External Effects of the Pension System in the Context of the Welfare State[1]

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1. Introduction

This article presents results from various studies conducted by the authors, along with other researchers, aiming to measure the external effects generated by the existence of an intergenerational transfer system such as the pension system, and the welfare state as a whole. The primary reason for this externality is that a pay-as-you-go pension system socializes the intergenerational contract, thereby providing insurance against the possibility of not having children. This feature extends to other welfare state programs that are implicitly financed through similar pay-as-you-go mechanisms. As a result, the children of certain citizens, who are largely raised with their families' private resources, create a positive externality for those without children. In other words, the taxes these children pay once they reach adulthood support the welfare state programs for all individuals, regardless of whether they have had children or not. This external effect produced by children (and the existence of the pay-as-you-go system) has been analyzed in the theoretical literature on intergenerational transfers, primarily within the framework of dynamic macroeconomic models of overlapping-generations.

The ability to measure the magnitude of the externality generated by parenthood for society as a whole ultimately depends on the availability of data. In this regard, National Transfer Accounts (NTA) offer an innovative data source by providing comprehensive estimates of public and private intergenerational transfers occurring at any given time. Although initially these estimates were only disaggregated by age, they already highlighted the welfare state's strong bias in favor of the elderly—a key element in relation to the aforementioned external effects. In this paper, we describe this method and the developed extensions to measure these external effects, providing an illustration for the case of Spain in comparison to three other countries. Specifically, we present the results of a dynamic microsimulation model incorporating NTA estimates disaggregated by gender, family type, and educational level. This allows for simulating the transfers received over the life cycle through family and welfare state mechanisms, offering a quantification of the externality generated by having children in the presence of a pay-as-you-go financed welfare state. The results indicate that parents of any educational level provide more family transfers, receiving around half of the net family transfers over their lifetime compared to those without children. And the welfare state does not compensate these differences with public transfers. The externality is therefore considerable.

These results are crucial to the debate on pension system reform, suggesting that such reform should be considered within the broader context of welfare state programs—that is, the total public intergenerational transfers, both forward (aimed at children) and backward (targeting the

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elderly). Recent measures adopted in the Spanish pension system, focused on increasing contributions and avoiding pension adjustments, will shift the adjustment burden to the generations active during the retirement of the baby boomers, further increasing the current welfare state bias toward the elderly. Consequently, the children of the baby boomers will face the challenge of continuing to finance their parents' acquired rights within the pay-as-you-go pension system while maintaining fertility and funding the costs of child-focused policies (education and family policies), which are essential for ensuring fairness and for the future payment of pensions within the pay-as-you-go system.

The following section (2) summarizes the theoretical literature analyzing these external effects, selecting some key milestones relevant to this topic. Next, the standard NTA methodology is described (Section 3) along with the extensions made to measure the externality in the Spanish case (Section 4). The final section concludes with a discussion of the results and potential avenues for future research, including adding a monetary valuation of parental time transfers to children to the externality measurement.

2. The external effects of having children

The literature on endogenous fertility and intergenerational transfers is extensive and quite fragmented. Its origins trace back to studies analyzing the conditions of the "golden rule" of capital accumulation within the framework of the standard overlapping generations model (Diamond, 1965). In this context, in the absence of altruism—and thus, without private transfers—and assuming exogenous fertility, the fact that the competitive equilibrium does not achieve the golden rule justifies the introduction of public intergenerational transfers. When the steady-state capital exceeds the golden rule level (overaccumulation), a properly sized pay-as-you-go pension system brings the economy to the golden rule under a Pareto-optimal transition. This does not hold when there is underaccumulation of capital, as it would require a funded system that increases savings, leading to a transition that disadvantages certain generations.

Samuelson (1975) added a key element to this issue by considering the possibility that the planner optimizes not only capital but also the population growth rate, bringing the economy to the "goldenest golden rule" (GGR). Again, the competitive equilibrium generally does not reach the optimal solution—for various reasons, including that fertility remains exogenous for agents. In fact, the competitive economy only reaches the GGR by chance—or serendipity—when the level of per capita capital resulting from private savings decisions happens to yield a marginal product equal to the optimal fertility rate determined solely by the planner. Samuelson articulates this as his Serendipity Theorem, which is crucial for understanding the interaction between public policies and fertility.

