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Hammer, Bernhard; Istenič, Tanja; Vargha, Lili

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The Broken Generational Contract in Europe: Generous transfers to the elderly population, low investments in children

by Bernhard Hammer, Tanja Istenič and Lili Vargha

A *bstract: Based on European National Transfer Accounts data from 2010, this paper quantifies and evaluates the balance of intergenerational transfer flows in 16 EU countries, including transfers in the form of unpaid household work. On average, the value of net transfers received by a child amounts to sixteen times the labour income of a full-time worker, and the net transfers received by an elderly person to six times the labour income of a full-time worker. Intergenerational transfers can be regarded as the reciprocal exchange between two generations: the size of the transfers to the child generation determines their potential to generate income and finance public transfers to the elderly population once they enter employment. We develop and calculate an indicator to analyse if there is a balance between transfers to children and transfers expected by the elderly population. The results indicate that in most of the analysed countries the human capital investments in children are far too low to finance the generous transfers to the elderly population in the future.*

Keywords: Generational Contract, Intergenerational Transfers, National Transfer Accounts, Intergenerational Indicators

Introduction[1]

Periods of dependency in childhood and old age are characteristic of the human life course. The economic needs during these periods are largely covered through transfers from the working-age population. For children, the most important transfers are those from their own parents, with personal care and household services playing a particularly important role. In Europe, the transfers to the elderly population are predominately in the form of public transfers, of which pensions and health services are the largest components. There is an interrelationship between the intergenerational transfers to the child generation and the transfers to the elderly population. For a generation to receive public transfers in old age, it requires the transfers of resources to children in the first place, providing for their needs, upbringing and education. These transfers determine the human capital of the child generation, including their number, and thereby influence their productivity and their potential to contribute to the public transfer system.

However, as Gál et al. (2017) emphasise, there is an asymmetry in the visibility of transfers between generations. While the public transfers to the elderly population are recorded in the central economic statistics such as National Accounts, the private transfers to children are hardly visible in official statistics. The working-age population faces a trade-off between transfers to children, transfers to the elderly population and their own use of resources. There is the danger that the more visible, mandatory public transfers crowd out transfers to children and create an unsustainable imbalance of intergenerational transfers. Using

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data from 57 countries, Ehrlich and Kim (2007) find a significant negative relationship between the introduction and expansion of pay-as-you-go pension systems and fertility.

Several measures indicate that the economic situation of young generations has been worsening in the last decade. Chen et al. (2018) show that the risk of poverty for the young and the working-age population has increased significantly since the financial crisis in 2008/09, while it has declined sharply for the elderly population. They conclude that the real incomes of the elderly population were effectively shielded from the crisis, while social protection systems are ill-equipped to provide assistance to the young. Using a range of different measures, Leach et al. (2016) generated a composite *Intergenerational Fairness Index*, which indicates a decline in intergenerational fairness and living standards of the young generations. Because transfers to children are mainly provided by the parents, it is not surprising that researchers find a strong relationship between fertility and the economic conditions (Matysiak et al. 2018; Buckles et al. 2018). Worsening economic conditions for the young population could therefore lead to a vicious cycle of lower fertility and strong population ageing, an increasing burden through public transfers and a further reduction of fertility and investments in the child generation. Keeping a balance between transfers to children and transfers to the elderly population is of key importance for maintaining and recreating the human capital of societies and the maintenance of the intergenerational support system in the long run.

The contribution of this paper is threefold. First, we describe and analyse the relationship between transfers to the child generation and transfers to the elderly population using the concept of a generational contract (Section 2). The concept of a contract provides a framework that facilitates the analysis of economic relationships between generations and the analysis of challenges for the public transfer system due to population ageing. Second, the value of intergenerational transfer flows in 16 EU countries is measured using data from the European National Transfer Accounts and the European National Time Transfer Accounts (Section 3). We distinguish between private transfers of goods and services bought on the market, non-market transfers in the form of services such as household work and care, and public transfers. Third, we develop and calculate a new indicator to analyse if the current level of intergenerational transfers comply with the generational contract and if there is a balance between transfers to children and transfers to the elderly population (Section 4). This measure shows that the age pattern and levels of intergenerational transfer flows is out of balance in most of the countries: human capital investments, in particular in terms of the number of children, are too low to enable the child generation to finance the rather generous transfers to the large elderly population in the future.

Intergenerational transfers and the concept of a generational contract

By using the concept of a contract to describe intergenerational transfers, we emphasise that the economic relationships between generations have characteristics that are usually associated with contractual relationships. This includes in particular reciprocity and the binding nature. However, the term *generational contract* is used in different contexts and with different meaning. Laslett (1992) raises the criticism that it is seldom clear what type of

generational relationships is in the mind of politicians or transfer analysts when they refer to generational contracts. We therefore use this section to discuss and clarify the notion and the underlying concepts.

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We have identified two different types of concepts of generational contracts that are used in the literature and the public discourse. One of these concepts follows the basic logic of social contracts and describes intergenerational support as a hypothetical agreement between different generations, without explicit reciprocal exchange between the contractual partners. The other concept uses the notion of a generational contract to describe intergenerational support as reciprocal, mutual exchange between individuals belonging to two different generations. Our own concept of a generational contract adapts the latter concept and describes intergenerational economic transfers as mutual exchange between generations as a whole, not as direct exchange between individuals belonging to different generations. Such conceptualisation enables us to account for the private and public part of the system of intergenerational support. Before we explain our own concept in detail, we briefly discuss the existing concepts.

