolbox can be combined rather flexibly to form models which are not just simplified according to the modellers' convenience, but specifically suited for addressing a multitude of particular research questions.

First of all, the subject of fertility choices can be taken to be a couple ("household") of potential parents who are acting jointly as a decision making unit or, alternatively, the (two) individuals who typically interact in producing and raising a child. In the former case which dates back to Becker (1960), the internal structure of the household and any potential conflicts between its members are largely neglected, assuming that there is a common interest in having, or not having, children, subject to a common set of constraints. Models of this kind are still in use as they are easier to handle; they are useful if the interest lies mainly with external determinants of fertility that affect household members, i.e. potential parents, in much the same way. In the latter case, the differing roles of partners become visible and the possibility of an intra-household division of labour arises. While it can still be assumed that the individuals involved follow pre-defined decision rules to avoid analytical complications, more complex models, such as those first suggested by Pollak (1985), reflect that potential parents may have different objectives and are faced with differing constraints, implying that their fertility choices are the outcome of a bargaining process with several stages – forming a couple, having children, allocating childcare responsibilities, staying together as a family, etc. – which can again be subjected to economic analysis (see Section 3.1 for further details).

Second, children as the object of fertility choices can be classified in economic categories in different ways, each implying different motives ("incentives") to have them and bring them up. In a stylized view,<sup>6</sup> children can be seen (a) as sheer by-products of other desirable activities, mainly sex, which is clearly a limiting case of a model of active fertility "choices"; (b) as consumption goods which, not unlike the consumption of many other goods, directly increase the utility of parents (as in Becker 1960); (c) as investment goods which increase parental utility indirectly, viz. by increasing their parents' life-time income or life-time consumption of other goods (as in

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<sup>6</sup> See Schultz (1973) or Cochrane (1975) for discussions of the first three categories children can be put in; the fourth one is explicitly acknowledged in Werding (1998: Section 2.1).

Cigno 1993). Another aspect which sets children apart from all economic categories of “products” or “goods” is that they are (d) new individuals themselves. This latter aspect renders all kinds of normative analyses in the context of fertility conceptually very difficult.<sup>7</sup> Nevertheless, the desire to see how one’s children respond to parental actions and eventually grow up to making their own choices on various issues may be a strong, and genuine, fertility motive. Some of this is probably reflected in “altruistic” fertility models where parents’ utility increases in line with the utility of their children (as in Becker and Barro 1988). In many respects, however, altruistic models of fertility choices behave much like consumption-goods models, so that (b) and (c) – or, alternatively, (c) and (d) – are the two major cases one may have to distinguish. Combining these “pure” fertility motives in mixed models is, of course, possible; but it can become analytically difficult and, in any case, confuses the different mechanisms at work.

In another dimension, children can be treated as being purely private goods, for the purposes of consumption or investment of their parents, or for their own well-being that parents may be interested in. Alternatively, it can be acknowledged that they tend to have considerable externalities, i.e., effects for the well-being of other members of society. Folbre’s (1994) description of children as “public goods” exaggerates this point,<sup>8</sup> but there are clearly various channels – for instance, preservation of a cultural heritage, contributions to future technological progress, or “fiscal externalities” arising in tax systems and public pension schemes – through which decisions on having children affect a wider public. This, in turn, could justify some amount of public intervention in this area, for instance, through instruments of family policies.

Whatever the motives for, and the returns to, having children, doing so also involves certain costs by which fertility choices interfere with other economic decisions due to the different types of constraints mentioned above. When compared to the costs of other goods and activities, child costs are particular in several ways that economic theory is fully prepared to deal with. For instance, when raising children, parents are not only faced with monetary expenses on each of their children’s cost of living (food, clothing, body care and health, extra costs of housing and household appliances, education, etc.). Often, the main types of costs arising are “opportunity costs” of income foregone through the time spent on childcare activities (or, alternatively, expenditure on child care provided by other persons or in appropriate institutions).