After several decades, and likely due to the demographic transition, this literature re-emerged in different directions. On one hand, there have been several attempts to introduce private transfers to children or the elderly within the standard overlapping generations model with exogenous fertility, which in its initial formulation ignored the early dependency period (Willis, 1988). In each case, the motive behind private transfers provides a different justification for public intervention. The literature is extensive on this front, though only a few studies analyze the simultaneous relationship between transfers to children and to the elderly. Boldrin and Montes (2005) investigated a policy in this vein within a model where parents decide on the level of human capital for their children. Similarly, within the field of Political Economy, Rangel (2003) examined the optimal provision of forward and backward transfers in a non-cooperative game setting. He developed a model to explore the feasibility of non-market institutions to politically sustain a combined system of public intergenerational transfers directed toward both

the young and the elderly. The main conclusion was that an equilibrium with positive forward transfers (such as education) requires the existence of a backward exchange mechanism (such as pensions) or some degree of altruism.

On the other hand, the literature on endogenous fertility examined the interaction between public policy and fertility. In an environment of endogenous fertility—where agents chose the number of children they have—policies that lead to the GGR link transfers to both the young and the elderly. In contrast with Samuelson's (1975) analysis, individuals also decide on fertility, which requires the introduction of the costs and benefits of having children. An interesting result indicates that there is a possibility of achieving the first-best solution through a single instrument: a pension system that links the pension each person receives to the contributions made by their own children [see Eckstein and Wolpin (1985) and Bental (1989)].[2] The reason is that this policy leads individuals to internalize the fact that there are two mechanisms for saving—human and physical capital—thus achieving the GGR through arbitrage. Alternatively, the same objective can be met by using two pay-as-you-go systems: an unlinked pension system and a family support system (see Fenge and Meier (2005) for an open economy; van Groezen and Meijdam (2008) for a closed economy).

Continuing with the literature on endogenous fertility, Abio et al. (2004) developed a model that endogenizes not only fertility but also the demographic transition that most OECD countries have experienced in recent decades. This transition was associated with changes in female labor market participation, motivated by the empirically observed fact that women's wages have historically increased at a higher rate than men's. Following Galor and Weil (1996), this was formalized by assuming that female labor was more complementary to capital than male labor.[3] In this model, the results of Eckstein and Wolpin (1985) and Bental (1989) hold. In addition to analyzing the steady-state solution, the model dynamics are examined, illustrating the demographic transition through simulation. When applying a pension policy linked to fertility—where the pension depends on the contributions made by children—the externality is internalized, achieving the GGR. Moreover, achieving the first-best requires taxing only male labor for contributions, as these distort female labor supply. In this context, it is shown that neither the introduction of a Beveridgean pay-as-you-go pension system nor a Bismarckian system can decentralize the social optimum, although they can achieve the golden rule. The optimal policy also has the virtue of restoring the financial balance of the pay-as-you-go pension system.[4] The main challenge of this policy lies in the transition. Sinn (2000) makes an interesting and likely more politically viable proposal. This involves transitioning to a mixed funded system, where only childless individuals would contribute to the funded system. This way, it distributes the three burdens associated with the transition to a funded system: maintaining acquired rights in the pay-as-you-go system, creating the new fund, and having and raising children with private resources.

Subsequently, other studies have been developed, although this literature remains somewhat limited. One could say that the question of whether an optimal fertility rate exists is at the

[2] In Eckstein and Wolpin (1985), the number of children appears in the parents' utility function (imperfect altruism), while in Bental (1989), the marginal benefit of having children takes the form of receiving care in old age (investment motive).

[3] Models of endogenous fertility that successfully replicate the demographic transition are less common. The transition can be demand-driven, by introducing into the utility function the so-called trade-off between the quantity and quality of children, or supply-driven, due to the endogenous incorporation of women into the labor market—as in the cited work of Galor and Weil (1996)—or by combining supply and demand elements, as in Galor and Weil (2000), to simultaneously endogenize fertility and growth.

