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MPC out of Augmented Wealth in Poland

Janusz Jabłonowski*

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Abstract

The study attempts to link the descriptive economics with the theoretical model of permanent income and life cycle hypothesis (PILCH) to shed some light on a low private savings rate for Polish households. These may be explained by the households' belief that the public pension are a collateral to borrow against, which could discourage the buffer stock effect. The study comprises two research fields: 1) the estimation of so called augmented wealth, and, 2) the marginal propensity to consume (MPC) out of different types of wealth with the permanent income model. The mean augmented wealth (i.e. net wealth plus public pension wealth) per household in PLN amounted to 705 thousands, consisting of public pension wealth of 388 thousands and net wealth of 415 thousands. The model perfectly matches the augmented wealth Lorenz curve. The average MPC out of all types of wealth reaches 10% on average, ranging 6–20%, with a negative MPC to wealth correlation, and 60% of hand-to-mouth households. The explanation for this perfect match may stem from a high wage growth (also public pension contributions wedge) that that builds the public pension wealth. The Ricardian-type households may then mentally account the future pensions as a collateral (fiduciary money) for current high MPC, which may implicate crowding out their propensity to save for retirement privately.

Keywords: marginal propensity to consume, crowding out private savings, augmented wealth

JEL Classification: D15, J32, C15

*SGH Warsaw School of Economics, Warsaw, Poland; e-mail: janusz.jablonowski@sgh.waw.pl; ORCID: 0000-0001-5935-8515

1 Introduction

The rate of voluntary savings for Polish households, varying around 1–2%, is surprisingly low when compared to other countries and flourishing wage fund dynamics since 2017 (7–9% year-to-year quarterly, on nominal basis). The expected private savings' rate trend should be increasing due to e.g. aging population. If translated into the permanent income theory, it is expected that due to aging population, the buffer stock saving motive should start overcome the precautionary motive. Counterintuitively, the savings' rate falls, and the consumption quarterly dynamics remain high – close to 7% year-to-year, on nominal basis.

The study sheds some light on this phenomenon with use of permanent income in life cycle model with an input of so called augmented wealth. The augmented wealth consists of net wealth (mostly self-declared real estate value) extended by public pensions wealth. If spread smoothly across entire lifetime, it gives the path of expected annual income to be consumed. The marginal propensity to consume (MPC) out of this permanent income shall be high, provided lifetime low private savings rates. The study attempts to find out if an empirical distribution of augmented wealth across heterogeneous households matches the model Lorenz curve for the marginal propensity to consume (MPC), which was initially proposed by CSTW. Further referred to as CSTW stand for initials of Christopher Carroll, Jiri Slacalek, Kiichi Tokuoka, Matthew N. White, who has proposed the model structure in the article: "The Distribution of Wealth and the Marginal Propensity to Consume" (2017). If the modeled Lorenz curve suits well to the empirical augmented wealth distribution, then it is assumed that it may indirectly explain low private savings' rate of Polish households for the entire distribution of augmented wealth. It may prove that households think that the state-guaranteed public pensions serve as their collateral for current high MPC or kind of fiduciary money on top of their private savings (wealth). Since the public pensions are recorded on the unfunded (notional) defined contribution (NDC) accounts, i.e. immediately finance current pensions, but are virtually recorded on individual accounts, which increment with the individual pension contributions. Consequently, the labor wedge shall be a good candidate as a reference for the impatient households to plan their MPC. If social contributions (simplified here to the labor wedge) grow proportionally to gross wages, then the future public pensions and augmented wealth increase as well. The pension wealth is not treated as a category of money aggregate, but households may treat it as a fiduciary money, while the information on the expected pension to be paid out of this wealth is cyclically provided by social security authority.

2 Why MPC out of augmented wealth?

J. M. Keynes defined the basic relationship for savings – consumption as MPC + MPS = 1, which states in principle that the main determinant of consumption is the current disposable income. A small voluntary savings' rate observed in Poland shall coincide with a high propensity to consume. However, the voluntary savings' rate was not that small in the past, while the economy in the transformation process, i.e. since 90's was rather characterized by a high share of consumed disposable income. The mismatch in timing of cumulation of the savings by institutional sectors may be blamed, as suggested by e.g. Kolasa et al. (2016). The share of savings of households' sector in the aggregated savings in the economy, anyway not significant in period 2006–2010, nearly disappeared after 2010. The key source of investment in the economy was driven for a decade by the fluctuated savings of the non-financial corporations. This is not a principle topic of this study, nevertheless, has motivated to dig deeper for the savings / consumption motives of the Polish households, for instance, in the life cycle theory.

According to the life cycle theory, a change in expected benefits should offset private wealth, and the pension reforms affect the retirement expectations and private wealth accumulation, as in e.g. Bottazzi et al. (2006). The reform of a type introduced in Poland in 1999 poses a responsibility for pensions through the entire contributory period, e.g. 45 years. But in this study, the assumption is that the households control both, the overall lifetime private and public wealth. If, on the one hand, the households mentally anchor their lifetime disposable permanent income to the augmented wealth (lifetime gross income and the stock of private wealth), and on the other hand, they have only their disposable net income, they may overestimate their lifetime liquidity in a purely, economically rational terms. It may seem that, in spite of a small voluntary savings' rate, they tend to believe in full insurance against the economic uncertainty, and that the state, which guarantees their public pensions, is a last resort insurer. Other words, from their naïve perspective, this can be sort of rationality (expectation bias anchored in heuristics) based on the trust to the (welfare) state's omnipotence. The problem deepens, if households overestimate the public pension component of the augmented wealth in estimations of current MPC.

The motivation of such conceptually expensive complication deserves some explanations. There is at least one significant difference in interpretation between the liquid/net wealth model and augmented wealth model: the liquid and net wealth increments with private saving's rate, i.e. unconsumed part of net disposable income. The public pension part of the augmented wealth builds with an additional portion of labor wedge (taxes and contributions), i.e. gross income and some compensation to e.g. minimum pension level from the state. Since the system is of NDC nature, then the public pensions accrue virtually on the individual accounts, and its future financing will depend on the next generations' labor activity and public debt. In the permanent income life cycle model, provided the NDC pensions scheme, the public pensions cancel out with the earlier paid taxes, so they may be omitted as a redundant

complication. But if the households are myopic, and have a hunger to catch up of the Western consumption levels, the size of the augmented wealth may be regarded as nearly infinite collateral to borrow against. If so, then the MPC out of liquid or net wealth means something different than the same MPC out of lifetime gross income. The latter means much smaller private savings rate. The scale of such process is unknown, but maybe a nearly perfect match of theoretical and empirical MPC out of augmented wealth could explain such an assumption.
The paper is structured as follows: after current introduction the literature review shows a context for interrelated topics, then follows a description of the augmented wealth calculation, then the results and the summary concludes. The appendices cover a list of a referred literature.

3 Literature review

Starting from the main motivation, i.e. a low voluntary savings' rate, decomposed by Kolasa (2017), apart from low interest environment and post-crisis "abstemiousness", may stem from the cultural issues: thrift, trust, and religiosity pointed out by De Castro Campos et al. (2013), probably deepened by a high legislative uncertainty around sensitive area of pensions. For instance recently the government tends to increase the legally binding 20% pension valorization by the discretionary one-off pension payments. This study takes the legal approach as given, i.e. nominal valorization rules and no changes in voluntary savings' rate.
The public pension wealth distribution estimates are calculated from scratch in a forthcoming chapter, and such procedure was not applied knowledge before. The augmented wealth is here defined as a households' net wealth extended by public pension wealth, as in e.g. Bönke et al. (2017). The approach taken in this study shall give then a complete amount of controllable lifetime wealth – but for bequests. However, as Bönke et al. point out, the public pensions are available conditionally on changing legal rules, age and career performance, so its size is uncertain and the liquidity is smaller in a life cycle as compared to private savings. To this end, the article provides a pilot estimate for the augmented wealth in Poland based on households' wealth survey, matched with a sample administrative social security data. From the point of view of MPC modeling tools based on permanent income model (PI), this study contributes to the vast evidence of MPC out of different types of wealth based on life cycle models. Life cycle models start from Zeldes (1989), where representative agents encounter permanent and transitory shocks. The novelty to treat the public pensions as a collateral needs explanation. The clarification may start from the national accounts rules stipulated in ESA2010 that require to calculate, among other aggregated accounts, the implicit pension debt table. It covers not only private compulsory and voluntary pension assets, comparable to the 401k system in the US, but also a principle part of many EU pensions schemes – the notional defined contribution schemes, managed and guaranteed by the state. There is a variety of

methods how to calculate the stock of the implicit pension debt based on this pillar. This study takes the point of view of all currently living individuals, who contribute to the system for their entire career path, and then expect to get an adequate pension. If these streams of payments are calculated, they may reflect sort of implicit assets that are unfunded, i.e. not backed by the financial wealth, but expected to be paid by the future generation(s). The funded schemes then are in large part reflected in the existing money stock, while the unfunded schemes are sort of fiduciary money – the economists must be aware of this important methodological difference, but the households may not bother. Even if these implicit assets are not held directly in the books, they exist as the liability of the state, so the household may think to borrow against this stock of future actual pensions contributions to be paid by the forthcoming generations. A word collateral is used here not as a direct wealth insurance against borrowing (e.g. real estate mortgage), but as a future stream of pensions that smooths the consumption, and may give a self-confidence for current high MPC.