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<sup>7</sup> The difficulties show up in questions like these: How to assess an “optimum” population size, accounting or not accounting for the interests of “potential” individuals? How to assess the distributional and incentive effects of public support for poor people who have more children than they can “afford”?

<sup>8</sup> As long as children do have “internal” effects for parents or themselves that are relevant as fertility motives, they are by definition not (purely) public goods. However, children are public goods (or actually “club goods”) for the two parents involved in raising them – a feature that becomes important when their potentially diverging interests are taken into account (again, see Section 3.1 as well as 3.2).

Another peculiarity is that parents are able to determine the “price” of their children themselves to a considerable degree, simply by spending more or less on each child (this is the “quality” aspect of fertility choices first suggested by Becker 1960). Furthermore, the timing of all these costs is unusual in that they do not require a substantial down-payment when a child is born. Rather, they accrue in portions over a very long period of time, nevertheless amounting to enormous bills on present value terms. A feature which also matters in this context is that children are, to a large extent, an “experience good”, meaning that actual costs – as well as actual returns to having them – are fully revealed only once they are there. The impact of all these peculiarities on fertility choices may differ, e.g., depending on the relative preferences of parents for quality over quantity of children, or resulting in what looks like an underestimation of costs for “myopic” parents and an overestimation of costs for parents with a strong risk-aversion.

Against this background, constructing meaningful fertility models is an art, or rather a craftsmanship, which rests on choosing between these basic elements, highlighting one aspect or another that is thought to be particularly relevant, and abstracting from features that appear to be less important for the specific research interests pursued. The resulting models can then be represented using mathematical methods, they are usually analysed formally, and the results can be subjected to empirical testing. This leads to a final observation about the role of economic theory for research on fertility. Economics is essentially a quantitative discipline, interested in exploring not only the direction, but also the size, of effects for tangible outcome measures it can attribute to those determinants that economists are able to identify. In the context of fertility research, this may well be an advantage and a weakness at the same time, leading to a clear focus, but implying a narrow perspective, on specific aspects of this issue.

### **2.3 How much of the social context can enter the analysis?**

While stressing the element of choice involved in fertility behaviour, taking into account its social context is clearly not one of the strengths of the economic theory of fertility. The early contributions by Leibenstein (1957) and Easterlin (1969; see also Easterlin, Pollak, and Wachter 1980), who both include ideas borrowed from sociologists and demographers in their (non-standard) formal models, are now almost forgotten, at least in the discipline of economics. Up to a point, these ideas have been taken up once again in recent empirical work when controls for the social status of individuals and for related consumption aspirations are taken into account as background variables which may matter for decisions regarding fertility. Yet, their

basic idea that preferences for having children are actually shaped by social influences and economic conditions during youth and early adulthood are no longer actively pursued.

There are several ways of arguing that some of the social context is implicit even in the most basic economic models. Decision units in these models are sometimes called “representative agents”, which could be taken to reflect the existence (and importance) of social customs and norms effectively limiting the choice set much like other constraints. There is now also a broad strand of literature on “institutional economics”, explaining all kinds of formal or informal rules through the resulting reductions in transaction costs which would be involved in unguided interactions between rational individuals (for an early application to the institution of the family, see Ben-Porath 1980). But unless specific aspects of the social context of fertility behaviour are explicitly included in the set-up of a particular model, taking these into account is certainly not an integral element of the economic approach. Rather, economists conventionally discuss some of the context as an aside, for instance, to motivate a piece of applied research or to interpret their findings.

Given these limitations, at least three societal sub-systems are often explicitly addressed in economic analyses of fertility, though rarely all at the same time. First, a number of studies pay specific attention to how potential partners interact in the context of making fertility decisions – addressing, among other things, the formation of partnerships, marriage and divorce, the governance structure for “joint” decision making or for how partners bargain with each other (see Section 3.1 for further details).