[4] See also Cremer et al. (2006), where fertility is partially endogenous and partially exogenous.

frontier of economic theory, as the Pareto criterion does not apply to the decision of whether a new individual should exist.[5] Likewise, attempts to design a social welfare function to choose this rate can lead to undesirable results at both extremes: maximum utility for zero individuals or vice versa (the so-called "repugnant solution"). However, this literature is valuable for our topic, as it demonstrates the importance of the externality created by having children in the presence of a pay-as-you-go system.

3. National Transfer Accounts (NTA)

The NTA project began in the early 2000s within the framework of an international collaborative network, leading to a methodology to generate the data necessary for the analysis of what became known as the *generational economy*. The method disaggregates the main aggregates of National Accounts (NA) by age, allowing the observation of how resources are produced, consumed, and shared among people of different ages living within the same period. Lee and Mason (2011) published the first comparative results for 23 countries. Today, more than 90 countries are part of the NTA network, and at least partial estimates are available for each one of them for a given year. The methodology has been endorsed and published by the United Nations Population Division (UN, 2013). In Europe, a Horizon 2020 project (AGENTA) produced comparable estimates for 25 countries for the year 2010, also disaggregated by gender.[6] The fundamental identity of the reordered National Accounts is expressed as:

$$YL + YA + TG^{+} + TF^{+} = C + S + TG^{-} + TF^{-} \qquad [1]$$

where YL and YA are labor and capital income, respectively; C is total consumption (including public consumption); S represents savings; TG are public transfers and TF represents private transfers. The positive and negative superscripts in the transfers indicate whether individuals receive them (inflows, +) or pay them (outflows, −). In the case of public transfers, flows are from the public sector to individuals or vice versa: negative TG values are taxes and social contributions, while positive TG values are benefits received, such as pensions, unemployment benefits, family allowances, etc. Private transfers capture the flows of resources that occur between individuals of different ages, with those flowing within households being particularly significant. For instance, children receive considerable transfers from their parents to finance their consumption. Equation (1) represents the necessary balance between sources of income (on the left-hand side) and their possible uses (on the right-hand side). By introducing age and rearranging Equation (1), we derive the general NTA equation:

$$LCD^{a} = TG^{a} + TF^{a} + ABR^{a} \qquad [2]$$

where the LCD (life cycle deficit) represents the difference between consumption and labor income for each age *a* in the observed period, which must be financed through (or allocated to) the three channels on the right-hand side of the equation: net public transfers (TG), net private transfers (TF), and asset-based reallocations (ABR), which consist of capital income plus dissaving.

Equation [2] holds at the aggregate level and for each age group (or any other disaggregation of interest, such as gender or educational level). To obtain the estimates for each age (called age

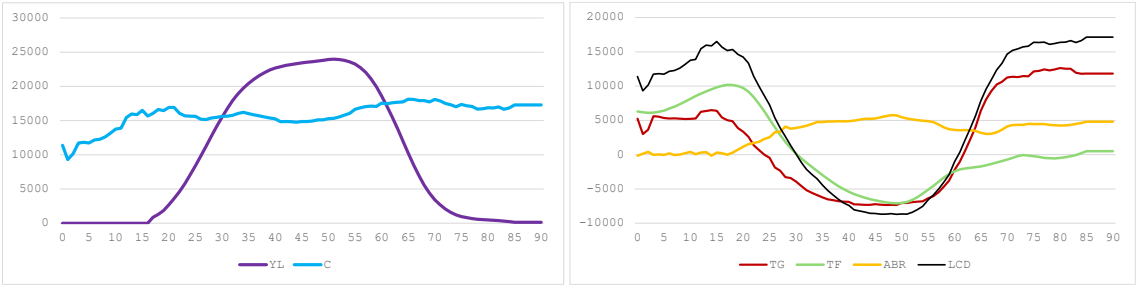
[5] See Razin and Sadka (1995) and Golosov et al. (2007) for a review of efficiency considerations in an endogenous fertility setting.