With respect to actual estimates of MPC, their most common range of aggregated MPC out of liquid and illiquid wealth ranges between 0.01 and 0.1 as derived initially by e.g. Carroll (1994) and Parker (1999). Poterba (2000), Lettau and Ludvigson (2004) provide the results of around 0.03–0.05 for the US, Catte (2004) summarizes the OECD countries, setting an early reference of around 0.01–0.08 cents out of each additional currency unit of wealth. Bover (2005) calculates the MPC of 0.015 for housing wealth in Spain, while Bostic (2006) shows a range of 0.02–0.06 for homeowners in the US, while slightly higher 0.08 for Italy by Grant (2008).

Ludwig and Sløk (2002) summarize other authors by distinguishing three channels of the impact: 1) the realized wealth effect, 2) the unrealized wealth effect, and 3) the liquidity constraints effect. This approach requires a use of surveys for several years and, furthermore, distinguish the realized and unrealized gains (losses) from real estate / net wealth. They also point out that the especially the MPC out of unrealized gains may be lower than the other two. Anyway, the results they provide are close to the already quoted records: 0.014 in France to range of 0.04's in Australia, Japan, US, Canada or UK.

Unlike these quoted Authors, this study applies just one point in time for wealth survey, which does not consider the consecutive, annual change in stocks of wealth, and relies on the cross-sectional heterogeneity. Additionally, the realized and unrealized gains are outside our range of input data. However, the public pension wealth may be regarded as sort of unrealized financial gain until retirement.

The approach taken in this study is closer to Campbell (2006), who suggests that the relationship between wealth and consumption is affected by the wealthier part of society. An issue of the uneven distribution of the wealth composition and, in consequence, shocks to its value, is tackled by Arrondel et al. (2014): Cyprus 0.005, France 0.006, Germany 0.008, Spain 0.016, Belgium 0.023, Italy 0.046. A more recent literature covers the thematic MPC with heterogeneity, e.g. debt crisis by Garbinti

et al. (2019) or Auclert (2018) who deals with the unhedged interest rate exposures. This article does not expand this issue due to data constraints for Poland. Relying on surveys may be biased by imperfect valuation of illiquid wealth, as pointed by Kennickel et al. (1997). Also, there are frequent inconclusive studies pointed out by e.g. Davis (2001), while an issue of MPC out of wealth is generally very complex for developing countries as noted by e.g. Apergis et al. (2014). As for the regional perspective of Central Europe, Fidrmuc et al. (2012) finds a statistical insignificance for the MPC out of housing wealth for Slovakia, which may add some pinch of salt also to our results. From the technical standpoint, a possible endogeneity and collinearity problems are often raised. Therefore, the results need to be taken with caution.

The closest approach to the one taken in this article apart from CSTW, can be followed in two studies: the first is Arrondel et al. (2015), where MPC is computed and analyzed across the entire wealth distribution at the household's level, using French households survey. As for the results they show a negative correlation between MPC and a rigidity of wealth across wealth distribution as well as its structure.

The second study to directly refer to is Kaplan et al. (2014), who focus on so called wealthy and poor hand-to-mouth (W-HtM and P-HtM respectively) households. Provided a high wealth the HtM households tend to have a high MPC out of transitory income, as if there was full insurance against unemployment (regarded as retirement too). These Authors apply also HFCS data that follow to ca. 40% of sum for P-HtM and W-HtM share for the Western European economies, while this study suggests well above 60% for Poland. The difference in economic development and gross income approach by this paper can be blamed, however, these results will be tackled later.

Considering a country specific perspective for Poland with the permanent income models, the precautionary motive of savings dominates, as in Florczak et al. (2016) or Kolasa (2017), the liquid assets are cumulated mainly as a financial shock absorber. These are anyway modest, as stipulate in details in HFCS 2014 report for Poland. The basic permanent income model based on Florczak et al. (2016) does not suit to the lifetime profile of net wealth based on Household Finance and Consumption Survey (HFCS 2014), and since the net wealth consists in Poland primarily of real estate, and that model does not fit to the MPC out of illiquid wealth, then they claim it is not (yet) a primary source of life cycle consumption smoothing. Firstly, a discussible subjective valuation of households of the primary real estate, which contributed to 90% of net wealth. It may be prone to mismatch of self-estimated market declared value and its average market transaction price. Secondly, which is important for the outcomes of this paper, the households did not use so far their real estates to smoothen lifetime consumption (for details see Florczak et al. (2016)), if confronted with the upcoming retirement period. What may be important for the development of future inequality measures is a high variance of both permanent an transitory shocks to income path, much higher than in Carroll et al. (2017). These also will be tackled in the results section.

With regard to the MPC benchmark values for Poland, apart from a historical pseudo-

panel results for 1987–1990 by Duncan et al. (2005), a more recent Zachłod-Jelec (2010) estimates VAR model on basis of financial wealth and suggests MPC at around 0.042, however, with uncertain conclusions due to modestly described input. Florczak et al. (2016), on basis of PILCH model calibrated on the administrative the general public pension system and HFCS 2014 suggest MPC out of liquid wealth at around 0.06. The MPC out of net wealth based on the latter study to match more or less the empirical consumption was around 0.00004 for a very limited number of households, and with a poor fit to the model. These two seem the only direct references for Poland for a comparable modeling approach. The other Authors compute the MPCs with the additional conditions, which make their results incomparable to ours, e.g. Kalinowska (2016), estimates empirically the MPC out of permanent changes in income in the context of stabilizing role of the unemployment benefits.

Considering the above findings our work adds to the topic of the MPC out of wealth in the following areas: firstly, to our knowledge, this is the pilot estimate of the augmented wealth for Poland. Secondly, follows the calculation of the MPC for the heterogeneous households in Poland out of different types of wealth, but we are first to calculate the MPC out of augmented wealth. With respect to precise quantitative outcomes for the MPC, these will be confronted with the abovementioned range of 0.01 to 0.1 out of wealth. If more detailed results in terms of heterogeneity by Florczak et al. (2016) and Kolasa (2017) are to be confirmed, then the MPC out of liquid wealth in an infinite time horizon will range to 0.04–0.06. The MPC out of net wealth in life cycle model with finite horizon should poorly match the data with actual values below 0.0001.

In order to confirm such a complex approach, the MPC out of augmented wealth (i.e. lifetime gross wage) should reach an upper limit of that from the literature, i.e. 0.1 (10%) to give a chance to thinking of its high negative impact on private savings rate.

4 Methodology and results for augmented wealth

This chapter describes the procedure of the augmented wealth calculation and its imputation to the individual household members, with concluding results. It starts with a description of the households' population covered in the available data, then follows the exact procedure concluded by the description of the augmented wealth distributions.

