ORIGINAL RESEARCH

Long-term fiscal implications of funding assisted reproduction: a generational accounting model for Spain

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Abstract   The aim of this study was to assess the lifetime economic benefits of assisted reproduction in Spain by calculating the return on this investment. We developed a generational accounting model that simulates the flow of taxes paid by the individual, minus direct government transfers received over the individual's lifetime. The difference between discounted transfers and taxes minus the cost of either IVF or artificial insemination (AI) equals the net fiscal contribution (NFC) of a child conceived through assisted reproduction. We conducted sensitivity analysis to test the robustness of our results under various macroeconomic scenarios. A child conceived through assisted reproduction would contribute €370,482 in net taxes to the Spanish Treasury and would receive €275,972 in transfers over their lifetime. Taking into account that only 75% of assisted reproduction pregnancies are successful, the NFC was estimated at €66,709 for IVF-conceived children and €67,253 for AI-conceived children. The return on investment for each euro invested was €15.98 for IVF and €18.53 for AI. The long-term NFC of a child conceived through assisted reproduction could range from €466,379 to €-9,529 (IVF) and from €466,923 to €-8,985 (AI). The return on investment would vary between €-2.28 and €111.75 (IVF), and €-2.48 and €128.66 (AI) for each euro invested. The break-even point at which the financial position would begin to favour the Spanish Treasury ranges between 29 and 41 years of age. Investment in assisted reproductive techniques may lead to positive discounted future fiscal revenue, notwithstanding its beneficial psychological effect for infertile couples in Spain.

Introduction

Birth and fertility rates in Spain have declined significantly in recent years. In 2011 the birth rate stood at 10.2 births per 1000 inhabitants, its lowest level since 2003, while the fertility rate was 1.36 children per woman (INE National Institute of Statistics, 2014), which is below the replacement level (2.1). This is partly attributable to the greater integration of women into the labour market and consequent delay in maternity (IMW Instituto Max Weber, 2012), but it is also compounded by the prevalence of infertility, defined as the inability of one or both partners to conceive naturally after a year of frequent unprotected sexual intercourse. Infertility affects 15% of the population in Spain, or one in seven couples of reproductive age (Matorras Weinig, 2011). Currently, the Spanish public health system offers two types of assisted reproduction: IVF and artificial insemination (AI). In both, the public health system finances a maximum of three IVF cycles or four AI cycles, or a combination of both techniques, whether pregnancy is achieved or not. Inclusion criteria for receiving publicly financed assisted reproduction are women between 18 and 40 years of age, who are physically and mentally fit (no definition provided), who have been classified as infertile according to the previous definition but have no evidence of a poor ovarian reserve. Priority is given to nulliparous and infertile couples (Alberto et al., 2002). In 2010, there were approximately one million couples requesting assisted reproductive treatment. Only 22% received one or more assisted reproductive treatment cycles, of which 65% were performed in private facilities. The average waiting time for an AI or IVF cycle in a public health facility was 339 days (Matorras Weinig, 2011), so women or couples who can afford to pay for treatment, and those who do not fulfil inclusion criteria, may choose to go to a private health facility without a waiting list (Matorras Weinig, 2011). Therefore, not only is there an excess demand for assisted reproductive treatment but also inequity of access to that treatment.

Previous studies have shown that, even under the most optimistic projections, a declining birth rate combined with an ageing population might result in fiscal imbalances that can only be mitigated through spending cuts or tax increases (IMW Instituto Max Weber, 2012; MESS Ministry of Employment, 2006; National Research Council, 2012; Pérez-Camarero et al., 2012). A higher birth rate would contribute to a medium-term increase in the taxpaying population and offset the imbalances caused by the growth of the ageing population.

In this context, public funding of assisted reproductive treatment could have a positive effect not only on mitigating the excess demand and the current inequity in access to healthcare services, but it could help restore replacement rates and improve fiscal stability (Pérez-Camarero et al., 2012). Indeed, beyond the obvious benefit of assisted reproduction allowing a couple to conceive, generally improving their quality of life, it could produce a social benefit that goes far beyond the direct individual benefit, because each individual conceived contributes a tax flow to society, especially during his/her working life. Since the individual also 'costs' society the amount of pensions and public services he/she receives, the net benefit that an individual brings to society is quantifiable as the taxes paid minus benefits received.

The long-term fiscal implications of public funding of assisted reproductive treatment have been estimated previously in countries as diverse as Brazil (Kröger and Ejzenberg, 2012), Denmark (Connolly et al., 2011), Sweden (Svensson et al., 2008), the UK (Connolly et al., 2009), the USA (Connolly et al., 2008) and, more recently, Greece (Fragoulakis and Maniadakis, 2013), The Netherlands (Moolenaar et al., 2014), Ukraine, Belarus and Kazakhstan (Mandrik et al., 2015). These studies use generational accounting models that estimate the social net benefit of an IVF-conceived individual. With the exception of the Dutch case, they conclude that such funding would bring net fiscal benefits to the State over the lifetime of the individual. However, these results are not directly transferable to Spain, since they apply only within the context of each country's own fiscal, healthcare and welfare policies.

In order to investigate whether funding assisted reproduction might be considered an efficient use of public resources in Spain, this analysis models the long-term tax implications that public funding of assisted reproduction might have in the country. Using a generational accounting model, we analyse the fiscal balance of the economic transfers between the government and an individual conceived through assisted reproductive treatment over his/her lifetime. Both IVF and AI treatments are considered.

Materials and methods

A generational accounting model was built to estimate the net fiscal value of an individual conceived through assisted reproductive treatment (Auerbach et al., 1991, 1992, 1994; Cardarelli et al., 2000). To analyse the fiscal relationship between the State and an individual throughout his/her life cycle the model calculates the sum of all gross income that the State will receive from the individual, minus direct transfer expenses throughout his/her lifetime. The net present value (NPV) of future flows of revenues and transfers for each individual is as follows:

$$NPV = \sum_{t=0}^{N} \left[\frac{T_t - X_t}{(1+r)^t} \right] - K_0 \tag{1}$$

where N is the individual's life expectancy, T is gross revenues received by the government through taxes paid by the individual, X is direct transfers to the individual (e.g. healthcare, education and pensions), K is the cost of assisted reproductive treatment, r is the discount rate and t corresponds to 1 year. Revenues and transfers are apportioned to each year of the individual's life, from age 0 to the age of life expectancy. We assume that an individual