Comparative Welfare Analysis of German Public Policies

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Abstract
This paper implements the comparative welfare analysis method Marginal Value of Public Funds (MVPF) developed by Hendren and Sprung-Keyser (2020) for historical public policies in Germany between 1990–2018 across the domains of taxation, job training, social insurance, and infrastructure. It contributes to the public finance literature by constructing among the first MVPF collections of public policies outside the United States, identifying key similarities and differences between MVPF results of the two nations, expanding the MVPF framework into the field of public infrastructure, and shedding light on the approach's particular weaknesses. German tax reforms generated positive and significant MVPFs; retirement and unemployment insurance policies yielded relatively small MVPFs, and child treatment scored the largest MVPF among health insurance programs.

A. INTRODUCTION

Resources spent on a government policy represent public investment. Compartmentalized decision-making on the distribution of the public budget enables each policymaker to strive for the most efficient allocation for their respective domain. The ramification of public economics literature reflects this nature—for each sub-sector, a particular branch of research is devoted to the continuous development of feasible levers for optimal policy. Since Mirrlees (1971), fiscal literature has focused on optimal tax schedule; several authors articulated the ratio of behavioral to mechanical costs in social insurance programs (e.g., Ye, 2018); infrastructure tends to lean heavily toward project-specific cost-benefit analyses; in education, economics contributes by shedding light on (optimizing) the economic returns of education.

These measures of optimal public policy embody distinguishable characteristics across domains, reflecting field-specific tradition and capturing macroeconomic trends that affected some domains more severely than others. As a result, an adequate theoretical concept is necessary to build a reliable comparison of policies across these domains.

One plausible solution would be to implement some version of conventional cost-benefit analysis. For example, Heckman et al.'s (2010) benefit-cost ratio weighs a policy's net social benefits against its costs. As noted by Hendren and Sprung-Keyser (henceforth HSK, 2020), however, there is a particular caveat: For policies that trigger considerable behavioral responses affecting the government's budget, its capacity to express fiscal externalities is less than perfectly precise.

On the other hand, HSK's marginal value of public funds (MVPF) is defined as the ratio of beneficiaries' willingness to pay to the government's net costs. Here, because behavioral responses are incorporated as part of the net costs, any policy that generates positive fiscal externalities more significant than its initial expenditure merits, by definition, an MVPF value

of infinity—a sharp indication of the policy's enforceability.

Moreover, traditional cost-benefit analyses offer limited possibilities for researchers to address social welfare weights, whereas the MVPF framework incorporates these inherently (HSK, 2020). This is a corollary from the MVPF's (aggregate) social welfare definition as a weighted sum of individual utilities. Where other cost-benefit methods require consideration of deadweight loss/excess burden, the MVPF framework 'closes the budget constraint' by directly juxtaposing the welfare impacts of multiple policies—these welfare impacts must consist of each policy's MVPF value and its respective social weight. In this way, the welfare interpretation in the MVPF framework facilitates, even necessitates, a more holistic examination that considers how efficiently a policy improves welfare and whose welfare it improves[1].

To the author's knowledge, among the time of its writing (end 2020-early 2021), this work constitutes the earliest attempt to perform the MVPF method as defined in HSK (2020) directly for historical public policies outside the United States. Its collection spans four major policy fields. Taxation is a natural inclusion given the central stage it has garnered among optimal policy literature. Moreover, taxes are Germany's primary government revenue source, constituting 88% of the nation's total public income in 2020 (Statistisches Bundesamt, 2021).

The bridging between education, active labour market programs, and job training is incorporated as the second field. The social insurance system is covered next, recognising its history[2] and diversity: Germany has separate health, retirement, and unemployment insurance systems. Lastly, public investment in infrastructure is one of the significant public spending areas not covered in HSK's (2020) original MVPF library—hence a particular contribution of the present paper.

MVPF values were successfully constructed for eighteen German public policies implemented across these four domains between 1990–2018. Top marginal tax rate reforms and children's health insurance programs display generally positive and large MVPFs. In particular, the 1990 tax cut was found to have generated negative net government cost and merits subsequently an MVPF of ∞.

At the other end of the scale, short-term job training and reforms in retirement insurance show relatively small MVPFs. Further analysis highlighted several critical similarities with HSK's (2020) results for the US, e.g., the decreasing MVPF trend of tax reforms over time. On the other hand, contrasting evidence between the two countries is present for other aspects, such as the single-vs-married-household ratio of MVPF tax policies.