Firstly, own concept of countable and uncountable lifetime wealth on the individual level needs to be distinguished. It is assumed that the households are endowed or are well aware of their privately owned assets, including valuation of real estate, and the stock of social insurance accounts. Then, the individually countable lifetime wealth is narrowed in the model to these assets. However, e.g. the generational accounts use a broader category of all public finance expenditures, including uncertain (uncountable, since unknown) value of education, healthcare services or even defense. If a government redistributes more wealth (consumption) than public pensions, then

why only public pensions are considered in the augmented wealth calculation? Only current public pensions are precisely earmarked to individuals, while even healthcare expenditures are offered conditionally on health status, and need to cover the unknown costs of medical treatment, while the pension covers rather more predictable consumption that allows to survive with a good health. The public infrastructure, the blurred valuation of safety due to defense expenditures, or the environmental protection cannot be that directly earmarked to each individual. Even the rate of return on public (higher) education cannot be directly valued. Translated to the microeconomics, the lifetime utility takes all public finances government consumption as complementary or substitutable to private consumption, but the exact valuation of the entire government consumption is unknown and individually uncountable. The approach that takes these unprecise (or individually uncountable) calculations into consideration is called the generational accounts, and may be treated as a broader generalization of this study. The main difference is that this paper considers a perspective of an individual household's member, who can much easier evaluate her own individualized and earmarked (augmented) wealth, but cannot value exactly in monetary values, e.g. the future government consumption. To this end, public pensions are certainly not the only important factor, but if narrowed to the precisely earmarked kind of wealth – the limit can be certainly drawn. Nonetheless, the future research could shed more light on e.g. healthcare insurance in public system as a perfect insurance against *any* health deterioration.

More precisely, the augmented wealth concept, which should be countable for households, comprises here then the net wealth, as defined in the Polish HFCS methodology, and the net present value of future pension streams. The Polish public pension system comprises mainly of notional defined contribution scheme, where stock of virtual pension depends directly on accumulated pension contributions on virtual accounts. After a reduction of funded pillar contributions in 2018, a subsequent melting of its financial stock, the unfunded part forms a vast majority of the future public pension. The pension reform introduced in 1999 change the previous, defined benefit formula based on the 10 years' average mean's tested salary to the notional defined contribution scheme based on the social contributions recorded through the entire career labor activity. These, at retirement age are divided by the life expectancy expressed in moths, which gives an initial gross pension. In this study it is represented by the imputed, discounted net present value of expected lifetime streams of net old-age pension payments for the existing population aged +16 (i.e. net lifetime social security contributions), limited to labor force insured in a "general" public pension scheme (ZUS). The augmented wealth in the meaning applied here is a narrow version of the broader category that would include the earmarked NPV of the entire public finance lifetime net transfers, including healthcare, disability, maternity, sickness and general expenditures that comprise altogether for general government expenditures and explicit debt.

The groups excluded from the ZUS 1% are farmers (insured in so called KRUS

scheme), and those receiving non-unemployment government transfers, mainly pensioners. So called occupational pension system gathers judges, prosecutors and uniformed services, who obey a different legal regulation and are present in the Polish HFCS but cannot be identified (but for farmers and pensioners) and separately calibrated. Additionally, since their careers often overlap with ordinary employees and self-employed after early retirement (e.g. separate pension system for the civil servants), their careers are simplified due to model specification, i.e. they are treated as if they were insured in the general public pension system. Precisely, the average pension wealth is imputed to their individual record. There are other important groups that are not reflected precisely, especially coal miners, who enjoy a separate ZUS subsystem, i.e. retire at age of around 45 and enjoy over doubled pensions as compared to ordinary the general public pension system members for nearly 30 years. The old-age pensions of all types were not matched, if their values declared by the surveyed households are a sufficient starting point for a lifetime public wealth estimates.

The expected pension in the NDC system comprises social contributions recorded on the individual account and the pre-reform stock of entitlements represented by the initial capital, i.e. recorded labor activity before 1999. Although, the Polish HFCS includes already estimated social contributions for each 1) working person in the household and 2) the old-age pension for pensioners. However, the computational challenge is to earmark individually the initial capital that is missing from the Polish HFCS. Merging the administrative and survey samples with just few common variables is tricky.

4.1 A one-off procedure for the administrative data

In fact, the augmented wealth could have been derived from the survey, where the item (coded PFA1300) covers self-reported level of presumed or actual pension. More precisely HFCS survey PFA1300 question exact wording is as follows: "What is the level of old age benefit (from all sources) you or members of your household expect to receive or receive now?", so a breakdown into public / non-public part is unknown. However, the time costly imputation procedure of the initial capital and the lifetime pension contribution was chosen, and both are compared at the end to check how does the self-reported and systemic replacement rates suit each other.

The computation of augmented wealth in the version applied here is of one-off usage, since the 1% the general public pension system sample is no longer provided by the general public pension system due to a presumed sensitivity issues. Therefore, the applied programming procedure was neither strictly disciplined nor structured as a frequent usage tool, but more as a single workflow. Many ad-hoc decisions and tailored assumptions needed to be forced in order to continue the calculations. It certainly lowers the quality and makes a potential verification and repetitions of this exercises rather hard. Although, it may serve as an inspiration for alike computationally

challenging and complex projects. The schedule envisaged several steps with use of the administrative data and the intermediate microsimulation modelling.
The steps for the general public pension system administrative data are as follows: the administrative data provided by the general public pension system for 1% sample of persons insured in the public pension system (~169 000) for monthly time series between January 1999 and December 2014 served as the core dataset for the microsimulation of the expected streams of future pensions. For around 40% of insured persons the so called 'initial capital' was absent, which was imputed with the *R/mice* package on basis of the following methodology. The initial capital represents the virtual amount of social contributions earmarked to the accounts of those insured persons, who were employed before the introduction of the pension reform in 1999. The missing initial capital stems from the fact that the persons insured in ZUS usually complete the documentation necessary for the calculation of the initial capital while applying for pension. The existing records for insured persons were divided between those who applied and those who most likely apply and were born before 1974. The analysis of NDC accounts of these two groups reveals that the non-applicants have significantly lower NDC accounts (see Table 1).

Table 1: Mean of total NDC contributions, differences in contribution history – Applicants vs. non-applicants for the initial capital (IC) calculation

Birth year	Applicants	Non-Applicants
1955	59,773	25,587
1960	56,344	24,313
1965	56,136	26,850
1970	53,399	23,653

Source: Mueller (2015) based on administrative data sample for social security data.

The least angle regression (LARS) results from Mueller (2015) showed that the following variables rank high as explanatory ones for the difference: age in 2014, gender, contributions collected in 1999 to 2001. The contributions correlated positively with the initial capital, while the gender – negatively, which proved a smaller contribution basis for women. The imputation based on the abovementioned features with the *R/mice* package resulted in the initial capital of non-applicants lower by around 15% than of the applicants.
Contributions paid under employee contracts represent around 61% in the period 1999–2014, then the unemployment contributions and stages of long-term unemployment without payments of the unemployment benefits amounted to 10% of recorded contribution periods. The entrepreneurs add another 11% and finally self-employed 5%. The latter category seems the most discussible in terms of the new legal rules introduced in 2016, where the social contributions needs to be paid also on basis of the civic code contracts, unlike earlier. Therefore, the basis for

social contributions' calculations widened significantly for the period uncovered in the 1% the general public pension system sample. Since there are no proxies for the distribution of that widened contribution basis, the issue is postponed to the next version of the computations. Altogether, nearly 90% of all contributions belong to these five groups in period 1999–2015. The next stage of calculation are as follows:
The input set of insured persons was cleared for the groups insured in other systems, i.e. already retired or deceased. Additionally, the records of persons who have the id number in the general public pension system data but barely paid or paid no contributions were removed.
The length of theoretical career path based on age, i.e. 65 – 20 = 45 for men (M), 5 years shorter for women in the current system, differs from the actual one represented by the contributory periods. The average contributory periods for men and women in period 1999–2014 is shown in Table 2.

Table 2: Average contributory periods, years 1999–2014

Gender, quartile of gross income	Average contributory periods
K, I quartile	28
M, I quartile	29
K, median	30
M, median	35
K, III quartile	32
M, III quartile	37

Source: Calculations based on the ZUS 1% data.

Table 2 reveals that in the first 15 years after the reform, an average of contributory periods, as compared to assumed theoretical 45M / 40W, was shorter by 25-30%. The reason may stem from many factors, not analyzed here, as voluntary unemployment or lower labor activity. Anyway, the theoretical career path is reduced in the model by this ratio, relative to income decile. The lower the income decile, the higher the reduction of career path, as briefly shown in Table 2.
The pension microsimulation models are generally used to measure the adequacy of the pensions with respect to e.g. final salary before retirement or impact evaluation of the minimum pensions. However, if properly sampled, the generalized results of the microsimulation may be confronted with e.g. macro-models based on cohorts, to compare to the macro aggregates of the pensions. The current study aims to meet the weighted microsimulation results with the existing aggregates of the discounted gross implicit debt stemming from the public pension schemes. The pension is calculated with use of the initial total pension account (initial capital plus indexed stream of pension contributions) accrued until the retirement divided by the unisex life expectancy at the age of retirement. The aggregated pension account consists of public account (NDC) and private account (FDC) if the latter applies. The NDC

account is broken down into NDC1 and NDC2, which stand for sub-pillars of the notional defined contribution scheme, which differ by indexation: the NDC1 is indexed with the last year wage fund in the economy, the NDC2 is indexed with lagged 5 year walking average of GDP real growth. The NDC1 and NDC2 indexation rates barely differ and have minor influence on the results.