Second, a major issue in current economic research on fertility is how choices in this area interact with decisions regarding labour force participation and how they respond to labour market performance, to decisions taken by firms, and to labour market institutions. Specific questions addressed in these fields relate to participating in paid work at all, the timing of entry or withdrawing temporarily and/or partially (viz. in terms of hours worked), firms’ hiring behaviour, as well as the effects of employment protection and other labour market regulation specifically targeted at parents (see Section 3.2).

Labour market institutions also form part of a third issue addressed in current research where aspects of the social context are explicitly taken into account, investigating how parental fertility choices are influenced by various instruments of public policy, for instance, through the general design of taxes and social protection schemes, through tax rules or benefits specifically geared towards families and children, or through public provision or subsidization of child care, etc. (see Sections 3.2 and 3.3).<sup>9</sup>

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<sup>9</sup> It is of course a distinct question whether public policy *should* engage in actively influencing parental fertility decisions – or whether its influence, provided there is one, should not be removed (as a “first-best”

### 3. Milestones and recent developments

It was already mentioned that, in its early days, the economic theory of fertility has been absorbed, to some extent, by fully developing and understanding its analytical tools. Some of the models suggested, while formally challenging, were of little use for applied research or for a fruitful dialogue with researchers from other disciplines.<sup>10</sup> Even though economic research on fertility may have had to go through this stage, the main advances since then have been marked by the formation of several types of fully-fledged models incorporating some amount of the social context and the institutional background of actual fertility choices in a tractable fashion, and by subsequent moves in the direction of empirical research.

In this sense, three developments appear to be particularly important for current and future fertility research conducted by economists: investigations into the internal structure of parental couples and their decision making (see Section 3.1); analyses reflecting the interdependence of fertility choices and labour supply decisions of both parents (Section 3.2); and analyses exploring the potential benefits of having children in a life-cycle perspective, that is, focusing on children as an “investment good” (Section 3.3).

#### 3.1 Fertility and intra-family bargaining

In economic models of fertility suggested in the initial phase of this research, the parental household was taken to be the relevant decision making unit. The simplification involved in this “unitary” model of a given couple’s interactions and choices was not only due to technical reasons. Emphasis at that time was placed on discussing (common) motives of parents to have children and investigating how their (joint) decisions – for instance, regarding an optimal number of children – would react to changes in income and child costs. Later on, opening the “black box” of the household as a collective agent and looking at intra-household relationships, as is done

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solution) or reduced to a minimum (to approach a “second-best” scenario, at least). The economic theory of fertility provides a number of caveats, but it also establishes a few reasons why public intervention in this area might be justified (see *Werding* 2010).

<sup>10</sup> An interesting example is offered by the in-depth analysis of the quantity-quality interaction involved in parental fertility decisions by *Becker and Lewis* (1973). In their model, intriguing problems regarding the existence of an “interior” solution move to the fore. The way in which they set out, and solve, these problems is a brilliant piece of theoretical analysis, but it is empirically empty as a key parameter of their approach, viz. the price per “quality unit” of a child, is unobservable. In current research, the negative impact of income and wage earnings that could arise in this model is usually attributed to increasing “opportunity costs” of child rearing which are likely to be much more important in explaining the fertility decline in developed countries.

in Easterlin, Pollak, and Wachter (1980) or Rosenzweig and Schultz (1985), marks a major extension of economic analyses applied to this field.

As an intermediate step, fertility models started to distinguish between two parents with differing roles and a specific division of labour. As long as these roles are effectively assumed to follow a pre-defined structure, the models become empirically richer but still leave out a considerable amount of potential internal conflicts that may matter for fertility decisions in reality. Yet, as more complex models are analytically demanding and difficult to handle in an empirical context, the assumptions of fixed role assignments and pre-defined decision rules for parental couples are still a common standard in most of current research. In an empirical context, for instance, fertility choices are often considered as if they were effectively made only by women (the existence and characteristics of a partner being only included among a number of background variables). The design of these models reflects that women are typically acting as second earners who take care of children much more than do their husbands or partners. Behaviour conforming to this conventional role model is indeed still rather wide-spread, so that these models are not necessarily far away from reality.