The remainder of this paper is organized as follows. Section 2 provides theoretical background. Section 3 details each MVPF construction. Section 4 discusses the main results. Section 5 concludes and illuminates future research avenues.

B. LITERATURE REVIEW

If one digs as far down as the bottom layer of the MVPF framework's concept, one would be well-advised to trace the definition of empirical welfare analysis back to its roots: the notion of welfare economics and the subsequently developed welfare paradigms. As early as a century ago, in The Economics of Welfare (1920), Pigou identified a central aim of welfare economics: to "study certain important groups of causes that affect economic welfare in actual modern societies" (p. 11). While exact proxies such as consumer surplus have generally been accepted for evaluating individual economic

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[1] In the tax literature, this is also known as taking into account the bearer of the policy's incidence.

[2] In 1883, Chancellor Otto von Bismarck introduced what became the world's first mandatory health insurance (see, e.g., Hassenteufel & Palier, 2007).

welfare, measuring aggregate welfare entails several extra problems (see Slesnick, 1998 for review).

The marginal value of public funds is the latest in a list of welfare parameters in the public finance literature that attempt to single out the value of a policy-induced (marginal) change in public revenue/expenditure through some form of benefit-cost ratio. How the MVPF theoretically differs from and ultimately fares against its direct predecessors will be discussed below. First, some details on the MVPF itself, all of which directly cite the definitions in HSK (2020): it is defined as the ratio of aggregate willingness to pay (of the policy's beneficiaries) to the governmental net cost; it can be equivalently interpreted as the shadow price of raising revenue from the corresponding beneficiaries of the program expenditure; lastly but crucially, its design allows it to incorporate causal effects of policy changes obtained from increasingly rigorous toolbox of the empirical economics. In other words, the MVPF framework requires the net cost to the government to incorporate, on top of the actual government expenditure on the policy (mechanical cost), all behavioral responses from the beneficiaries (externalities) induced by the policy. These externalities are, in turn, estimated through the increasingly available and ideally causal empirical findings. Below is MVPF equation that explain its definition (HSK (2020).

$$\text{MVPF} = \frac{\text{Beneficiaries' Willingness to Pay}}{\text{Net Cost to the Government}}$$

In his seminal work introduced earlier, Pigou (1920) acknowledged the inevitability of considering social welfare weights, stating, "If income is transferred from rich persons to poor persons, the proportion in which different sorts of goods and services are provided will be changed" (p. 89). This crucial notion of incidence-based externalities remains relevant in today's public economics and sets the stage for a specific MVPF advantage against other welfare methods.

Specifically, the MVPF as a welfare method is most related in the public finance literature to the marginal cost of public funds and excess burden approaches.

In the marginal cost of public funds framework, one calculates the benefits of a policy and divides it by the costs needed to incur government revenue, which is the size of the initial expenditure (see, e.g., Gahvari, 2006). These costs, in turn, consist of the actual spending for the policy and a proportional cost premium. The latter is known in the literature as the distortionary costs of taxation and is commonly assumed to be between 30–50% (see, e.g., Saez et al., 2012). The marginal cost of public funds should, conceptually, correspond heterogeneously to the group of individuals selected as program recipients. In other words, the established approach of applying a single, convention-based multiplier to the spending budget is only limitedly—only when considering policies for the same recipient group—valid (cf. Hendren and Sprung-Keyser, 2022). The MVPF approach, on the other hand, can facilitate direct comparisons of policies across different recipient groups due to its inclusion of social welfare weights in its calculation.

Another strand of optimal taxation literature concerns mainly the marginal deadweight loss—also known as marginal excess burden—of a policy. While the marginal cost of public funds measures the welfare cost of exacting tax on beneficiaries, the marginal deadweight loss accounts for the expected additional government revenue by replacing distortionary taxes with a particular form of lump-sum compensation (Auerbach & Hines, 2002).

However, lump-sum transfers are a relatively rare policy instrument. Moreover, calculating the optimal size of these Hicksian compensating variations is a highly challenging empirical task because they are entangled with individual consumer utility functions—primarily private information. The MVPF approach alleviates this problem by not having to close the

budget constraint through hypothetical lump-sum taxes, forming hypothetical budget-neutral policies by directly comparing MVPF of two different policies (Finkelstein & Hendren, 2020).

The distinctive aspects of MVPF are salient when compared to the marginal cost of public funds and marginal excess burden frameworks because these two methods are theoretically closest to MVPF. Nevertheless, since MVPF can be used across policy domains and is not confined to the taxation field, it is also a relevant task to get a glimpse of policy evaluation tools in other domains.