The generational social contract

The notion of a generational contract in the meaning of a social contract is not often used in the scientific literature, but is often used in public discourse, in particular in Germany. It justifies the obligation of the current productive generations to finance the pensions and health services of the older generation by arguing that future generations will provide the same service once the current productive generations retire (e.g. CECU 2018). The concept of the generational contract with the meaning of a social contract is derived from social contract theory, in which socio-political arrangements including the state as a whole are interpreted as if they were grounded in the consent of all members of society (Kersting 2015). The intuitive idea of a "social" generational contract is that the redistributive mechanism of the welfare state is based on a hypothetical agreement of different generations or cohorts (Lorenz-Meyer 1999). The popularity of the notion of a *generational contract* or *solidarity contract between generations* in the German-speaking world is based on its appearance in the so called *Schreiber-Plan* (Schreiber 1955), which contributed important elements to German pension reforms in 1957. However, Schreiber's original plan included also transfers to children and was designed as a defined-contribution-pay-as-you-go pension system, with the yearly adjustment of benefits to match total contributions. The concept of a social contract is clearly inappropriate to describe and justify the current organisation of public intergenerational transfers to the elderly population with fixed benefits. Such a contract would be a contract at the expense of a third party and a promise to expropriate the young generation to the extent needed to finance these transfers. Eventually, the working-age population would find themselves unable to finance these transfers. Although the term generational contract in the meaning of a social contract

is still used in public discourse, its use is heavily criticised (e.g. Komp and Van Tilburg 2010; Borchert 2004; Schüller 1996).

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A generational contract between individuals

The notion of a generational contract should be used only when the relationship it describes actually has characteristics of a contractual relationship. A contract is defined as "an agreement with specific terms between two or more persons or entities in which there is a promise to do something in return for a valuable benefit known as consideration."[2] The consideration is something of objectively determined value given by both parties to a contract that induces them to enter into the agreement to exchange mutual performances.[3] In the context of a generational contract, the considerations are economic transfers between individuals belonging to different generations.

Focusing on African countries, Whyte et al. (2008) and Roth (2008) use a comprehensive concept and describe the generational contract as the implicit expectation that parents will care for their children until they can care for themselves, and children will support their parents when they can no longer support themselves. Roth emphasises the contractual nature by describing the contributions to and benefits from this contract as being based on "the logic of debt", with parents as the creditors of their children. The children pay off their debt with support for their parents in old age. In the countries analysed by Whyte et al. and Roth, the intergenerational transfers are indeed a mutual exchange between individuals, as public transfers are not common. Social norms and cultural values act as enforcement mechanism of mutual obligations between generations (Göransson 2013). The concept of a generational contract as agreement between individuals belonging to successive generations fits well in countries with a small welfare state and an important role of the family in the transfer system.

A contract between generations

In European societies, the transfers that comprise the generational contract are split between the family and the state. The transfers to children are mostly privately organised, while the transfers to the elderly are predominantly public transfers. Gál et al. (2017) estimate that about 80% of net transfers to children are private transfers, while the net transfers to the elderly tend towards 100% public transfers. Laslett (1992) argues that in societies with generous public health care and pension systems the transfers from parents to children are made without explicit expectation for return; these transfers can hardly be interpreted as resulting from an agreement between individuals. However, the parental generation does expect the child generation as a whole to finance their pensions, health services and care in old age. Although public old-age provision acts as fertility insurance and does not require a certain individual to have children (Sinn 2004), it is nevertheless required for a generation as a whole.

We therefore adapt the concept and think of intergenerational transfers as mutual exchange between two generations. The parental generation provides resources to the child generation until they enter the labour force and maintain themselves. These transfers include the time and other economic resources that parents provide to their own children, but also publicly provided education and health services which are financed by all taxpayers. We can regard these transfers also as investment, because by transferring resources to children, a generation acquires a claim on part of the children's future labour income. Once the children enter the labour force, they pay part of their taxes and social contributions to finance pensions and health care for the elderly population. The description of intergenerational transfers as a contract between generations emphasises the binding character of these reciprocal transfer flows. The transfers to children are an essential, indispensable part of the contract as they create the contribution base to finance the old-age transfers. The transfers to the elderly constitute a well-protected part of the public distributional system: once young people enter the labour force, they are bound to pay taxes and social contributions on labour income.

> We [...] think of intergenerational transfers as mutual exchange between two generations. The parental generation provides resources to the child generation until they enter the labour force and maintain themselves. [...] Once the children enter the labour force, they pay part of their taxes and social contributions to finance pensions and health care for the elderly population.

Voluntarity is a necessary condition for a legal contract between parties to be valid and ensures a balance in the value of considerations. A party that does not see an advantage in the mutual exchange offered in a contract would simply not enter the contract. The concept of a contract between two generations therefore deviates from the definition of a contract in the legal sense, since the child generation is forced into the generational contract. It is this characteristic that creates the problem of imbalances in the transfer system. The impossibility for the child generation to opt out of the generational contract enables the parental generation to extract a high and increasing share of the income of the young generation. As a result, it can become increasingly difficult for the young generation to finance transfers to the elderly population, to keep a decent living standard for themselves and to invest into their own children at the same time. This asymmetry requires the monitoring of the generational contract. Imbalances can seriously harm societies in the long run, as they hinder the reproduction and the recreation of human capital.