Nevertheless, life styles of couples are becoming more and more heterogeneous, and partnerships and marriages are increasingly unstable. This calls for new types of models explicitly dealing with the formation and potential break-up of parental relationships which constitute a major difficulty for decisions to raise children as an intra-family public good. Bargaining models in which the two partners may strategically interact with each other to define their positions and their individual and collective room for manoeuvre are thus another remarkable progress. Building on Pollak (1985), Ott (1992) was effectively the first to fully spell out the implications of a bargaining approach for fertility choices in a theoretical fashion.<sup>11</sup> With some delay, her research has sparked off a number of empirical contributions, the most recent being Iyigun and Walsh (2007), Brodmann, Esping-Andersen, and Güell (2007), and Rasul (2008).

The bottom line in this research is that the optimal number of children tends to be smaller if models are based on bargaining between two partners, rather than on the “unitary model” or on simple decision rules applied within the parental household. The reason is that these latter types of models neglect the costs of weakening the bargaining position of one partner through an asymmetric division of labour regarding the options of engaging in paid work or in child care and other intra-household activities. Resulting inefficiencies become even more apparent when linkages between fertility choices and

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<sup>11</sup> While the approach by Ott (1992) combines elements of cooperative and non-cooperative bargaining, there are also models in which partners are assumed to interact entirely non-cooperatively, but explicit applications to fertility choices are limited (see Konrad and Lommerud 1995 for an exception; Chiappori and Donni 2009 for a broader survey).

parental labour force participation (and education) are taken into account as well (see Section 3.2). Existing analyses also indicate that partners are often unable to commit to co-operative solutions which could restore the balance of bargaining power to some extent. Uncertainties involved in the bargaining procedure may thus have rather strong effects.

### **3.2 Fertility and labour force participation**

Another area where economic fertility research has made substantial progress is that of in-depth analyses of interactions between fertility choices and labour force participation of parents, especially mothers. Willis (1973) was effectively the first to explicitly incorporate (maternal) labour supply decisions and their impact on fertility choices in the simple theoretical models dominating the literature at an early stage. In this type of models, female wages tend to become a key parameter for the determination of fertility outcomes (see, e.g., Ermisch 1979, 1990). At closer scrutiny, however, they cannot be taken to be an exogenous determinant of fertility, as they depend on women's qualifications and are thus the result of more fundamental choices (Rosenzweig and Schultz 1985).

Decisions regarding the number of children or the timing and spacing of births are therefore part of a larger picture in which potential parents are operating under a basic time constraint which gives rise to conflicts with a number of other core activities in life-cycle planning that are likely to have a strong impact on life-time financial budgets. Education, labour force participation in general, or the pursuit of occupation-specific career patterns are probably the most important examples for these competing activities, with long-lasting effects in any of these areas if individuals have, or do not have, children. Models suited to deal with this should have a longitudinal dimension, ideally spanning the entire life cycle of the individuals considered (as in Mofitt 1984; Hotz and Miller 1988). They should reflect the sequential nature of actual fertility decisions, that is, consider them as decisions to have (yet) a(-nother) child (e.g., building on Wolpin 1984), rather than taking observed fertility outcomes to be the result of a one-shot optimization. Last but not least, they should capture all types of opportunity costs that may influence fertility decisions (see Joshi 1998; Waldfogel 1998), so that they include not only those earnings forgone while taking care of a child, but also lasting effects for wage rates and the career prospects offered to job applicants or employees (including the possibility of a differentiation or discrimination by their gender).