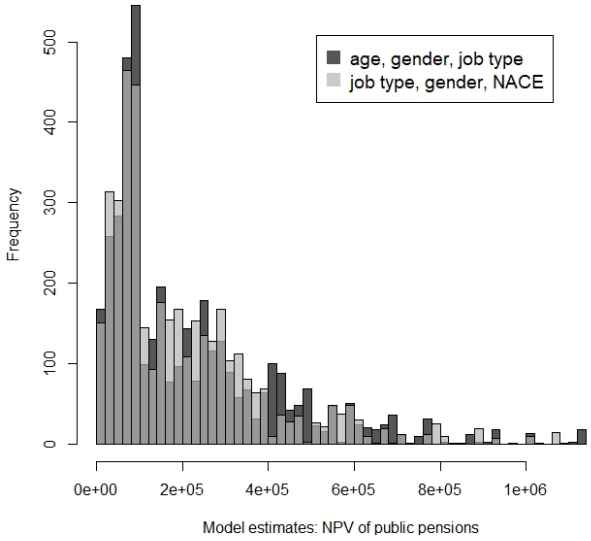
The microsimulation was performed with the use of *R/MicSim* demographic projection package extended by the contribution-pension section, where, firstly each contributor is assigned to the state space probability of receiving pension in the future, and then, for each positive indicator of future pensioner, the exact amount of the initial pension was calculated. The calculation of the pensions relied on the Markov chain Monte Carlo simulation of the state spaces path. Each period, the absorbing state space of the expected pension contributions are indexed with the wage growth rate times the unemployment probability and survival rate. The time series of GDP growth rate, unemployment and employment probability is taken form the Ageing Working Group 2018 assumptions. The non-absorbing states covers gender and death. The transition rates between consecutive states is indexed with monthly periods up to the age of retirement, 60 for women and 65 for men. It is important to stress some consequences of the applied methodology: the individuals in the input dataset are pictured in different points of their career paths, i.e. older workers records include longer path with promotions, unemployment and job switching history, while the younger workers depict their path without promotions and absence. A unified wage growth rate for these two groups results in incomparability, which highly unifies the wage path of younger workers, who are differentiated by their starting point salary without promotions. To reflect promotions, the additional state is introduced, based on the structure of salaries in the Polish economy published by the NSI, which adds to the age specific wage growth rate some additional portion of promotion. As this age specific "promotion profile" flattens around age of 50, it has little impact on actual promotion path of contributors aged 50+. When inspecting the absolute levels of the annual contribution basis (NDC + FDC), the striking difference occurs between young and older workers' accounts: despite abovementioned proxy for promotions, around 75% of annual salaries falls below average salary in the economy in 2014 (ca. 46 thousand PLN), which seems a key driver for decreasing replacement rate in the upcoming decades. The key contributors to this result are two kinds of dominating salaries: minimum wages and the minimum declared gross taxable income by self-employed and entrepreneurs.

The initial pension is valorized according to already existing rules, i.e. with 20% wage growth, with exceptions of minimum pensions: the indication of minimum pension comprises the level of initial pension below the expected legal minimum pension level and required contributory period, i.e. length of transition matrix for individualized career expressed in full years. If an individual is entitled to the compensation to the level of minimum pension, the actual pension is removed, and the minimum pension is introduced instead (around 70% of all pensions in 2050) and valorized until expected

death. The streams of valorized pensions end up with the unisex life expectancy counter. The NPV of future pensions is calculated with the NPV function from *R/FinancialMath* package, where the starting point takes the initial pension, the stream of payments consists of stream of pensions, and the interest rate is fixed at 3%. This NPV stands then for the public pension wealth component.
The imputation between different sorts of datasets poses not only technical hurdles, but the methodological ones too. The 1% ZUS data is *small*, but anyway the administrative dataset, which shall cover the adequate representatives of all, especially high income earners. Any survey, including HFCS, relies on the incomplete data due to participation bias, missing the representativeness especially for the richest households because of sensitivity issue. That means that the selected matching features present in both datasets may cause an imputation of the actual (administrative) top decile households data to top decile of survey, the latter may be in e.g. below 9^{th} actual (i.e. administrative) decile or even lower. Although, this risk was known, the matching procedure was processed, so the public pension wealth was imputed into the Polish HFCS survey. The common features for matching individuals from two datasets are modest and comprise age, gender, region, job type or retirement, NACE category and amount of annual gross salary. Theoretically, the social security contributions are available in both datasets, although, the social security contributions from the HFCS survey paid by employee were estimated, so these could have been misleading to the unknown extent. Altogether 6 identifying variables would allow to closely identify the nearest neighbors, especially, if performed sequentially, i.e. donor and receiver narrowed group having complete 6 variables, then next group with 5 variables etc. Instead the simplified procedure was chosen: the matching process to reach a correct imputation is described in details in D'Orazio (2013, 2020), and was repeated three times with the *R/StatMatch* package and *rankNND.hotdeck* function, where the entire the general public pension system 1% was donor, and weighted Polish HFCS was receiver for matching deciles of gross individual income. Due to capacity constraints, a more detailed coding solutions and descriptive statistics can be provided upon request to the author. The abovementioned repetition considered the following sets of variables present in both datasets that met the function completion criteria: 1) age in 2014, gender, job title, 2) age in 2014, gender, NACE, 3) job type, gender, NACE. In spite of attempts to merge regions, the applied cross-sectional table could not be completed with inclusion of regional distinction variable due to underrepresentation of required variables. The administrative data 1% sample seemed too small for this purpose. As the donor is 16 times larger than the receiver, altogether 9 rounds of draws of matching without replacement were completed before the algorithm failed due to lack of sufficient number of donors. Consequently, for each of around 4000 Polish HFCS individuals who qualified as receivers, 9 times 4000 donors were matched with kNN algorithm from the general public pension system data. The range of pensions' NPV for matched id's varied considerably, although, the distribution of all 9 sets of neighbors resulted in very comparable shapes. Figure 1 illustrates the 1^{st} distribution

of first set of variables (age, gender, job type) and the final 9th matched distribution of 3rd set of variables (job type, gender, NACE). The difference between distributions of the 1st and 9th imputed public pension wealth was very small, which may give a hope that the donors' dataset was quite homogeneous in quality.

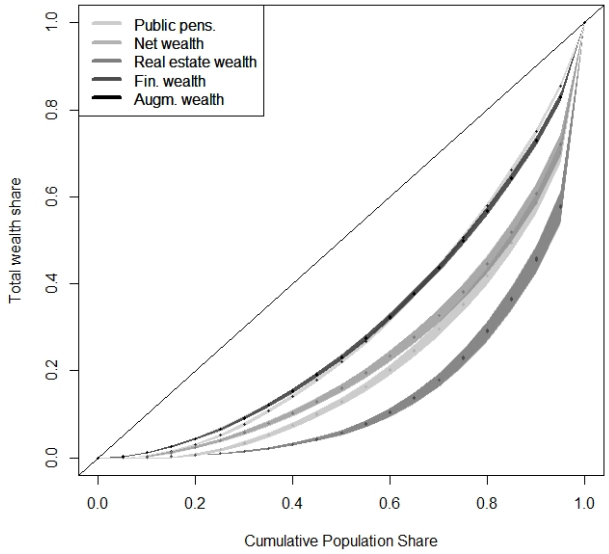
Figure 1: Net present value of public pensions for the 1st distribution of first and the final 9th matched distribution of 3rd set of variables (job type, gender, NACE)



Source: Calculations derived from social security administrative sample data.