The generational contract concept constitutes a flexible framework for analysing economic transfers between generations. It is explicit about the type and direction of transfers that are the contribution of each generation to the contract. However, it says nothing about the exact size of transfers. This flexibility is desirable as it allows adaption to different uses, for example the development of different indicators for sustainability and intergenerational fairness. Hammer et al. (2018) uses the concept to calculate a sustainability indicator for public transfers, taking the longevity of the elderly generation and the change in employment rates and retirement age of the child generation into account. They show that not even a considerable increase in the retirement age of the child generation would be able to eliminate the imbalances. The generational contract concept puts these imbalances in the intergenerational transfer system into a context. For example, it is able to identify the difficulties of financing the public transfers to the

elderly as a consequence of low investments in the child generation. By including private transfers, it is better suited to discussing intergenerational fairness than generational accounting (Kotlikoff 2017; Laub/Hagist 2017), a concept which focuses only on public transfers.

Methodology and data: European National Transfer Accounts
Our estimates of intergenerational transfer flows are based on the European National Transfer Accounts data (Istenič et al. 2017) and the European Time Transfer Accounts data (Vargha et al. 2017).[4] National Transfer Accounts (NTA) are built up as an accounting system that introduces information on the relationship between age and economic activity into National Accounts (for details, see UN 2013; Lee/Mason 2011). NTA measure how much labour- and asset-income each age group generates, how income is redistributed between age groups through public and private transfers, and how the disposable income is used for consumption and saving. The dataset contains age-specific per capita averages of income, public transfer payments and public benefits, private transfer payments and benefits, consumption and saving.

> The generational contract concept constitutes a flexible framework for analysing economic transfers between generations.

The production boundary in National Accounts, and consequently in NTA, excludes most of the services which are produced by households for their own use, such as housework and child care, or which are provided free of charge to other households. Information about household production is usually introduced into National Accounts through so-called *Household Satellite Accounts* (Holloway et al. 2002; European Communities 2003; Abraham and Mackie 2005). Accounting for unpaid household work is of particular importance in the context of NTA, because the services produced through unpaid household work constitute important intergenerational transfers. Donehower (2013) developed a method to generate Household Satellite Accounts by age, to account for the intergenerational transfers in the form of unpaid work. The estimation of these accounts is mainly based on time use data, which is the reason for calling them *National Time Transfer Accounts* (NTTA). NTTA measure the age-specific production, the transfers and the consumption of services produced for the households' own consumption. In addition, unpaid production activities for other households are included, such as care for grandchildren. Several attempts have been made by researchers to combine NTA and NTTA, providing comprehensive information on public and private transfers between age groups (Kluge 2014; Hammer 2014; Zannella 2015; Gál et al. 2015; Hammer et al. 2015; Rentería et al. 2016; Gál et al. 2017). The results highlight the importance of transfers in the form of unpaid work, constituting clearly the largest transfer component of the total transfers to children. The Harmonized European Time Use Survey and the Multinational Time Use Survey provide comparable time use data for a range of countries. Both data sources have been used by Vargha et al. (2017) to generate comparable NTTA for 17 countries.[5]
In this paper we combine the new European NTA data with European NTTA, and NTTA based on the Austrian time use survey, to provide a comprehensive picture of the system of intergener

ational transfers in 16 countries.[6] The combination of NTA and NTTA is not straightforward and requires assumption and approximations, which we have to keep in mind when we analyse the results. NTA and NTTA refer to different years. While NTA refer to the year 2010, the NTTA, and the time use surveys they are based on, are in most countries considerably older.[7] We use 2010 as the base year and assume that age-specific intergenerational transfers in the form of time are the same in 2010 as in the survey year. This assumption can be justified, as changes in time use are rather slow and we adjust the transfers so that outflows and inflows match over the total population. Unfortunately, NTA data are only available for the year 2010, which was in many countries characterised by unusually high government expenditure relative to labour income and public revenues. This pattern affects in particular the results for public transfers in Latvia and Lithuania; both countries reduced government expenditure relative to labour income in the years after 2010.
A controversial issue is the valuation of time use for production in monetary terms. NTA are based on National Accounts and therefore measured in market prices. For household work, such market prices do not exist. The usual approach is to value unpaid work activities with wage rates that could be earned on the market for similar activities. Unfortunately, there is no data source that would allow a consistent estimation of the hourly wage rates for domestic staff across all included countries. We therefore use the average country-specific net wage per hour to value the time spent on unpaid household work.
In the remaining part of this section we give a quick overview of the combined NTA and NTTA transfer data, first the age-specific per capita values, then the total transfers between generations in the economy.

> The results highlight the importance of transfers in the form of unpaid work, constituting clearly the largest transfer component of the total transfers to children.

Intergenerational transfers per capita by type and age in 2010
Figure 1 plots the simple average of age-specific net transfer benefits by type in the 16 countries. In order to make the transfer flows comparable, we standardised the transfer data before calculating the average. The transfers are measured as a share of the average labour income of a full-time worker (YLFT) in each country, calculated using the measure of labour income as defined in NTA and data on working hours from the European Labour Force Survey. This standardisation eliminates differences in the level of hourly labour income across countries, but accounts for differences in employment rates. Two countries with similar levels of productivity per working hour and similar tax rates would be different regarding the levels of transfers when measured in terms of YLFT, with transfers being higher in the country with the higher employment rates.