In Germany's education landscape, a group of authors mandated by the Federal Ministry of Education and Research periodically publish a comprehensive report that details multiple aspects of the education system (latest edition: Autorengruppe Bildungsberichterstattung, 2020). Findings on the effects of and rate of returns to education are described using descriptive statistics and some regression models, where special attention is paid to measuring non-monetary gains to the beneficiaries of education, such as political participation and healthier lifestyles. However, specific studies on the causal effects of policy changes or education reforms are still limited.

Public investment in the construction or maintenance of public infrastructure possesses arguably the vastest array of cost-benefit studies among all public domains. Government expenditures in this area are generally characterized by the needs for most or all: large budget, long-term commitment, and tactful consideration of market equilibrium in the presence of public-private partnerships or outsourcing contracts. An example from digital infrastructure shows the interplay of opposite welfare effects in early 21st century Germany: The competition between cable TV and broadband service prevented monopoly from either party and, in so doing, reduced society's potential deadweight loss, yet the sheer size of the initial investment in the parallel services

ultimately managed to drag the overall welfare effect down to negative (Höffler, 2007). However, this conclusion appears subject to the adopted welfare calculation method: the welfare effect was assumed to be the sum of consumer and producer surpluses subtracted by capital expenditure. Whether and within which boundaries this single approach can come to terms with MVPF's general concept remains the subject of discussions in the subsequent chapters.

In short, welfare analysis has, up to now, been utilized at inconsistent degrees across subfields of public economics—endemic conventions and practices abound—and German public economics literature appears no exception. This paper is the first attempt to unify welfare methods across German public policy domains using the MVPF framework.

C. RESEARCH METHODS
DATA COLLECTION AND TRANSLATION INTO MVPF

Overall, this paper's collection comprises 23 empirical studies containing ideally causal welfare effects of 18 German public policies spanning 28 years from 1990 to 2018. This section recounts the process of gathering findings(s) from each of these studies and their subsequent translation into the marginal value of public funds.

In German taxes, the record of formerly executed reforms is straightforward. Building such a list is considerably less complicated for other policy domains. This is especially true for the fields of education and infrastructure, where policy levers are available at various levels, and the number of programs is myriad. Though the selection ultimately undergoes established criteria, the collecting phase inevitably faces several limitations. First, reliance on existing studies with identified causal policy effects leads to the exclusion of a relatively large number of studies that considered welfare consequences but did not incorporate causal design.

Furthermore, those who did implement causal strategies are available at partially contrasting degrees of aggregation, such as school-level programs in education or national-level infrastructure deals. Incorporating fiscal externalities or behavioral responses is inevitably subject to the varying availability of existing empirical estimates in each policy domain[3]. The search procedure was relatively exploratory: the publication databases Google Scholar, Elsevier's Scopus, and Clarivate's Web of Science were explored at various points, albeit with records of neither the exact query strings nor their execution order.

1. Tax Policies

This paper focuses on top marginal income tax rate policies, for which Germany's progressive income tax schedule enters the so-called proportional zone and for which MVPF calculations can focus on a singular, constant marginal tax rate. Moreover, because top earners generate the heaviest response to tax rate reforms, most observed fiscal externalities can be traced back to the upper tail of income distribution (Saez et al., 2012). For Germany, this axiom is supported by empirical results (Schmidt & Müller, 2012).

As we now turn to the MVPF calculation, recall that the two main components of MVPF are willingness to pay and net cost. Because a taxpayer values a 1-unit increase/decrease to her net income induced by a marginal tax rate reform at exactly one monetary unit[4], measuring willingness to pay for a marginal change in the top marginal tax rate is straightforward (HSK, 2020). The net cost of a marginal change in top marginal tax rate reform is given by equation below (Diamond & Saez (2011).

$$1 - \frac{\tau}{1-\tau} * \alpha * \text{ETI} \, ,$$

where τ denotes the tax rate, α the Pareto parameter of the income distribution, and ETI the elasticity of taxable income, respectively. For deriving this result, see Diamond & Saez (2011).

The Pareto parameter of income distribution α for the following calculations is derived from the best available estimate for Germany, namely the estimate by Atkinson et al. (2011): The inverted Pareto-Lorenz coefficient β is estimated at 2.49, giving the Pareto parameter $\alpha = \beta / (\beta - 1) = 1.6711$.