[6] See the project website (www.ntaccounts.org) and Istenič et al. (2016) for details on the methodology in the case of estimates for European countries.

profiles), microdata from consumption and income surveys are required. Each variable in Equation [2] is decomposed into multiple components. For instance, in the case of LCD, the difference between consumption (C) and labor income (YL) implies estimating public and private consumption on one hand, and wages and income from self-employment on the other. Additionally, public and private consumption are further broken down into categories (health, education, and other consumption). The process is complex and requires extensive information from various data sources. Specifically, in Spain (and Europe), two major surveys contain the essential microdata needed, although other statistical sources or administrative data are also used. First, the Statistics on Income and Living Conditions (SILC) provides most of the income-related information (including taxes and cash transfers received). Second, the Household Budget Survey (HBS) contains data related to private consumption and expenditure. Consumption and some income variables are only collected at the household level, and data must be individualized. The standard procedure in the NTA methodology is to impute other consumption (i.e., expenditures on food, clothing, etc.) to household members using an equivalence scale that assigns a lower weight to younger ages. Some specific types of consumption (health and education) are distributed using specific imputation methods or regression analysis.

Taxes, social contributions, and cash transfers are taken from SILC. In-kind transfers (such as government expenditures on health and education) are not present in the survey data and must be imputed using administrative and related sources according to their age-based utilization. Once this stage is completed, intra-household transfers are calculated.[7] In particular, the surplus of each household member is first calculated by subtracting individual private consumption from disposable income. Second, transfers from members with a surplus are made to those with a deficit inside the household. The resulting household surplus (or deficit) is transferred to the household head (or is financed by them), given that the standard methodology assumes that they are the only ones saving (or dissaving) the remaining resources.

Figure 1: National Transfer Accounts results for Spain (2012)
a) Consumption and labor income age profiles b) The four basic NTA profiles



Source: Authors' own elaboration from results published in Solé et al. (2020).
Note: Consumption (C), labor income (YL), life cycle deficit (LCD), net private transfers (TF), net public transfers (TG), and asset-based reallocations (ABR) profiles. Per capita values, in euros.

The household head is the main income provider and the default recipient of most household benefits, inter-household transfers, and asset income. Once individual profiles are estimated, they must be adjusted to match the macro-aggregates provided by the National Accounts, ensuring consistency between both estimates.

Figure 1 shows the main NTA results for Spain in 2012. Panel (a) presents the per capita profiles of labor income and consumption. Labor income exhibits its typical inverted U-shape, while consumption—including public consumption—tends to be flat. The increasing shape in the early

[7] Transfers between households are also obtained from the microdata.

years is due to the equivalence scale used to allocate household consumption to younger individuals (0–19). The leveling during child-rearing years reflects that adjustment. For older ages, the consumption profile tends to be fairly flat, although in some high-income countries, a significant increase is observed, explained primarily by substantial public consumption at those ages, such as healthcare or long-term care. The difference between consumption and labor income results in the so-called life cycle deficit, shown in black in panel (b), along with the contributions of the three available mechanisms for transferring the surplus generated during active ages to dependent ages (children and the elderly). Asset reallocations follow the expected trajectory throughout the life cycle. They begin to be relevant from around age 20 and accumulate until the end of the working life, then slightly reduce and/or remain constant.

Profiles of family transfers are one of the major innovations provided by NTA data compared to NA. Figure 1 (b) shows that these primarily occur between working-age adults and children. In old age, net private transfers tend to neutralize or become negative, indicating that parents (and grandparents) continue to transfer resources to their descendants. Per capita profiles logically include transfers in other directions (such as transfers between spouses and between households, which are not distinguishable in the figure).

Finally, net public transfers (TG) received by individuals from the public sector also exhibit the expected shape: the working-age population transfers resources to children and the elderly. The shape of this profile already suggests a significant bias in the welfare state towards financing the consumption of the elderly (the level of net TG is considerably higher for the elderly than for children). This bias is not an isolated fact of the Spanish case that could be explained by the late development of our welfare state, but a regularity observed in almost all countries once the welfare state is consolidated (Solé et al., 2020).