The black area represents the public transfers, the dark-shaded area the private market transfers and the light-shaded area the private non-market transfers. The basic pattern is highly similar in all of the countries. Children and young adults are net receivers of transfers until their early twenties in all of the countries, on average until the age of 23. The non-market transfers to children are clearly the most important transfer component at a very young
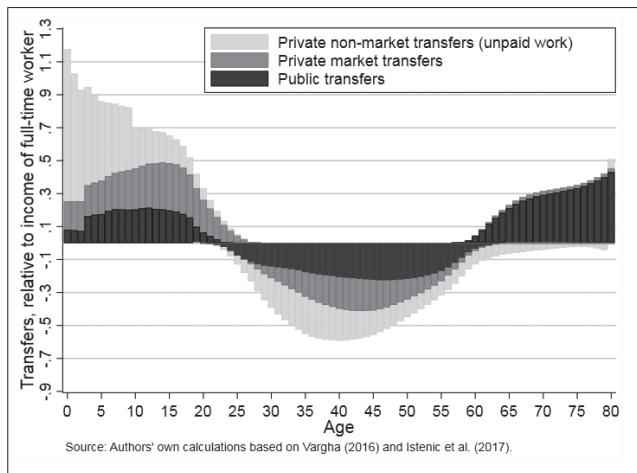
Figure 1: Intergenerational transfers by type and age in 2010

three life stages: childhood, working age and old age. Childhood is defined as young ages with positive average net transfer benefits, working age covers the ages with positive net contributions, and old age is characterised by positive net benefits. We derive a measure for the total net transfers between generations by multiplying the age-specific averages per capita with the corresponding population and adding up all age groups in childhood, working age and old age, respectively. Table 1 shows the country-specific age borders and the values of net transfer benefits relative to the total labour income in the economy.

> The highest non-market transfers are provided by the population with young children, in most countries the age groups around 30-35.

The sum over all life stages for non-market transfers is zero, as contributions have to equal the net benefits exactly. There are some cross-border flows of private market transfers; the sum over all life stages is therefore not necessarily zero. The sum of the pub-

age, amounting to almost one YLFT in the first years of life. We could interpret these numbers as childcare for young children corresponding to a full-time job. While the private non-market transfer benefits decline strongly with the age of the children, private market transfers and public transfers are higher for older children and peak around the age of 15 because of the public expenditure for formal education. After the age of 15, there are more and more who enter the labour force and generate their own income, therefore the net transfer benefits decline strongly after this age. On average, members of the age groups from 24 to 62 are net providers of intergenerational transfers. The highest non-market transfers are provided by the population with young children, in most countries the age groups around 30-35. While the non-market transfers decline with the age of the own children, the market transfers to children increase and peak at the age of 40-45. Total net contributions to intergenerational transfers correspond to more than 0.5 YLFT between the ages of 30 and 50. The population in old age are net receivers of intergenerational transfers, mostly of public transfers. The average yearly values correspond to 0.3 - 0.4 YLFT. This seems small, but the measure of labour income in NTA includes all taxes on labour, including the employers' social contributions and labour-based taxes on production. In many countries there is a small flow of private non-market transfers from the elderly population to younger generations.

Total intergenerational transfers by type and life stage in 2010

The total transfers between generations in an economy is not only determined by the age-specific values per capita, but to a considerable degree by the population structure. We use the pattern of net transfers to define the

	Young	Working	Old		Young	Working	Old
Austria (AT)	**0.36**	**-0.54**	**0.17**	**Belgium (BE)**	**0.43**	**-0.58**	**0.15**
Public	0.08	-0.28	0.19	Public	0.11	-0.26	0.14
Market	0.11	-0.11	0.00	Market	0.12	-0.14	0.01
Non-market	0.17	-0.15	-0.02	Non-market	0.19	-0.19	0.00
Age-border	22		60	Age-border	23		62
Bulgaria (BG)	**0.47**	**-0.50**	**0.15**	**Germany (DE)**	**0.35**	**-0.51**	**0.15**
Public	0.05	-0.17	0.13	Public	0.07	-0.22	0.15
Market	0.19	-0.14	0.05	Market	0.12	-0.13	0.00
Non-market	0.22	-0.19	-0.03	Non-market	0.16	-0.17	0.00
Age-border	24		62	Age-border	24		63
Denmark (DK)	**0.40**	**-0.51**	**0.11**	**Estonia (EE)**	**0.44**	**-0.50**	**0.15**
Public	0.10	-0.22	0.12	Public	0.10	-0.23	0.16
Market	0.12	-0.12	0.00	Market	0.15	-0.10	0.01
Non-market	0.18	-0.17	-0.01	Non-market	0.19	-0.17	-0.02
Age-border	23		64	Age-border	22		62
Spain (ES)	**0.49**	**-0.55**	**0.14**	**Finland (FI)**	**0.37**	**-0.50**	**0.20**
Public	0.09	-0.15	0.14	Public	0.09	-0.22	0.20
Market	0.14	-0.15	0.01	Market	0.13	-0.13	0.00
Non-market	0.26	-0.26	-0.01	Non-market	0.15	-0.15	0.00
Age-border	26		63	Age-border	23		62
France (FR)	**0.44**	**-0.54**	**0.16**	**Italy (IT)**	**0.47**	**-0.67**	**0.18**
Public	0.11	-0.22	0.17	Public	0.08	-0.29	0.19
Market	0.14	-0.14	0.00	Market	0.15	-0.16	0.00
Non-market	0.19	-0.19	-0.01	Non-market	0.23	-0.22	-0.01
Age-border	23		61	Age-border	25		62
Lithuania (LT)	**0.57**	**-0.51**	**0.18**	**Latvia (LV)**	**0.46**	**-0.39**	**0.12**
Public	0.13	-0.16	0.17	Public	0.11	-0.12	0.16
Market	0.24	-0.17	0.02	Market	0.17	-0.13	0.02
Non-market	0.20	-0.19	-0.02	Non-market	0.18	-0.13	-0.06
Age-border	24		61	Age-border	24		61
Poland (PL)	**0.53**	**-0.61**	**0.17**	**Sweden (SE)**	**0.36**	**-0.53**	**0.16**
Public	0.09	-0.20	0.16	Public	0.10	-0.26	0.14
Market	0.18	-0.16	0.02	Market	0.11	-0.12	0.00
Non-market	0.26	-0.25	-0.01	Non-market	0.14	-0.16	0.01
Age-border	24		60	Age-border	23		65
Slovenia (SI)	**0.42**	**-0.53**	**0.15**	**United Kingdom (UK)**	**0.47**	**-0.56**	**0.15**
Public	0.09	-0.22	0.16	Public	0.10	-0.18	0.15
Market	0.15	-0.15	0.01	Market	0.14	-0.15	0.00
Non-market	0.18	-0.16	-0.03	Non-market	0.23	-0.22	-0.01
Age-border	25		60	Age-border	22		63
Avg. EU16	**0.44**	**-0.53**	**0.15**				
Public	0.09	-0.21	0.16				
Market	0.15	-0.14	0.01				
Non-market	0.20	-0.18	-0.01				
Age-border	24		62				