Against Germany's 1990 tax reform, where the top marginal tax rate was reduced from 56% to 53%, Schellhorn and Gottfried (2004) found an estimated ETI of 0.58. Recall that for a top marginal tax rate, a fiscal externality is given by

$$\text{FE} = - \frac{\tau}{1-\tau} * \alpha * \text{ETI} \, .$$

Because the top marginal tax rate before the reform was 56%, we arrived at

$$\text{FE}_{\text{Pre}} = - \frac{0.56}{1 - 0.56} * 1.67 * 0.58 = -1.233$$

Analogously, for the 53% post-reform top tax rate,

$$\text{FE}_{\text{Post}} = - \frac{0.53}{1 - 0.53} * 1.67 * 0.58 = -1.092$$

The overall FE is the average between FE_{Pre} and FE_{Post} and is, in this case

$$\text{FE} = \frac{\text{FE}_{\text{Pre}} + \text{FE}_{\text{Post}}}{2} = -1.163$$

The net cost for this marginal tax reform is given by

$$\text{Net cost} = 1 + \text{FE} = -0.163$$

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[3] Among the ultimately selected policy domains, fiscal externalities are covered to the full extent in tax reforms, unemployment insurance policies, and retirement insurance programs; partially covered in active labor market programs; and not covered in the infrastructure domain.

[4] Recent literature addresses policy beneficiaries with such behavior as infra-marginal recipients (e.g., Finkelstein & Hendren, 2020).

Table 1. MVPF of Germany's top tax rate reforms decomposed. Author's calculation

Tax reform	ETI estimate source	ETI estimation method	α	τ pre	τ post	ETI	FE pre	FE post	FE	MVPF
1990 reform	(Schellhorn & Gottfried, 2004)	Baden-Württemberg only	1.67	56%	53%	0.581	−1.233	−1.092	−1.163	∞
2004 reform	(Gottfried & Witczak, 2009)	Income control	1.67	48.5%	45%	0.435	−0.684	−0.594	−0.639	2.772
2004 reform	(Gottfried & Witczak, 2009)	Rent/lease control	1.67	48.5%	45%	0.555	−0.873	−0.758	−0.816	5.423
2004 reform	(Schmidt & Müller, 2012)	Total	1.67	48.5%	45%	0.321	−0.505	−0.439	−0.472	1.893
2004 reform	(Schmidt & Müller, 2012)	Income >€50,000 only	1.67	48.5%	45%	0.469	−0.738	−0.641	−0.689	3.218
2004 reform	(Schmidt & Müller, 2012)	Married household only	1.67	48.5%	45%	0.471	−0.741	−0.644	−0.692	3.248
2004 reform	(Werdt, 2015)	Total	1.67	48.5%	45%	0.36	−0.566	−0.492	−0.529	2.123
2004 reform	(Werdt, 2015)	Married household only	1.67	48.5%	45%	0.44	−0.692	−0.601	−0.647	2.830
2004 reform	(Doerrenberg et al., 2017)	1-year difference	1.67	48.5%	45%	0.675	−1.062	−0.922	−0.992	124.073
2004 reform	(Doerrenberg et al., 2017)	2-year difference	1.67	48.5%	45%	0.548	−1.032	−0.749	−0.890	9.122
2005 reform	(Schmidt & Müller, 2012)	Total	1.67	45%	42%	0.321	−0.439	−0.388	−0.413	1.705
2005 reform	(Schmidt & Müller, 2012)	Income >€50,000 only	1.67	45%	42%	0.469	−0.641	−0.567	−0.604	2.525
2005 reform	(Schmidt & Müller, 2012)	Married household only	1.67	45%	42%	0.471	−0.644	−0.570	−0.607	2.542
2005 reform	(Werdt, 2015)	Total	1.67	45%	42%	0.36	−0.492	−0.435	−0.464	1.864
2005 reform	(Werdt, 2015)	Married household only	1.67	45%	42%	0.44	−0.601	−0.532	−0.567	2.308
2005 reform	(Doerrenberg et al., 2017)	1-year difference	1.67	45%	42%	0.675	−0.922	−0.816	−0.869	7.651
2005 reform	(Doerrenberg et al., 2017)	2-year difference	1.67	45%	42%	0.548	−0.749	−0.663	−0.706	3.398
2007 reform	(Doerrenberg et al., 2017)	1-year difference	1.67	42%	45%	0.675	−0.816	−0.922	−0.869	7.651
2007 reform	(Doerrenberg et al., 2017)	2-year difference	1.67	42%	45%	0.548	−0.663	−0.749	−0.706	3.398

Source: Author's calculation

Recall that a policy is defined to have an infinite MVPF whenever its net cost takes a negative value. In other words, Germany's 1990 top marginal tax reform ideally paid for itself due to positive fiscal externalities, ultimately overcompensating the initial reduction in tax revenue.