Within this larger picture, due to data limitations and resulting identification problems, empirical research often concentrates on single aspects or on particular sub-periods, such as interactions between fertility choices and qualifications, or between

fertility and time patterns of labour force participation of young women. Early empirical work exploring the enormous heterogeneity of individuals and career patterns offered in specific firms and occupations (see, e.g., Cigno and Ermisch 1989; Eckstein and Wolpin 1989) has since been replicated and extended again and again, using richer data for an increasing number of countries. Attention has been given to the role of the macroeconomic environment, particularly fluctuations and trends in unemployment (Butz and Ward 1979; Adsera 2005; Del Bono, Weber, and Winter-Ebmer 2012). More recently, empirical research has shifted its focus towards investigating the impact of institutional factors, such as public regulation regarding parental leaves, benefits meant to replace wage earnings during periods of pregnancy and subsequent leaves of absence, or the public provision of child-care institutions (see, e.g., Kögel 2004; Björklund 2006; Lalive and Zweimüller 2009; Del Boca and Sauer 2009; or Bergemann and Riphahn 2009). Up to a point, researchers are now effectively evaluating the active role that the state is increasingly taking in this area.

### **3.3 Children as investment goods**

The life-cycle dimension of fertility decisions is important also for a further aspect that has moved to the fore in the economic theory of fertility over time and is rather prominent in current research. Leibenstein (1957: 161–163) had already suggested that raising children may not only be desirable because of a consumption motive of potential parents. Through future contributions of children to the lifetime income of their parents, he argued, there could also be a strong investment motive for fertility.

This idea was largely forgotten in the work conducted by Becker (1960) and most of his followers. Of course, Becker's notion of child quality (as perceived and demanded by the parents) can effectively be taken to represent a large variety of parental "investments" in children (such as monetary expenditure on food, clothing, health, etc. to provide for a higher living standard of each child, but also time spent with children, e.g., to support them in obtaining a better education). Therefore, the notion may also have considerable overlaps with the concept of "human capital" (as a determinant of the life-time income of children) which is embodied in a given child.<sup>12</sup> But as long as the motivation of parents to expend resources on any of these items is assumed to be an increase in their own utility, the value of having a child has an arbitrary element, and virtually any changes in observed fertility behaviour could be attributed to changes in this consumption value. Changes in how parents might benefit from bringing up children in a much more tangible fashion, through financial transfers

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<sup>12</sup> Remember that Becker (1962b) himself contributed substantially to the literature on "human capital" in a distinct branch of his writing. But he never discussed the conceptual links to his ideas on fertility.

or personal services accruing at a later stage in their lives, are entirely neglected in pure consumption models of fertility.

More recent research has highlighted that, during the process of modernization, there have indeed been major changes in how subsequent generations typically interact with each other. As a consequence, the investment motive for raising children may have become much less important for potential parents than it has been in the past, certainly in more developed countries. However, this does not mean that theoretical models focusing on children as a potential source of parental lifetime income or well-being have become immaterial over time. On the contrary, they might actually contribute substantially to explaining long-term trends and ongoing changes in fertility behaviour.

Basically, this is the main idea behind the research triggered by Cigno (1993). Where child labour with early contributions of children to household income of their families is no longer an issue, raising children in order to receive financial support and care from them at old age could still be an important incentive to raising children. Having children is a genuine investment then, and any effort of parents to increase their children's living standard, health or education may add to the expected returns. In fact, all of these efforts are not only likely to increase the capacities of children to support their parents later on, but they may also increase their willingness to do so – hence, the probability that parents can actually rely on them at old age – within a system of mutual exchange between subsequent generations.<sup>13</sup>

Given that, the expansion of capital markets and the advent of public provision for old age may have interfered with parental fertility choices, essentially reducing the number of children and/or expenditure on children (a point further investigated by Werdning 1998 and fully explored in Cigno and Werdning 2007; related empirical work has been provided, e.g., by Cigno and Rosati 1996; Cigno, Casolaro, and Rosati 2003; or Ehrlich and Kim 2007). These effects could be mitigated or, alternatively, even reinforced through various types of uncertainty which also play a role for the long-term relationship between parents and children (Cigno, Luporini, and Pettini 2004; Cremer, Gahvari, and Pestieau 2006) and are still in the process of being investigated more closely in this strand of research. Note, however, that the returns to investment in children accruing at old age may not only take the form of monetary transfers, but also of personal care and attention, for which neither the state nor markets are able to offer perfect substitutes. Investment in children may therefore have changed considerably in both level and structure. Yet, it can still be relevant as a parental fertility motive.