Market refers to the private transfers of goods and services bought on the market, e.g. necessities and housing.
Non-market refers to private transfers of services produced by unpaid work, e.g. care and household work.

Table 1: Aggregate intergenerational transfers by type and life stage as share of total labour income in 2010

lic net benefits over the three life stages can be considerably different from zero. First, there are considerable cross-border flows for public transfers. Second, public contributions can be used for interest payments or savings and the public benefits can be financed out of dissaving or public asset income. In most countries part of the benefits is financed through dissaving, therefore the total contributions to the public transfer system are in most countries smaller than the total benefits.

The values of total transfers to children range from 35% of total labour income in Germany to 57% in Lithuania. Because personal services are such an important component of transfers to children, the total transfer net contributions of the working-age population is high in the countries with large private non-market transfers, such as Italy and Poland. In these two countries the value of transfer payments of the working-age population exceeds 60% of total labour income. The transfers to the elderly consist mainly of public transfers and range between 11% of total labour income in Denmark to 20% in Finland.

Imbalances in the intergenerational transfer system
The level of age-specific per-capita transfers strongly depend on the age structure of the population. Many European countries experienced a baby boom after the Second World War, though with varying length and extent. The current population structure in these countries is characterised by a high share of the population being in working age and net contributors to the transfer system. Therefore the net transfer contributions per member of the working-age population can be low compared to the benefits received by children and the elderly. In the context of the generational contract we can state that the parents of the baby boomers invested heavily in the child generation. Together with the educational expansion and high economic growth rates, this pattern enabled the expansion of the public health and pension systems, reflected in increasing levels of benefits and increasing life expectancy coupled with declining retirement age. The change in the age structure of the populations and the retirement of the baby boomers themselves, characterised by much lower fertility, requires adjustments in the level of old-age benefits. There is an imbalance between the, comparably low, investments in the young generation and the generous old-age benefits.

Intergenerational transfers by type from a life course perspective
In a first step, we calculate measures that provide information on the size of transfers individuals would receive and pay over the life course, given the size of age-specific transfers in 2010. The measures are based on a thought experiment. We assume that the cross-sectional age pattern of transfers in the year 2010 corresponds to the transfer contributions and benefits of an individual over the lifetime. This individual faces an age-specific mortality corresponding to the age-specific rates observed in 2010.[8] We then calculate the amount of transfers that our hypothetical cross-section individual receives in childhood, the amount he/she transfers to children and the elderly during working life and the amount that he/she receives in old age. We want to emphasise that our analysis does not tell us anything about the transfers of a certain individual or member of a certain cohort. This would require longitudinal data for a long time-period, covering the whole life course of a generation. Our measures are designed to provide information on important characteristics of the pattern of inter-

generational transfers in a given year. The simulation of the life course values of transfers is used as a tool to derive intuitive and meaningful measures.

> There is an imbalance between the, comparably low, investments in the young generation and the generous old-age benefits.

Total net transfers received in childhood T_{young} are calculated as the sum of expected transfers per capita at all young ages with positive net transfer benefits (Equation 1). The term represents the net public transfer benefits at age i; the term $T_{market,i}$ the private market transfers; and the term $T_{non-market,i}$ the private non-market transfers. The age groups included range from zero to , with referring to the oldest age group in young age with positive net transfer benefits. We refer to this measure as *expected* transfers, because we adjust the age-specific NTA per capita values with survival probability. The measure of transfers paid during working age T_{work} is calculated as the sum of net transfer contributions over all age groups from l+1 to u-1, with u referring to the youngest age group in old age with positive net benefits (Equation 2). The total transfers in old age T_{old} are calculated as the sum over all age groups from up to 100 (Equation 3). Since transfer data in NTA are only available until age 80+, for all older age groups we use the age-specific value at age 80. The S_i stands for the survival probability until age i, calculated from cross-sectional mortality data. For i=100 the S_i represents the life expectancy at age 100, given the mortality rates of 2010.

$$T_{young} = \sum_{i=0}^{l}\left(T_{public,i} + T_{market,i} + T_{non-market,i}\right) * S_i \qquad (1)$$

$$T_{work} = \sum_{i=l+1}^{u-1}\left(T_{public,i} + T_{market,i} + T_{non-market,i}\right) * S_i \qquad (2)$$

$$T_{old} = \sum_{i=u}^{100}\left(T_{public,i} + T_{market,i} + T_{non-market,i}\right) * S_i \qquad (3)$$

The results are shown in Table 2, reporting the value of expected transfers relative to YLFT by type and life stage for each country. The total value of transfers a child can expect until becoming net contributor to the transfer system ranges between 12.6 YLFT in Belgium and more than 19 YLFT in Poland, Slovenia and Bulgaria. The differences across countries are mainly influenced by the amount of the private non-market transfers, ranging from less than 6 YLFT in Belgium and more than 10 YLFT in Poland. The cross-country differences in the value of public transfers and private market transfers are much lower: the simple average of the values across countries is 3.5 and 5.3 YLFT, respectively.