4. Making the role of the family visible across the life cycle: The microWELT microsimulator

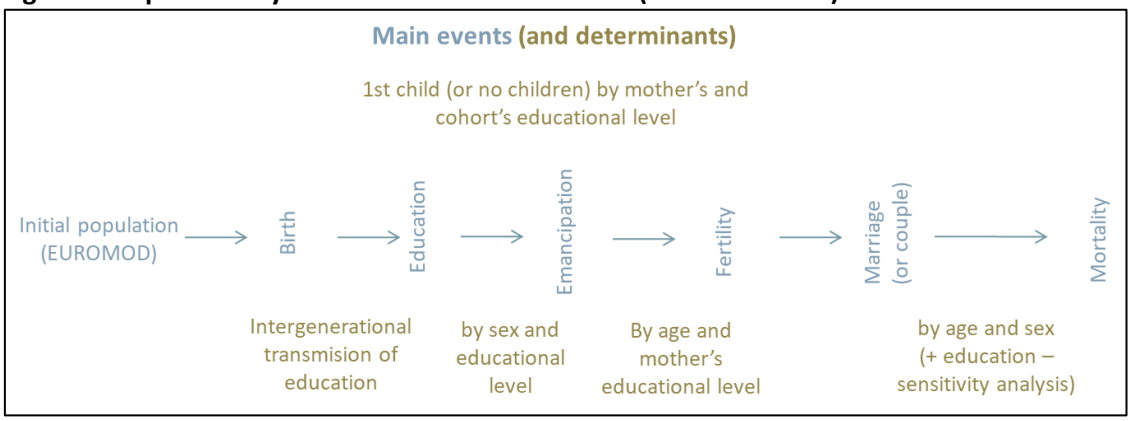
In Abio et al. (2021), this approach is expanded through a natural extension of the National Transfer Accounts (NTA) method: incorporating family structure into the estimation process. The main objective is to make the role of the family more visible by distinguishing between individuals who are parents and those who are not, thereby enabling the quantification of the mentioned externalities. The educational level is also included in the disaggregation, acknowledging the close interrelation between these processes.[8] A detailed explanation of these age-specific profiles by family type for the year 2010 can be found in the cited article.

These profiles have then been integrated as parameters into a dynamic microsimulation model (microWELT) to estimate the complete life cycle of individuals and the implications of an aging population. The functional dynamics of microWELT are illustrated in Figure 2. The initial population comes from the static simulation model EUROMOD, which is based on the European Union Statistics on Income and Living Conditions (EU-SILC) survey, having additional imputation of omitted variables and greater detail in key variables for welfare policies. MicroWELT simulates the remaining life of these individuals and continues to expand the sample with newborns who go through the series of socioeconomic processes illustrated in Figure 2. As previously mentioned, the parameterization of microWELT is centered around education as the main socioeconomic category, which, in turn, affects the probabilities of all other transitions. Additionally, given the model's focus on changing family structures, we also incorporate the

[8] While the standard method disaggregates NTAs by age, additional disaggregations have previously been made by adding gender (in the aforementioned AGENTA project and other applications) and socioeconomic level, primarily income level and education.

impact of the intergenerational transmission of education using data from the specific module of EU-SILC. The highest educational level achieved (which, in turn, depends on gender) influences the timing of emancipation, fertility behavior, and partnership formation. This parameterization strategy allows for capturing the effects of the educational transition and its impact on changes in family structures.

Figure 2. Population dynamics scheme of the model (MicroWELT 1.0)



Source: Own elaboration. For further details, see Spielauer et al. (2022 and 2023) and Chapter 2 of the WELTRANSIM project report, which provides greater detail on its parameterization (https://www.microwelt.eu/completed-projects/weltransim/weltransim-index.html).

Once the population is simulated at the individual level, this first version of the model (MicroWELT 1.0) introduces economic variables in a simplified manner, imputing NTA profiles by sex, family type, and educational level to each corresponding agent type.[9] This allows, on one hand, projecting the effects of population aging on the sustainability of the economy as a whole and on the welfare state in particular, taking into account its interaction with private transfers (mainly within the family). Spielauer et al. (2023) provide a detailed account of the results of the demographic support ratio (ratio between the working-age population and total population) along with the positive influence of the educational transition.