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<sup>13</sup> Cigno (2006) speaks of an informal “family constitution” prescribing the terms of this exchange and shows that it can be self-enforcing and renegotiation-proof under certain conditions. Still, such a system is fragile in that young people may have incentives to default on it – that is, terminate it – if the economic or institutional environment changes.

## 4. Agenda for future research

To some extent, directions for future research on fertility that appear to be promising from an economist's point of view follow directly from the extensions and refinements which have been discussed in the previous section. Most likely, some of the progress which can be expected is thus already under way.

First of all, combining the different aspects mentioned before in a unified research agenda may be worth some effort. For instance, interactions between fertility, educational attainments, and labour supply in individual decision making are effectively an important complication of the bargaining processes between two partners who could possibly have children together. Dealing with this in its full complexity, i.e., as a dynamic multi-stage process which is not restricted by any conventional role assignments, has so far been beyond the scope of theoretical and empirical research. Similarly, analysing children as an investment good with differentiated inputs by the (two) parents, with an eye on mechanisms making sure that the corresponding returns really do accrue to each parent is a field of research which has not been entered yet. There are, of course, limitations to the degree of complexity which can and should be accomplished in economic fertility models. Not everything that appears to be theoretically challenging can be made formally tractable, nor can it be taken to applied, empirical research in a meaningful way. Still, theory may need some leeway for exploring these potential limitations.

What is currently still underdeveloped in terms of promising empirical work is research fully taking care of the time and life-cycle dimensions of actual fertility decisions. For instance, tracking individuals on their pathways into forming a couple, becoming a parent, and combining this with individual activities of both partners in the areas of education, labour force participation, and professional careers is clearly worthwhile. Ideally, research of this kind should actively address the timing and sequencing of any of the events it is looking at, including all the uncertainties, instances of incomplete information, and path dependencies involved. An interesting observation for this type of research is that timing and spacing decisions should be expected to interact to some extent, and that the time dimension may feed back on fertility outcomes in terms of total numbers of children.<sup>14</sup>

For instance, longer education tends to lead to a postponement of first births. If this does not (fully) translate into a reduction in the total number of children, the births must be concentrated in a shorter time span. There are further, competing trends which may influence these spacing decisions. An important source of costs associated with children

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<sup>14</sup> Among other things, this makes it difficult to disentangle on-going changes in desired total numbers of children from changes in the average timing and spacing of births, a feature potentially obscuring many attempts at assessing the determinants of long-term trends in fertility behaviour in an applied context.

is time spent taking care of them, while care-taking can relate to more than one child at a time. There should thus be large “economies of scale” involved in a narrow spacing of births. At the same time, the lasting effects of parental leaves on future earnings could be an increasing function of the length of time spent out of work. Therefore, parents planning to have more than one child may wish to keep their parental leaves rather short, with intermittent periods for which they return to their jobs. Furthermore, as the decision to have a child is basically irreversible, the various uncertainties involved imply that there may be an “option value” of postponing births, sometimes even until it is too late. The advantage of this strategy is that unfavourable surprises on the cost side can be avoided, while expected benefits of having a child could still be reaped later on. As a result, the perceived value of waiting can become a quasi-determinant of the final number of children. This simple idea is implicit in some analyses of the optimal timing of births, but it appears that, thus far, it has not been studied explicitly.