The expected net contributions to the intergenerational transfer system in working age amount to 10 YLFT in Latvia and to about 17 YLFT in Poland and Sweden. The level of the different types of transfers varies considerably across countries. Public transfer contributions amount to slightly more than 3 YLFT in Latvia and Lithuania and more than 8 YLFT in Sweden and Austria. The values of private non-market transfer contributions during working age range between slightly more than 3 YLFT in Latvia to more than 6 YLFT in Spain, Poland and the UK. However, the year 2010 was exceptional for the former two countries, characterised

	Young	Working	Old	Diff.		Young	Working	Old	Diff.
AT	16.1	-16.3	7.4	7.2	BE	12.6	-13.9	4.6	3.4
Public	3.6	-8.4	8.0	3.2	Public	3.3	-6.2	4.5	1.7
Market	4.6	-3.2	0.1	1.6	Market	3.6	-3.3	0.2	0.6
Non-market	7.9	-4.7	-0.7	2.4	Non-market	5.6	-4.5	-0.1	1.1
BG	19.7	-13.2	3.6	10.1	DE	15.4	-14.5	4.9	5.8
Public	2.5	-4.7	3.2	1.1	Public	2.9	-6.2	4.9	1.7
Market	7.7	-3.7	1.3	5.3	Market	4.9	-3.4	-0.1	1.4
Non-market	9.5	-4.8	-0.9	3.7	Non-market	7.5	-4.9	0.1	2.7
DK	13.5	-15.0	4.5	3.0	EE	16.9	-14.4	4.6	7.0
Public	3.4	-6.4	4.6	1.6	Public	4.0	-6.6	5.0	2.4
Market	4.1	-3.5	0.1	0.7	Market	5.6	-3.0	0.2	2.8
Non-market	6.0	-5.1	-0.2	0.7	Non-market	7.3	-4.9	-0.5	1.9
ES	18.2	-13.1	5.4	10.5	FI	13.9	-15.4	8.0	6.5
Public	3.3	-3.5	5.5	5.4	Public	3.4	-6.6	7.9	4.7
Market	5.3	-3.5	0.2	2.0	Market	4.9	-4.0	-0.1	0.9
Non-market	9.6	-6.1	-0.3	3.2	Non-market	5.7	-4.8	0.1	1.0
FR	13.2	-14.7	6.3	4.8	IT	17.6	-15.9	5.6	7.3
Public	3.2	-5.9	6.6	3.9	Public	3.2	-7.0	5.8	2.1
Market	4.1	-3.7	0.0	0.4	Market	5.7	-3.7	0.0	2.0
Non-market	5.8	-5.1	-0.2	0.5	Non-market	8.8	-5.3	-0.3	3.2
LT	17.0	-11.5	3.9	9.4	LV	16.7	-10.0	2.9	9.6
Public	3.6	-3.4	3.8	4.0	Public	4.0	-3.2	3.8	4.6
Market	6.6	-3.7	0.5	3.3	Market	5.8	-3.4	0.5	2.9
Non-market	6.8	-4.3	-0.4	2.1	Non-market	6.8	-3.4	-1.4	2.1
PL	20.0	-16.8	6.5	9.6	SE	13.4	-17.1	6.7	3.0
Public	3.5	-5.5	6.3	4.3	Public	3.7	-8.4	6.1	1.4
Market	6.3	-4.7	0.6	2.2	Market	4.2	-3.7	0.1	0.6
Non-market	10.2	-6.6	-0.4	3.2	Non-market	5.5	-5.1	0.6	1.0
SI	19.6	-15.9	6.4	10.2	UK	16.1	-16.5	6.5	6.1
Public	4.3	-6.6	6.9	4.6	Public	3.4	-5.4	6.5	4.4
Market	6.6	-4.4	0.4	2.7	Market	4.8	-4.4	0.2	0.6
Non-market	8.7	-4.8	-0.9	2.9	Non-market	8.0	-6.7	-0.1	1.1
Avg. EU 16	16.2	-14.6	5.5						
Public	3.5	-5.9	5.6						
Market	5.3	-3.7	0.3						
Non-market	7.5	-5.1	-0.4						

Table 2: Simulation of intergenerational transfers by life stage and type. Based on the 2010 transfer and mortality pattern

by high dissaving of the public sector and low contributions relative to benefits. The value of private market transfers in working age range between 3 and 4.7 YLFT.

> The total value of transfers a child can expect until becoming net contributor to the transfer system ranges between 12.6 YLFT in Belgium and more than 19 YLFT in Poland, Slovenia and Bulgaria.

The value of public transfers in old age reflects the value of public contributions and the size of the public sector. It ranges from slightly more than 3 YLFT in Bulgaria to more than 7 YLFT in Austria and Slovenia. There are only minor private net transfers to and from the elderly population in the form of private market transfers. In all of the countries the elderly population are net contributors in the form of private non-market transfers, but the values exceed 1 YLFT only in Latvia. These transfers reflect for example the involvement of the elderly population in taking care for their grandchildren.