Figure 1 shows a very good reproducibility of the applied procedure for data donor sampling without replacement of the sample. As the Polish HFCS consist of 5 imputations, the same value for public pension wealth was recorded for each Polish HFCS imputation. The public pension wealth imputed to Polish HFCS shows a significant concentration around 150-250 thousand PLN. The calculations reflect the gross pensions according to the existing rules, i.e. with taxes and health contributions. The pension contributions are not imposed on the pensions in Poland. Consequently, quite sad picture of future pension replacement rates reveals, which is was earlier present in the literature: Jabłonowski and Mueller (2012, 2014) or Bielecki et al. (2018), where over 70% of new pensions after 2045 shall be paid at minimum level. Consequently, the NPV of expected future monthly gross pension ranges in 1000–1300PLN, considering over 20 years of retirement.
Figure 2 shows the empirical Lorenz curves for all types of considered wealth definitions. The most uneven distribution relates to the financial wealth, followed

Figure 2: Lorenz curve for the various types of wealth in Poland



by the net wealth and (self-declared) real estate value. Both public pension wealth and augmented wealth show less inequality in the data. The public pension wealth then may be regarded as a type of wealth that could diminish the uneven distribution of wealth in Poland.

Coming back to the micro data approach, Table 3 shows some descriptive statistics for the replacement rates (defined as the first pension to last salary ratio) that form the streams of pensions.

Table 3: Mean of public pensions replacement rate

Income quantile	RR in 2020	RR in 2030	RR in 2040	RR in 2050
I quartile	0.50	0.50	0.50	0.50
Median	0.47	0.36	0.25	0.25
III quartile	0.52	0.40	0.28	0.20

Note that the replacement rate for the I quartile does not change, since it is entirely covered by the minimum pension, in spite of collected contributions on the notional capital. And since it is referenced to the last salary, which is assumed low in the projection, the replacement rate stays actually constant. The other replacement rates drop significantly, i.e. after 2040 over 50% of all pensions may drop below the

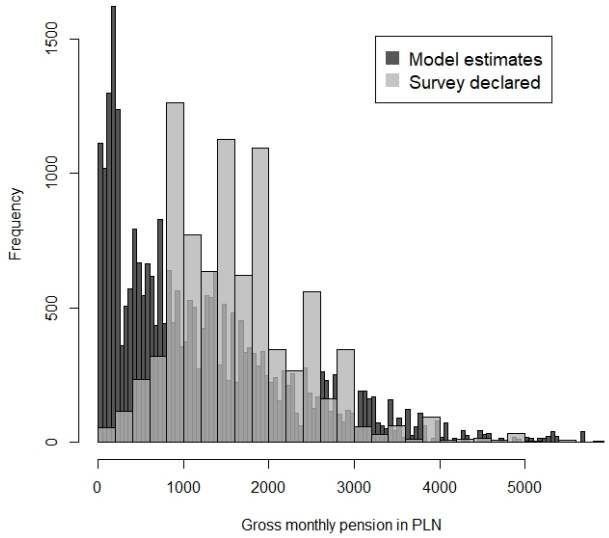
minimum pension level. Consequently, the public pension wealth may be sufficient just as the basic public pension "safety net".

4.2 Distribution and quality of imputed public pensions

The Polish HFCS 2014 covers the PFA1300 variable, which stands for declared, expected (or actual in case of pensioners) pension from public and private pension schemes (the general public pension system, KRUS, occupational pension schemes, and non-obligatory pension schemes, i.e. OFE, IKE, IKZE, PPE). The additional retirement savings include employee pension programs (PPE), individual retirement accounts (IKE) and individual retirement security accounts (IKZE). Their range remained very low. At the end of 2016, there were only 396 thousands people (coverage 1.6%). In 2017, there were 933 thousands IKE accounts (coverage 5.9%) and 664 thousands IKZE accounts (coverage 4.2%). Most of the income of retirees comes from public retirement benefits. As for the recent Employee Pension Plans (PPK), they were triggered off in 2017, and up to December 2020 gathered just 1.1 million participants, so below 10%. A slightly methodologically biased comparison between estimated and surveyed monthly pensions, depicted in Figure 2 and 3, shows a mismatch between pension levels declared as expected in Polish HFCS (public and private) and estimated for the general public pension system. The private pension savings are so far modest, so the mismatch should not be attributed to this issue. The HFCS 2014 report estimates that around 8% of the top income decile households save in private pension schemes, with below 5% of the median income households. The share of private pension savings in overall financial savings is reported below 7%. It may seem then that the Polish households either overestimate their expected pensions or count for significant resources saved on private accounts, or both.

Figure 3 shows a mismatch between the expected (survey) and estimated (microsimulation) pension level. The declared, survey pension represents nearly the normal distribution with higher mean, while the microsimulation model result is closer to an inverted gamma distribution, with much lower mean pension. An interpretation poses some contradiction: from the one hand the households are informed certainly about their presumed pension levels and public pension stock, so they shall adjust their MPC to it. This level should be closer to the microsimulation model pension level estimated in this study with a low mean below 1000PLN. On the other hand, in survey the households express much higher expectations, with 2000PLN mean pension, that is closer to their parents replacement rate. This kind of expectation bias, anchored in some type of heuristics, would suggest that the younger labor force rather expects that the replacement rates stay high, irrespectively of own notional account records. This in fact may be somehow justified by recent waves of breaching the basic valorization rules by the government, where the pensions are not indexed just by the 20% increase in wage fund stated in law, but also by 13^{th} and 14^{th} pensions granted on basis of discretionary government decisions.

Figure 3: Wealth survey monthly pensions versus pensions based on microsimulation



Source: Calculations based on social security administrative data (the general public pension system) and Polish HFCS.

4.3 The tricky results for the public pension wealth in the survey

It is hard to make the results comparable to researcher's expectations, while the are two counteracting processes that may cause a confusion:

1. The aging population and the NDC system progression cause that we tend to live longer, so the retirement period lengthens too – and the proceeding NDC system lowers the average replacement rate.

2. Growing wages, especially for well-educated 35-45 aged cohorts, increase their individual pension accounts, provided that they are not self-employed.

These tendencies that cancel out each other are, unfortunately, further complicated by the potential particularities:

1. The results are calculated for the entire households "unit", but they are referenced for the 1st person in the household, usually men - consequently, the age profiles are blurred by the merged distribution of the public pension wealth of (most often) all partners,

2. The PAYG system was generous for older pensioners with higher replacement rates in defined benefit formula, not always matching the levels of replacement rates expected from achieved education,

3. The point above may be nuanced by lower participation rates, higher and longer lasting participation rate in separately insured farming or disability level,

4. The existing statutory retirement age (60w/65m) widens the gender gap due to shorter career path and higher life expectancy,

5. The long period of education may shorten the actual career path, despite expected higher salaries for graduates,

6. The self-employed have a privilege to declare the reduced basis for social security calculation at level of 60% of average salary in the economy last year, so their social security wealth shall be very low, in spite of level of completed education,

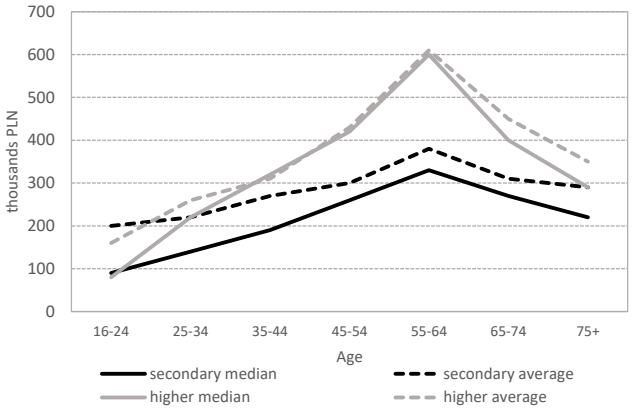
7. Technical constraint: the big cities attract people with high salaries, but these are small areas with dense population, which causes problems with matching potential neighbors from relatively small the general public pension system sample and survey data in terms of the regional stratification.

8. At last, but not least, another technical simplification: the microsimulation is static for lifetime optimization of couples within 2+ families: job quitting probability, fiscal optimization, unemployment and partial fertility rates - good example of solution in Holter et al. (2015).