Another issue that may deserve closer attention in future research involves the many dimensions of heterogeneity with respect to lifestyles encompassing bringing up children or not. Specific questions might be how marriage or cohabitation relate to fertility choices in different societies and under different economic conditions; how being a mother (or a father) may remain important for changing gender roles, even outside traditional heterosexual partnerships, resulting in lone parenthood (sometimes from multiple partners) or in homosexual couples with children; what, to the contrary, drives a growing portion of people to remain childless and how this influences their self-perceptions and activities at different stages of their life cycles; how fertility choices vary by income levels or over ethnic groups, or why migrant communities show signs of assimilation or no assimilation in this area. A promising point of departure for this kind of research which may become increasingly interdisciplinary is probably provided by the new concept of “identity economics” suggested by Akerlof and Kranton (2010). In Chapter 2 of their book, the authors include a few remarks regarding the desire for children, but there is ample room for developing this into a differentiated research programme.

At a more aggregate level, there has thus far been no theory, and probably never will be, which is generally accepted and provides a comprehensive explanation for the long-term fertility decline observed throughout the developed world. What comes closest to this standard is the theory of “demographic transition”, a purely descriptive approach which highlights a characteristic sequence of reductions in (age-specific) mortality and fertility, with consequences for the size and the age structure of the populations affected that are easily predictable. Meanwhile, demographers tend to assume that even many developing countries have started to follow these basic trends, although with some delay. While this might be good news in a global perspective, common challenges for all researchers who are interested in demographic phenomena

are to provide more insights into all mechanisms that are at work in this transition and to add to the understanding of lowest-low fertility, its conditions and its consequences, which is nowadays observed in some developed countries and regions.

Thus far, economists have been reluctant to use qualitative data, and they are certainly not qualified to apply qualitative empirical methods. However, there is now a new brand of “happiness research” being done by economists (see, e.g., Frey and Stutzer 2001; or Layard 2005) which may increasingly move this borderline. There, the degree of life satisfaction as indicated by respondents in representative surveys is taken to be a reliable indicator of individual well-being – and it is being investigated more and more intensely regarding its determinants in various areas of human life and human behaviour. In a sense, the older, more abstract notion of “utility” may thus have become measurable, allowing for fundamental changes in the design of research projects pursued in the discipline of economics. It is too early to assess whether research of this kind may also be a good example for potentially fruitful co-operations between economists and other social scientists who are specifically interested in fertility. For the moment, research focussing on “happiness and fertility” still appears to be a domain of demographers and sociologists (see, e.g., Billari and Kohler 2009; or Margolis and Myrskylä 2010).

Last but not least, future research of an interdisciplinary nature could certainly benefit from improvements in the data infrastructure. From the point of view of researchers, an ideal data base should be longitudinal, assembling detailed quantitative as well as some qualitative information for representative samples of individuals and households, organized in several “layers”, that is, it should encompass complete histories of household formation, education and labour force participation; contain data on various kinds of interactions with children, including information regarding child outcomes (most importantly health and skills); and include data on a broad array of public interventions that may matter for any of these aspects. In addition, the ideal data base should build on parallel surveys conducted in different countries to allow for comparative work at an international level. Again, some of what is described here is already under way, while one might also have to acknowledge that an ideal data base of this kind may well turn out to be prohibitively costly.

## **5. Concluding remarks**

Some of the issues brought up here for future research on fertility (see Section 4) are already being addressed in an initial fashion by several disciplines, but methods and observations are diverse, and investigating the role of economic aspects is not a primary concern. In fact, one major ambition of this article is to make a plea for including

economic aspects and models in any large-scale attempt at understanding fertility behaviour under contemporaneous conditions. Economists can make a substantial contribution to research on fertility, in spite of the limitations of their approach that have been mentioned here.

Current empirical work on fertility shows considerable convergence across disciplines. Up to a point it is mainly the disciplinary backgrounds of researchers, and the journals in which they publish their results, which mark a difference. If there is anything distinct about the work done by economists in this field, it is probably that their empirical models are more theory-based in their structure, hence less eclectic in the choice of variables, and that they are more interested in reliable identification strategies and in causal explanations than others. Against this background, joint research on fertility appears to be called for which is genuinely interdisciplinary, based on complementarities between the differing approaches and methods applied.

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