On the other hand, microWELT allows for the reconstruction of the full life cycle of representative individuals from each generation based on the projection of NTA profiles disaggregated by educational level and family type. Figure 3 shows the main results for Spain and three other countries to illustrate the impact of different welfare state models: Austria (continental), Finland (Nordic), Spain (Mediterranean), and the United Kingdom (Anglo-Saxon). Three educational levels are considered. In terms of family type, a distinction is made between individuals living alone and in couples, with or without children; however, for the results, they are grouped into parents and non-parents to illustrate the magnitude of the externality related to having children.[10] The present value of transfers is expressed as a proportion of the present value of labor income (labor wealth) generated over the life cycle.

Net private transfers (in green in Figure 3) are always positive, while public transfers are also positive except for the high-education level, which is the only one that, on a net basis, pays taxes (considering the entire life cycle), demonstrating the redistributive role of the welfare state. It is worth noting the difference in net family transfers received by parents and non-parents. Non-parents tend to receive around twice as much net transfers (in proportion to their life-cycle

[9] The model is in the process of being extended (www.microwelt.eu). Among its objectives is the econometric modeling of economic variables in order to individualize NTAs.

[10] The limitation of the sample size does not allow for reliable results for single fathers, so they are grouped with single mothers. See Abio et al. (2021) for more details on the disaggregation of NTA profiles.

income). The explanation is straightforward, as Figure 2 showed, since the cost of children is primarily borne by their parents. However, the analysis goes further by also visualizing the role of family structure. While most individuals receive transfers from their families during childhood and youth, only those who are parents themselves transfer to future generations. The differences are more pronounced in Spain, likely due to the delayed emancipation of young people in this country.

Figure 3. Present value of public and private net life-cycle transfers received as a proportion of present value of life-cycle labor income (born in the base year, 2010)

Source: Own elaboration based on results published in Spielauer et al. (2022).
Note: Net private (TF) and public (TG) life-cycle transfers are expressed as a percentage of life-cycle labor income for representative individuals of the generation born in 2010 (by educational level and parenthood status). The black circle shows the total sum of public and private transfers. The results shown correspond to the scenario that adjusts private and public transfer values beyond the base year for sustainability amid population aging.

These results lead us to the key question of this study: whether public transfers compensate for the greater effort that individuals with children make through family transfers. Figure 3 shows varying levels of compensation, which is generally limited. First, it is worth noting that the net contribution of parents with a high education level is greater than that of non-parents, except in Austria. Second, public transfers received tend to be higher for parents, with the exception of low education levels in Spain; however, in general, they are not sufficient to equal the total amount received by non-parents. Only Austria and the United Kingdom, in the case of low education, show a similar amount of total transfers for parents and non-parents. But this compensation is not the general trend. In conclusion, for the countries analyzed, with the exception of low education levels in Austria and the United Kingdom, the presence of the externality is striking, implying that individuals with children are significantly contributing to financing the consumption of non-parents.

5. Final considerations and future extensions: The role of non-monetary transfers

The results presented indicate a considerable magnitude of positive externalities generated by people who have children for the benefit of the rest of society, particularly in a social context where a well-established welfare state is in place, focused especially on protecting the elderly, as is the case in Spain. This section briefly discusses the limitations of the results and possible extensions, some of which are currently underway.

The main limitations stem from data availability and the methodology used. Dynamic microsimulation was chosen to mitigate the scarcity of longitudinal data that would allow for the measurement of the welfare state's impact throughout the life cycle. Additionally, the implications of the results presented are limited by the fact that economic variables are only simulated in a simplified manner based on the disaggregation of NTA by educational level and family type. This approach allows for an analysis of intragenerational income redistribution, in addition to the intergenerational level inherent in standard NTA methodology. However, there is room for improvement in this area. One of the objectives of the ongoing SUSTAINWELL project is to individualize economic variables and thus NTA.