The public pensions wealth grows exactly in proportion to the gross salary for around 70% of labor force, i.e. employees with labor contract. There are, however, around 20% entrepreneurs, who are allowed and do declare the lowest possible gross income for public pension purposes, i.e. 60% of average salary in the economy. This group collects a lower pension wealth and may count for a compensation up to a lowest pension if their pension account is too low to satisfy the minimum pension. There are also unemployed and inactive persons in labor force, whose public pension record grows erratically, and finally there are civil servants and farmers for whom the augmented wealth equals in this study to their net wealth. To somehow control the outcomes that may be hardly intuitive, two checkouts are applied related to 1) the aggregate, 2) distributional relationship with percentage coverage of selected categories.
The relationships to the aggregates of public pension liabilities (assets) can be compared to so called implicit pension debt, reported by the Polish NSI to the Eurostat on basis of estimates based on the cohort model. The overall aggregate that includes broader labor force aggregate (mainly farmers) amounted to 276% of GDP, with 2015 basis year. With comparable parametrization for the microsimulation model, the total pension wealth in Polish HFCS amounted to 201%, which seems a

plausible result. The remaining ~75% of GDP may be earmarked to the coverage differences between survey and the administrative data.
The distributional results rely on a comparison in percentage coverage between the referenced categories in 1) representation in the entire Polish HFCS and 2) distribution of the public pension wealth. It allows to catch quickly the differences in case of a potential misrepresentation. The example below shows a comparison in coverage between the public pension wealth and overall representation in population for categories of labor market status and education. Figure 4 mixes the two graphs above in absolute levels of the public pension wealth.

Figure 4: Public pension wealth by age and education status



The last chart shows that despite higher salaries of current working population, the public pension wealth of currently retiring population is significantly higher, particularly for fresh pensioners with higher education. A gloomy picture occurs for the population to enter currently the labor market, who may count on 1/3 of pensions of current new retirees.

4.4 The augmented wealth

According to obtained results, the augmented wealth per household, in PLN, amounted on average to 705 thousands. It consists of average public pension wealth of 388 thousands and average net wealth of 415 thousands. Figures 5–10 comprise the related results.

Figure 5: Augmented wealth by age cohorts

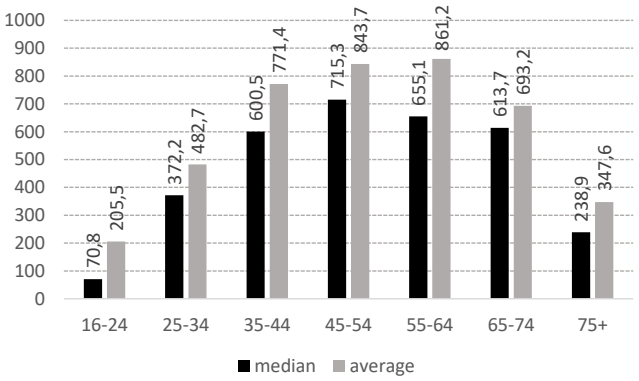


Figure 6: Augmented wealth by education status

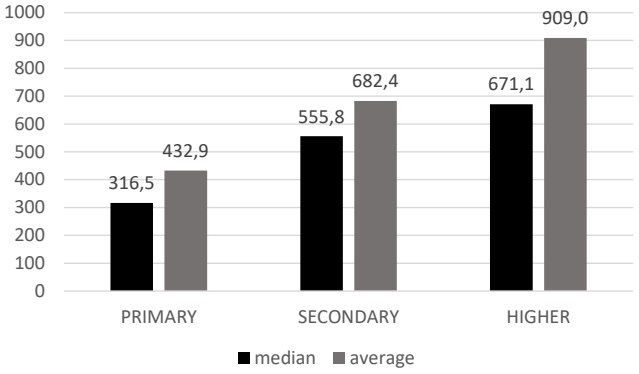


Figure 7: Augmented wealth by labor market status

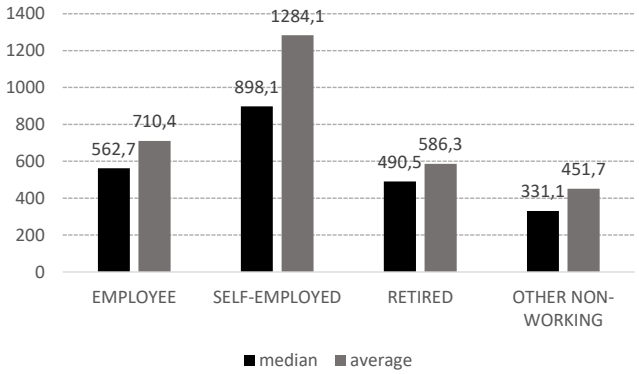


Figure 8: Augmented wealth by family type

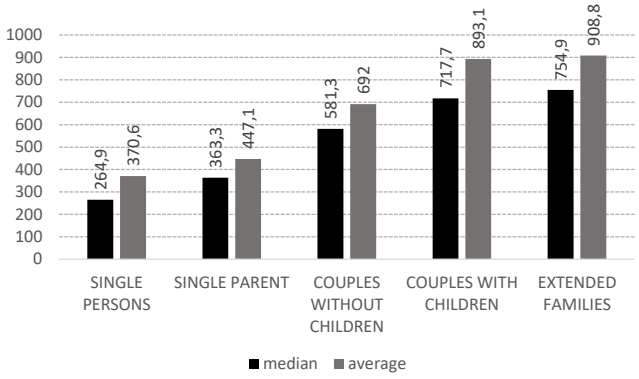


Figure 9: Augmented wealth by disposable income percentile

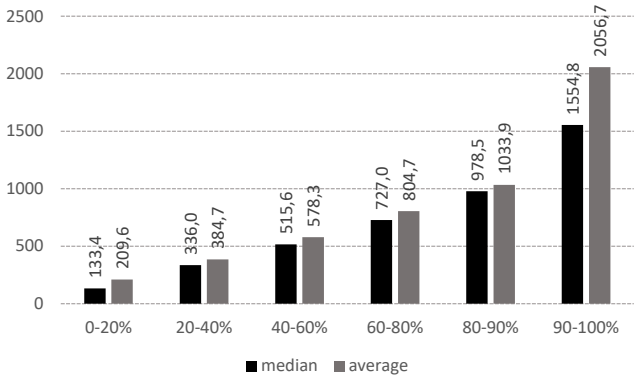
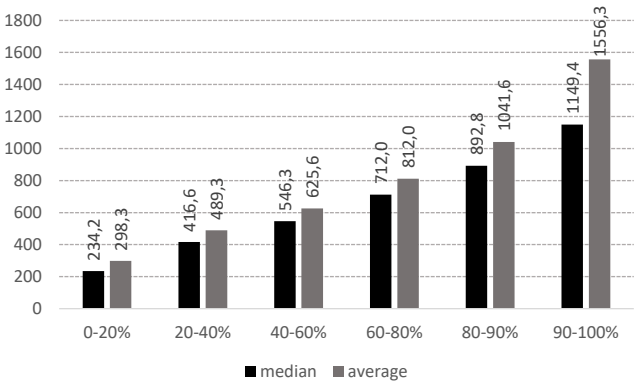


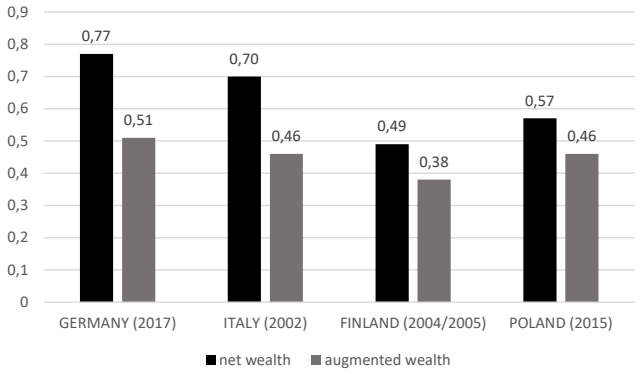
Figure 10: Augmented wealth by net wealth percentile



4.5 Gini coefficient from the international perspective

Regarding the international comparison, the Gini coefficient is small, however, some quoted results are outdated. This result makes no surprise, while both, the net wealth and public pension wealth are quite evenly distributed among Polish households, according to the pension contributions formula. Apparently, there is a wider range of Gini coefficients for net wealth as for the augmented wealth, while the public pensions should flatten the inequalities across both the wealth and age distributions.