The fourth column in Table 2 shows the difference between contributions during working age and the benefits in childhood and old age. Obviously, the value of total average net transfers paid during working age is considerably lower than the transfers received in childhood and old age. This pattern reflects the large share of the working-age population in most of the countries, who provide transfers for a comparably low number of children and,

in relation to the working-age population, a comparably low number of elderly persons.

A measure of imbalances in the transfer system
We use the results from the previous section to evaluate the compatibility of the 2010 age patterns of transfers with the generational contract. Given these patterns, are the investments of the current working-age population in the young generations large enough to finance their old-age benefits when they enter retirement? For this purpose, we generate two sub-indicators. The first sub-indicator measures the number of children that can be supported and raised with the transfers that are provided to the child generation during working age. The second sub-indicator measures the number of net contributors to the transfer system that are required to finance the total amount of transfers to a person in old age. We then calculate the difference between these two measures, which can be interpreted as the number of additional children and net contributors that would be required to finance the transfers to the elderly population.

For the first sub-indicator, the number of supported children, we assume that the net transfer benefits received in childhood measure the transfers that are required by a child to grow up and become a net contributor to the transfer system. The number of supported children is calculated by dividing the total transfers to children that are provided during working age, with the total amount of transfers that is required in childhood. Since contributions in working age and benefits of children are of very similar size for the population as a whole, this sub-indicator approximates the average number of children of the working-age population. To derive a measure for the net transfer outflows in working age that are provided to children, the total outflows are split in the part transferred to children and a part transferred to the elderly. The split is based on the relative size of total net benefits of children and the net benefits of the elderly population by type of transfer (taken from Table 1). Private transfers go almost exclusively to children while public transfers are mainly transfers to the elderly population. Additionally, we assume that the net contributions of private transfers of the population in old age are directed to the young generation, thereby reducing the costs of children for the working-age population. The results are shown in the first column of Table 3. The values range from 0.5 in Latvia to 0.88 in Sweden. In other words, the transfers that an average couple provides in working age finances the net benefits for one child in Latvia and 1.76 children in Sweden.

> Private transfers go almost exclusively to children while public transfers are mainly transfers to the elderly population.

The second sub-indicator measures the expected net transfers received in old age relative to the transfers to the elderly that are provided in working age. It can be interpreted as the number of working-age contributors that are required to finance the old-age net benefits. The values are reported in the second column of Table 3 and range from 1.11 in Bulgaria to 2.53 in Spain. The low values for Bulgaria reflect the low level of public transfers and the comparably low life expectancy. The high values for Spain can be explained with the low tax rates on labour, the high unemployment rates and a large dissaving of the public sector in 2010. Public dissaving enables the financing of public old-age benefits without an immediate increase of the contributions. The value of about 1.2 in Italy, for example, means that over the whole working life 1.2 net contributors provide the total transfers that are expected by a person in old age. The system would be balanced if fertility is about 2.4 children per women and the number of supported children is 1.2.

The difference between the two sub-indicators is our measure of interest (third column in Table 3). It measures the number of contributors per person that would be required, additional to their own children, to enable them to finance the transfers to the elderly without increasing the contribution rate or reducing the benefits. The values range from 0.37 in Sweden to 1.93 in Spain. The value of 1 in Slovenia means that it would require an increase in fertility of 2 children per women to have enough contributors financing the transfers to the elderly population. We have to conclude that in all of the analysed countries the intergenerational transfer system is considerably out of balance.

Country	No. of supported children per contributor in working age	Required contributors per elderly beneficiary	Balance indicator
AT	0.67	1.37	0.70
BE	0.82	1.31	0.49
BG	0.49	1.11	0.63
DE	0.66	1.16	0.50
DK	0.86	1.35	0.48
EE	0.63	1.24	0.61
ES	0.61	2.53	1.93
FI	0.78	1.77	0.98
FR	0.86	1.80	0.94
IT	0.64	1.21	0.57
LT	0.55	1.89	1.34
LV	0.50	1.86	1.36
PL	0.66	1.78	1.12
SE	0.88	1.25	0.37
SI	0.60	1.60	1.00
UK	0.82	1.92	1.10
EU16	0.69	1.57	0.88

Table 3: The generational balance of transfers

Discussion

The importance of private transfers is also the focus in Gál et al. (2017). In a similar way as this paper, they combine NTA and NTTA results to get a comprehensive picture of intergenerational transfers. Observing the larger amount of transfers provided to children, they conclude that we live in a *child-orientated continent*. However, whether more resources should be transferred to children or to the elderly population is not a meaningful question. Obviously, a child requires a much higher level of transfers than an average person does in old age. All children have to acquire the physical strength and the cognitive abilities in the first place through a lengthy learning process. During this process, they rely on transfers from their parents and public transfers. A balanced transfer system has to reflect the larger amount of resources and transfers that are required by the children. Our indicator shows that despite the much larger value of transfers to children, these investments are still too low to enable the child generation to finance the old-age transfers to the parental generation.

> We have to conclude that in all of the analysed countries the intergenerational transfer system is considerably out of balance.

The concept of a generational contract describes the fundamental relationship between transfers to children and transfers to the elderly population. Our results indicate that the rather generous public old-age benefits observed in 2010 will have to adjust to the lower investments in children of the population that enter retirement in the coming decades. Taking the net transfers relative to labour income as a benchmark, the observed pattern is unfair from a generational perspective. The current working-age population has to provide a large share of resources to the elderly population, while having fewer resources for themselves and their own children. As a consequence, they themselves will receive much lower benefits in old age.