Regarding future research, one key area is essential to consider the impact of externalities, which is the focus of this study. As noted at the beginning, the NTA method initially introduced age into National Accounts. However, it was soon also disaggregated by gender. Early results indicated a clear economic dependency of women on men, who tend to have greater participation in the labor market and thus show higher surpluses during their working years. This finding led to a fundamental extension of the methodology, which completed the quantification of the family's impact on goods production by accounting for production and transfers occurring outside the market, mainly domestic work and caregiving, known as National Time Transfer Accounts (NTTA). NTTA estimates are derived using time-use surveys (TUS in Spain) through a process similar to that described for estimating NTA.[11] Specifically, production and consumption are estimated from surveys following a simplified version of Equation [2]—as there are no public transfers or asset-based reallocations in this case—and time transfers are obtained as a result.

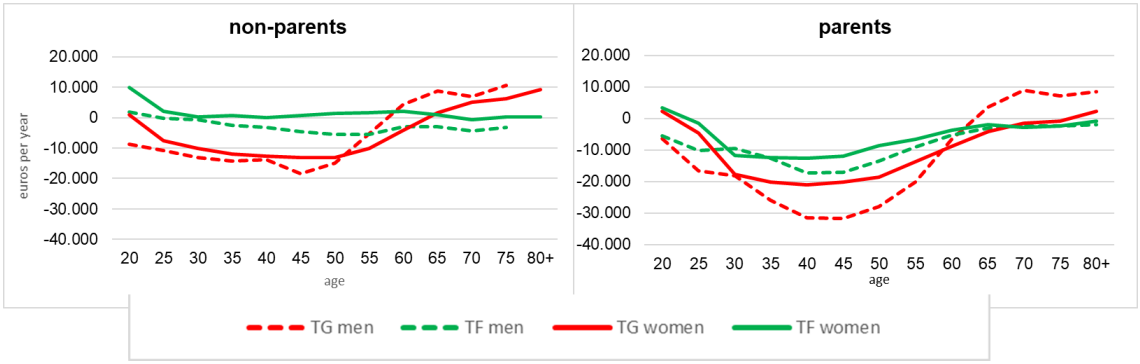
Once the life cycle deficit and time transfers are calculated, they can be monetized to integrate them with NTA. This work is currently underway as part of the SUSTAINWELL project. The private transfer (TF) results shown in Figure 3 only include the monetary transfers measured in standard NTA. However, it is possible to gauge the impact of incorporating time transfers on the magnitude of the externality based on findings from a study that estimates NTA and NTTA by family type in Spain for 2010 (Abio et al., 2023), whose results are displayed in Figure 4. Panel (a) plots private transfers relative to public transfers, while panel (b) compares monetary and non-monetary private transfers. The results are again presented by grouping family types to distinguish only between parents and non-parents. As can be seen, public transfers exhibit the expected form: all individuals are net payers during their active working lives and net recipients during retirement. In other words, taxes exceed the transfers received during the central portion of working age (more so for men due to their higher labor force participation). It is interesting to note that among non-parents, the differences between men and women are smaller than for those who are parents. Also notable is the difference in public transfer profiles between men who have children—who pay higher taxes during their working lives—and those who do not, which may be due to higher employment and/or wages. Private monetary transfers are close to zero for men and slightly negative for women without children but clearly negative for both fathers and mothers.

[11] This extension was developed specifically within the framework of the Counting Women's Work project (https://www.countingwomenswork.org/). The methodology is described in detail in Donehower (2019).