Figure 11: International comparison of Gini coefficient for net and augmented wealth



While the life-cycle models describe rather a long-term phenomenon, then the evaluation of this coefficient is more useful if taken from a longer perspective. The net wealth reflects mainly the value of real estate and self-employed mixed capital. Without spectacular mortgage bubbles during a transition period and provided stable growth of small business this seems a believable observation. The public pension wealth should serve in theory as a principle safety net for retirement, extended by the consecutive consumption of private wealth. Its level in the defined contribution schemes depends on the labor wedge and career period. The Gini coefficient confirms this basic safety role, provided relatively short period of growing wage inequalities. However, the absolute levels of public pensions that stem from a high labor wedge produce the public pension wealth of a size of the net wealth. And it does not sound like the basic safety net, and the households may be aware of this proportion.

4.6 Calibration

Some authors claim that such a high growth rate is discussable, e.g. Liberda (2015), who differentiates between micro- and macroeconomic voluntary savings' rate. This study considers the officially published national accounts data, so the macroeconomic approach. The calibration is set as a mixture of CSTW and own estimates, with a significant part taken from a broad literature, e.g. depreciation rate.

Table 4: Parameters used in calibration of the model

Description	Parameter	Value	Source
Representative agent model			
Time discount factor	β	0.984	Own estimates
Coef. of relative risk aversion	ρ	1.5	Own estimates
Capital share	α	0.32	Own estimates
Depreciation rate	δ	0.025	CSTW
Time worked per employee	ℓ	1.25	Own estimates
Capital/(quarterly) output ratio	K/Y	9	Own estimates
Effective interest rate	r	0.033	Own estimates
Wage rate	W	2.37	Own estimates
Heterogenous agents models			
Unemployment benefit / wage	μ	0.20	Own estimates
Probability of death	$\mathcal{O}$	0.0063	Yields 40-year working career
Income shocks			
Variance of transitory shock to income log θ	σ^2_θ	0.04	Florczak & Jabłonowski (2016)
Variance of permanent shock to income log ϕ	σ^2_ϕ	0.004	Florczak & Jabłonowski (2016)
Unemployment rate	υ	0.07	Own estimates
Variance of log transient shock to productivity Ξ	σ^2_Ξ	0.00001	CSTW
Variance of log permanent shock to productivity Ψ	σ^2_Ψ	0.00004	CSTW

Source: Calculations, CSTW.

5 The results for the MPC out of wealth

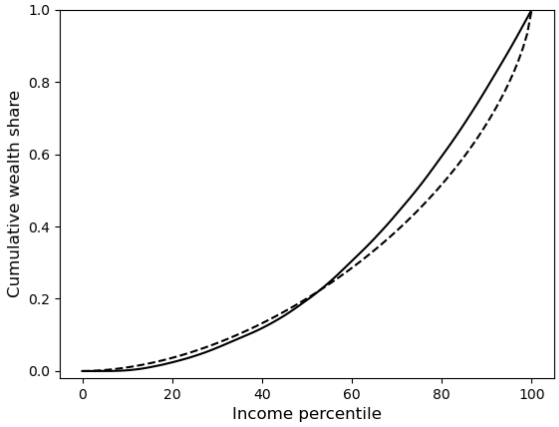
The results for the MPC out of different types of wealth, with a focus on the augmented wealth, are shown in the form of output of the CSTW model, i.e. Lorenz curve and related distribution indicators in Table 5. The solid line on the graph represents the actual Lorenz curve for a given type of wealth and the dotted line

shows the fit of an adequate model. The household survey provides lots of valuable information, one of which is that Polish households have a small stock of liquid wealth that does not exceed on average 3 months' net salary. The wealth accumulates in (self-declared) primary real estate, which is on average 15 times larger than the liquid wealth stock. The augmented wealth is around twice as high on average than the net wealth, so a comparable MPC could mean higher consumption out of permanent net income. The results are ordered from the least complex model and then get more complex and extended by the following types of wealth – net and public pensions.

5.1 MPC out of liquid assets with an infinite horizon

The first results to be shown refer to the **liquid wealth in an infinite horizon** version, with a single input parameter for discount factor, i.e. β – **point**. The average MPC amounts to 10% and varies between 7 and 20% with the liquid wealth to permanent income (W/Y) distribution. The model fits well to the data. Contrarily to the CSTW due to much deeper deflection of the Lorenz curve for the American liquid wealth. Interestingly, in this study the MPC distribution is negatively correlated with W/Y distribution, which suggests, firstly, that around 60% of households are of hand-to-mouth type, and secondly, upper W/Y quantiles save more from an additional PLN of their liquid wealth. This regularity repeats in all types of analyzed model settings.

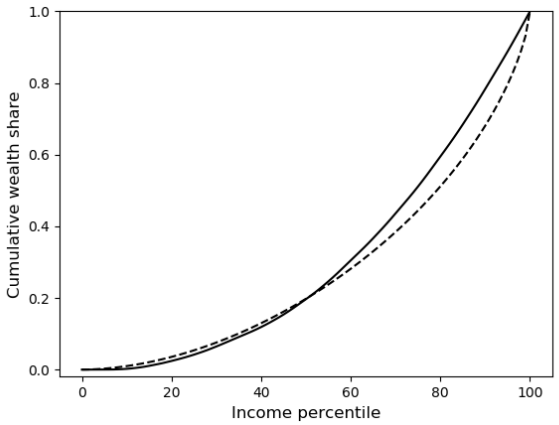
Figure 12: Lorenz curve for liquid assets with an infinite horizon



5.2 MPC out of liquid assets, infinite horizon, β – distribution

The next analyzed version extends the previous by **variable discount rate**. The chart shows a nearly perfect match up to a median of liquid wealth and a bit deeper than previously uneven distribution for higher quantiles, as compared to the actual W/Y quantiles. In terms of valuable information, a significant complication of the model related to the distribution of discount factor does not significantly improve the fit to the data, but for poorer households. It seems understandable, while the liquid wealth is small, used mainly to ease the intertemporal current budget tensions, so its distribution is quite equal, so the varying patience (discount factor) is not necessary to model such stable precautionary motive. Interestingly, the lowest wealth quantiles MPC are lower than for beta – point model, i.e. 9% instead of 20%, with a better suit to the model. However, these households are more impatient in the model, i.e. the discount factor for this group amounted to 97%.

Figure 13: Lorenz curve for liquid assets, infinite horizon, β – distribution

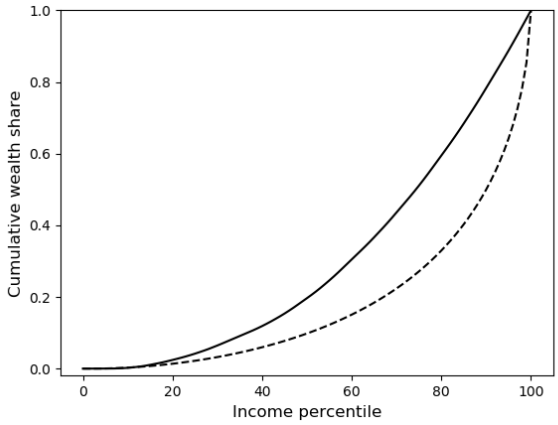


5.3 MPC out of net wealth, life cycle option, β – point

The next model to be analyzed is very interesting, while it reflects the life cycle profile for three types of lifetime net wealth distribution related to an adequate permanent income profiles based on education attributed to each household. It is fair to remind that the net wealth is a main source of Polish households' wealth, and it does not vary significantly from the gross wealth, since the level of the mortgage indebtedness is modest. Since the net wealth consist of self-declared real estate value, it is not market benchmarked so shall be taken with a pinch of salt. The settings assume 35

years of wealth accumulation (since a starting point in early 90's after a transition to the free market economy) with a single impatience parameter (discount factor in β - point option, and a switch to the beta distribution does not improve the fit. The model poorly fits to the data, provided the same parameters for shocks to the permanent income repeated in all calibrations. The sensitivity analysis shows no significant improvement in model fit also for smaller shocks to the permanent income of all three levels of education. The article does not comment on detailed model outcome, although, the educated guess for this modeling failure may stem from a short period of free market economy. This study assumes that it may be too early to apply life-cycle model for Polish households after "just" 35 years of transition.