How could such imbalances be avoided in the first place? Automatic balancing mechanisms would be desirable. These mechanisms should be simple, to allow individuals to predict their contributions and their benefits; furthermore, they should not create incentives that intensify the imbalance; and they should be fair – thus, they should not distribute from those who invest in the child generation to those who do not. The current pension rules in most of the countries do not have any of these characteristics. Pension rules rewarding labour income and transfers to the elderly provide disincentives for having children, as in most countries children are associated with the reduction of paid work. For the same reason they redistribute from those who have children and invest in the human capital of societies to those who do not. Furthermore, they largely ignore the capacities of the young generation to provide for these transfers. A possible solution would be the suggestion of Sinn (2013), who proposes a change to a funded pension system with a pay-as-you-go component for those who have children. He argues that childless couples could save the resources that families with children have to use for the intergenerational transfers to children.

Summary and conclusion

The contributions of this paper are threefold. First, we develop a framework for analysing intergenerational transfer flow using the concept of a generational contract. Intergenerational transfers to children and to the elderly population are best understood as mutual exchange between two generations. It requires human capital

investment in the child generation to enable the child generation to finance the public transfers to the elderly population once they enter employment. The public transfer system and the challenges due to population ageing cannot be understood without taking public and private transfers into account.

> Pension rules rewarding labour income and transfers to the elderly provide disincentives for having children, as in most countries children are associated with the reduction of paid work.

Second, we use age-specific data on transfer contributions and benefits provided in NTA and NTTA to quantify intergenerational transfers, including private transfers to children in the form of household work. Using the average transfer pattern of 16 EU countires in 2010, the value of total transfers to a child amounts to 16 times the yearly labour income of a full-time worker. The net transfers to the elderly are mostly public transfers, amounting to six times the yearly labour income of a full-time worker.

Third, based on the transfer data we develop and calculate an indicator that measures the extent of imbalances in the transfer system. In the countries analysed, the transfers to children provided by one person during working age can support about 0.7 children, on average. However, to finance the total transfers of a person in old age it requires almost 1.6 contributors, on average. Such a situation can only be maintained because most European countries experienced a baby boom in some years between the Second World War and the 1980s. The generation that is currently in retirement, the parents of the baby boomers, invested considerably more in the young generation than the current working-age population. The imbalance in the transfer system cannot be maintained; a reduction of transfers to the elderly population relative to the average labour income and an increase in the contributions of the child generation is inevitable.

To make transfers predictable and to maintain a balance of intergenerational transfers, an automatic adjustment mechanism of old-age benefits would be highly desirable. These mechanisms ideally take the transfers to children into account, at the level of a generation as well as on an individual level. Pension rules that take the number and education of children into account could help to avoid such imbalances.

Notes

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2 Collins Dictionary of Law (2006). Viewed on 28 July 2016 from http://legal-dictionary.thefreedictionary.com/contract.
3 Collins Dictionary of Law. (2006). Viewed on 28 July 2016 from http://legal-dictionary.thefreedictionary.com/consideration.
4 The data can be accessed on www.wittgensteincentre.org/ntadata (accessed on 6 March 2018).
5 NTA and NTTA data can be downloaded from www.wittgensteincentre.org/ntadata (viewed on 28 September 2017).
6 Austrian NTTA is based on: Statistics Austria, Zeitverwendungserhebung 2008/09.

7 The reference years of the time use surveys are the following: Austria 2008/09, Belgium 2005, Bulgaria 2002, Germany 2002, Denmark 2001, Estonia 2000, Spain 2003, Finland 2000, France 1999, Italy 2003, Lithuania 2003, Latvia 2003, Poland 2004, Sweden 2001, Slovenia 2001, United Kingdom 2005.
8 Source: EUROSTAT, population and number of deaths by age in 2010.

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Bernhard Hammer has been a researcher at the Vienna Institute of Demography since 2015. During his doctoral studies (2010-14) at the Technical University in Vienna he worked on National Transfer Accounts, an accounting system which measures the relationship between the age of individuals and their economic activities. His research interests focus on measuring, analysing and understanding the generational aspects of the economy, including the generational patterns of economic activity and intergenerational redistribution.

Contact details:
Bernhard Hammer
Vienna Institute of Demography
Welthandelsplatz 2
1020 Vienna, Austria
E-Mail: bernhard.hammer@oeaw.ac.at

Tanja Istenič works as a teaching assistant at the Academic Unit for Mathematics, Statistics and Operations Research at the Faculty of Economics, University of Ljubljana. She has a PhD in Economics at the Faculty of Economics, University of Ljubljana. Her main research interests are in socio-economic effects of population ageing, intergenerational transfers, gender issues and welfare regimes.

Contact details:
Tanja Istenič
University of Ljubljana
Kardeljeva ploščad 17
1000 Ljubljana, Slovenia
E-Mail: tanja.istenic@ef.uni-lj.si

Lili Vargha is a junior researcher at the Hungarian Demographic Research Institute and a PhD candidate in Demography at the Doctoral School of Demography and Sociology (Pécs, Hungary). Her main research interests are in population ageing, intergenerational transfers, human capital investments and time use.

Contact details:
Lili Vargha
Hungarian Demographic Research Institute
Budapest, Hungary
Doctoral School of Demography and Sociology
University of Pécs, Hungary
E-Mail: vargha@demografia.hu