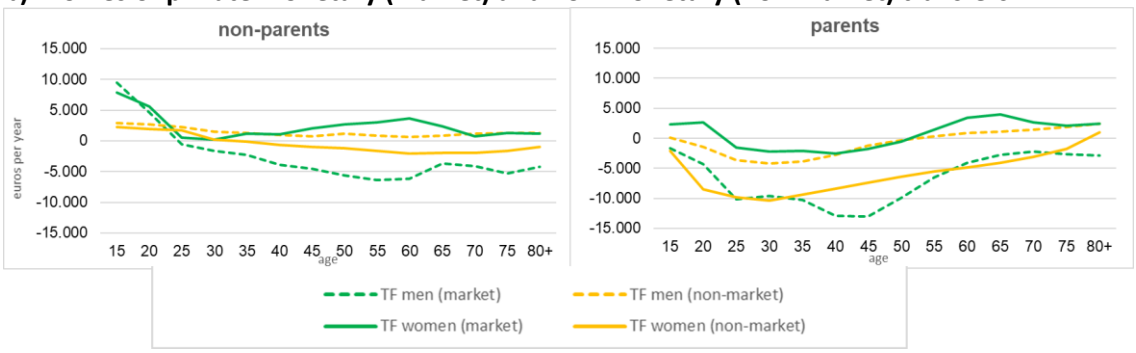
In panel (b), it is noteworthy that mothers give monetary transfers between the ages of 25 and 50, while women without children are always net recipients—their whole profile remains above zero. Among men, those who are parents transition from net recipients to net donors of non-monetary transfers during their child-rearing years, while also increasing their level of monetary donations. In summary, the difference between people who have children and those who do not is considerable, showing that adding non-monetary transfers increases the magnitude of the externality.

Figure 4. Age Profiles of Public and Private Transfers for Parents and Non-Parents (Euros per capita in 2012)

a) Profiles of total public (TG) and private (TF) monetary and non-monetary transfers



b) Profiles of private monetary (market) and non-monetary (non-market) transfers



Source: Authors' elaboration based on results published in Abio et al. (2023).

These results should be taken as a minimum estimate for both the value of time transfers and the effects of their incorporation into standard NTA. This is due to the way the value of time is monetized. The standard NTTA methodology adopts the most conservative assumption to ensure that the value of time transfers is not overestimated, using the so-called *replacement cost valuation*—what it would cost to acquire that service in the market. The alternative is to value it according to *opportunity cost*, which would imply that the same activity could be valued differently depending on who performs it (in particular, according to the wage they could earn in the formal labor market for the same amount of time worked). This second approach is only feasible if individual wage data are consistently available within the same data set as the time used for various activities, which is not the case with the Spanish TUS. It is also debatable whether the same activity should have a different valuation depending on who carries it out.

Specifically, the strategy followed in Abio et al. (2023) is to value different domestic production activities using the replacement cost, distinguishing household tasks, child care, adult care, and other types of care (a small portion that cannot be classified based on the age of the recipient).

Household tasks are valued at the legally established minimum wage in 2010 for domestic workers (including the corresponding social security contributions). The value of child and adult care is based on the average wage of workers providing such services (nurseries for child care, dependent care centers for adult care), which remains a relatively low wage. Finally, for other care activities, the legal minimum wage is used. As shown in Table 1, the wages ultimately used to monetize domestic production are low compared to the average wage in Spain for the same year. Therefore, as mentioned, this estimate of the value of non-market production should be considered a minimum value. To test the relevance of this assumption, the cited study conducts a sensitivity analysis, using the economy-wide average wage to monetize non-market activities.

Table 1: Replacement wages used to monetize domestic activities (Spain, 2010)

	€/hour
housework	5.60
childcare	6.50
adult care	7.70
other care	5.50
average wage of the economy	13.00 (**)

(**) The average hourly wage for the entire economy is obtained from the annual average wage estimated by INE, assuming 1,750 hours of work per year.
Source: Authors' elaboration based on INE and collective agreements data.

In summary, the results presented allow us to conclude that the current state of welfare transfers in Spain results in a considerable positive externality generated by having children, benefitting those of the same generation who did not have children, with consequent redistributive implications (parents eventually finance part of the consumption of non-parents). The magnitude of this externality would be even greater if family transfers included the monetary valuation of time dedicated to children.

This outcome points to the very existence and design of the welfare state as a sustainable mechanism for inter- and intragenerational redistribution over time. In addition to the classic need to design a welfare state that minimally distorts agents' economic decisions, there is also a need to consider the effect of policies over the life cycle. Alongside this redistributive impact, it is necessary to consider the effects of key life cycle decisions on the system's sustainability. Furthermore, beyond the impact of state intervention in the market, it is essential to recognize that these decisions also affect non-market production, mainly carried out within the family, which may have significant impacts on agents' well-being.

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