Figure 14: Lorenz curve for net wealth, life cycle option, β - point

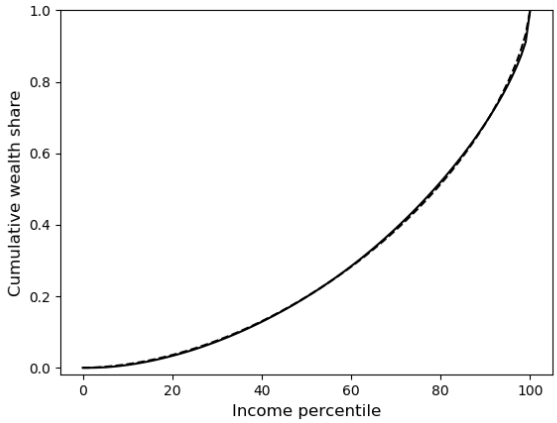


5.4 MPC out of augmented wealth, infinite horizon, β – point

The ultimate model that is analyzed is based on the augmented wealth and a standard (net) permanent income of an average consumer in an infinite horizon with a single discount factor rate. Let us remind that this study attempts to link the behavioral economics with the theoretical permanent income model to explain a low private saving's rate for Polish households. The private saving rate relies on net income, while for the MPC out of augmented wealth should, in a fully rational agents' model, rely on the gross income. But we presume a mental accounting of the labor wedge accumulation as the collateral for the high MPC. Therefore, the high pension contribution may crowd out private savings as often observed in the literature. The model applied in this study verifies if such a mechanism is popular across the entire augmented wealth distribution.

The model fits perfectly to the augmented wealth Lorenz curve, which (unbelievably) suggest that all households treat the public pension wealth as a collateral for an average MPC of 10%, ranging from around 7% in top percentile to 20% in a bottom percentile household. There are other interesting implications: if this model is correct, then households are very aware of their declared net wealth and a foggy level of public pension wealth. If so, then the power of the traditional Keynesian multiplier may be limited, i.e. the government transfers as e.g. 500+ may be regarded by such augmented-wealth-aware households as a part of a longer plan that considers also the paid social contributions.

Figure 15: Lorenz curve for the augmented wealth, infinite horizon, β - point



The average MPC for PL is about 10% (or 0.1) for models with uniform and heterogeneous preferences for liquid, net wealth and augmented wealth. The models suit well for the liquid wealth in an infinite horizon, while poorly for life-cycle model and net wealth, which to some extent confirms outcomes of Florczak and Jablonowski (2016). However, the MPC of 10% is on the higher end of literature review, with twice as high range in earlier studies. A perfect fit to the augmented wealth is a surprise and somehow confirm the thesis of this study. With respect to the range of the MPC provided in the literature review, the obtained results show rather high MPC for all types of wealth, i.e. 0.1 (10%). The MPC out of augmented wealth is the same high, which affects negatively the current private savings' rate. What is contrary to the literature findings, is a high share of HtM, i.e. over 60%, while Kaplan et al. (2014) on basis of HFCS 2nd wave show a bit over 40%. There are numerous methodological differences, two of which seems the most relevant: 1) a direct application by these Authors of answers from the survey, i.e. whether expenditures exceeded revenues taken as a benchmark for the model's fit, and 2) less precise model framework, since

the current study applies deciles of wealth and the endogenous grid point method to fit data to the model.

Table 5: Summary of the results for the MPC calculations

Type of assets	Liquid wealth	Net wealth	Augmented wealth
Discount factor type	β - point & (dist)	LCH β - point	β - point
Horizon	infinite	finite	infinite
Average MPC for all consumers is	0.099	0.145	0.099
Average MPC in the top percentile of W/Y is	0.068	0.088	0.068
Average MPC in the top decile of W/Y is	0.071	0.097	0.071
Average MPC in the top quintile of W/Y is	0.072	0.097	0.072
Average MPC in the second quintile of W/Y is	0.074	0.085	0.074
Average MPC in the middle quintile of W/Y is	0.074	0.079	0.074
Average MPC in the fourth quintile of W/Y is	0.076	0.100	0.076
Average MPC in the bottom quintile of W/Y is	0.199	0.365	0.199
Average MPC in the top percentile of y is	0.075	0.096	0.075
Average MPC in the top decile of y is	0.078	0.109	0.078
Average MPC in the top quintile of y is	0.084	0.116	0.084
Average MPC in the second quintile of y is	0.114	0.136	0.114
Average MPC in the middle quintile of y is	0.123	0.144	0.123
Average MPC in the fourth quintile of y is	0.082	0.153	0.082
Average MPC in the bottom quintile of y is	0.093	0.177	0.093
Average MPC for the employed is	0.097	0.119	0.097
Average MPC for the unemployed is	0.130 (0.131)	0.156	0.131
Average MPC for the pensioners	NaN	0.214	NaN
Of the population with the 1/3 highest MPCs...			
in the bottom wealth quintile,	61% (59%)	47%	61%
in the second wealth quintile,	28% (29%)	24%	28%
in the third wealth quintile,	7%	14%	7%
in the fourth wealth quintile,	2%	8%	2%
in the top wealth quintile,	1%	4%	1%

The average MPC for all consumers regarding the key question, i.e. whether the Polish households concentrate their MPC on the gross, and not the net income for their private saving rate – a perfect match with the augmented wealth distribution depicted above allows to think warmly about this thesis. If Polish households were regarded as the impatient, though, Ricardian agents, then such perfect match of the model MPC with the augmented wealth distribution seems a quite helpful explanation. They may

indeed adapt themselves for the net and public pension wealth as collateral for current consumption-driven life with a modest private saving rate.
There is a bunch of other potentially interesting points to derive: the MPC distribution according to wealth – to – income distributions are slightly different: between 7% and 20%. Therefore, the Keynesian multipliers should interact according to the above-mentioned distributions. Additionally, if translated to the redistributive normative economics, the Keynesian multiplier would be the highest in hand-to-mouth households (60% of all participating households). The variance of permanent income is much higher in Poland than in the US, therefore wealth inequalities in the life-cycle model should increase faster in Poland.

6 Conclusions

In spite of experts' warnings in terms of dropping future replacement rates the private savings' rate for Polish households stays low at around 1%. It may be partly due to their belief that the public pension are a collateral, which crowds out private savings and encourages the consumption. The study provides the estimation of so called augmented wealth, and, the related the MPC out of different types of wealth with the permanent income model and life cycle hypothesis (PILCH). The mean augmented wealth per household in PLN amounted to 705 thousands, consisting of public pension wealth of 388 thousands and net wealth of 415 thousands. Other words, the public pension component doubles the available lifetime net wealth. If households are aware of this structure, they may choose not to save privately, so the buffer stock savings motive may remain weak. As a support for this idea, the model perfectly matches the augmented wealth Lorenz curve. Average MPC out of all types of wealth reaches 10% on average, ranging 6-20%, with a negative MPC to wealth correlation, and 60% of hand-to-mouth households. The explanation for this perfect match may stem from a significant growth of wages (also public pension contributions wedge) that builds the public pension wealth. The Ricardian-type households may then mentally account the future pensions as a collateral (fiduciary money) for current high MPC, which may implicate crowding out of private savings in Poland. Therefore, a high labor wedge (social contributions) that builds public pensions NDC account may crowd out the private savings and spur current consumption.
As a point for a discussion one may ask if a perfect fit of the model to the augmented wealth data is suspicious? With regard to well settled in the literature aspect of crowding out of private savings by public savings – shall be of no surprise. This study, through the different sort of more dynamic PILCH mechanism attempts to confirm this argumentation. There might be several additional explanations for this result:
Retirement age 60/65 is taken as an assumption, so the distribution of permanent income across lifetime follows the demographics, which tremendously smoothens computational projections. If households have already changed their planned labor

activity length, that was not reflected in the microsimulation, then their MPC may be rational from the economic point of view. While the detailed information on the public pension wealth and expected replacement rate is regularly provided by the social insurance office to the contributors, which should limit the pension system literacy, but these surveyed pensions are higher than estimated in this study (see Figure 2 and 3). So how is it possible, that the households orientate their MPC on the actual (provided that our estimated are correct) and not self-declared pensions (under PFA1300 code in the Polish HFCS survey)? Let us assume that households believe that their replacement rates will be as high as expected in the survey. Then they overestimate their purchasing power during a retirement according to the results of this study. Consequently, a perfect fit to the augmented wealth unknown to the households is rational from their subjective perspective. Although, this means 10% MPC out of the estimated augmented wealth, but the households use for it their current disposable income, and may be convinced this is safe and rational, so they seem anchored to their subjective optimism on the lifetime MPC. With regard to the future research a more precise and complete administrative data would allow for less data manipulations and more robust outcomes. The policy makers could fine tune the financial literacy means to support planning of safer consumption limits.

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