Germany's top marginal tax rate underwent further cuts in 2004 and 2005 successively, while 2007 saw the introduction of an additional wealth tax rate (Reichensteuersatz). MVPF derivations are analogous and not detailed due to space limitations. Table 1 recapitulates the results.

2. Job Training
One Euro Job program

First implemented by the German government in 2005–2007, the One Euro Job program offers auxiliary jobs for recipients of unemployment benefits with a dismal prospect of re-entering the workforce. Using administrative data from the Institute for Employment Research (IAB), Harrer and

Stockinger (2019) evaluated the program's effects after its reform in 2012. They discovered an average monthly cost per participant of €459, of which €124 is a cash transfer to the participant as a lump-sum expense allowance.

Because participation in this program does not automatically impart ineligibility for further or re-subscription to standard unemployment benefits, expenditure-induced cost reduction is not spared. Furthermore, since the transferred lump-sum allowance is, on average, (€1,488 yearly), far below the annual tax-exempt amount (€8,130 as of 2013), the net cost does not need to incorporate tax externalities.

On the other side of the scale, willingness to pay for the One Euro Job program combines received work compensation and post-program earnings changes. Harrer and Stockinger (2019) reported a negative effect on participants' earnings for three years after the program's start, ranging between −€330 to −€110 for residents of former West Germany states and −€220 for former East Germany states. Below is the

corresponding MVPF calculation based on author's construction

$$\text{MVPF} = $$

$$\frac{\text{monthly allowance} \left[\frac{\text{€}}{\text{month}}\right] \times \text{duration [months]} - \text{annual earnings loss [€]}}{\text{monthly program cost} \left[\frac{\text{€}}{\text{month}}\right] \times \text{duration [months]}}$$

Evaluating the One Euro Job program at the end of the 4.5-month average participation duration and assuming the case scenario of earnings loss as reported by Harrer and Stockinger (2019) yields the following MVPF value:

$$\text{MVPF} = \frac{\text{€}124 \times 4.5 - \text{€}330 \times \frac{4.5}{12}}{\text{€}459 \times 4.5} = 0.21$$

Correspondingly, calculating for program participation with maximum duration (one year) and assuming a more optimistic earnings effect (in the middle of the range estimated by Harrer and Stockinger, 2019) gives us:

$$\text{MVPF} = \frac{\text{€}124 \times 12 - \text{€}220}{\text{€}459 \times 12} = 0.23$$

Note that Harrer and Stockinger (2019) did not specify substitute revenue source (if any) after program exit, meaning the only changed MVPF component if one were to extend the evaluation period unto their 3-year timeframe would be multiplicated yearly earnings loss. For example, assuming worst-case earnings loss projected over three years, the MVPF for maximum participation would be 0.09, and the MVPF for average participation would be –0.21; negative MVPFs remained, for the most part, undiscussed in HSK (2020).

Short, long, and re-trainings

Lechner et al. (2011) utilized multiple administrative datasets to evaluate publicly sponsored training programs between 1975 and 1997. Retraining programs, which last on average 21 months and award successful participants with professional degrees in a field different from their current one, cost the government an average €20,983 per participant (this figure includes seven months of monthly financial support to the participant). Despite initially affecting participants' income negatively (lock-in effect), retraining programs reach the break-even point after, on average, five years and eventually return the most significant positive earnings gain (Lechner et al., 2011 specified the cumulated surplus after eight years: €37,000). Thus, retraining programs have, on average, a lower MVPF bound of 1.76. On the other hand, the willingness to pay expect to increase when the seven months of income support mentioned above are counted in—which, in turn, were part of the €1,200 monthly cost but at an unspecified ratio to the program cost. Monthly €1000 compensation, for example, would have inflated this MVPF to 2.096.

Short training refers to job training programs finishing after less than or at most six months and generally display a shorter lock-in effect and lower monthly costs. Participating individuals achieve positive net gain after, on average, one year and accumulate an average of €42,000 earnings surplus eight years in the future. In contrast, the cost to the government is estimated at €4,439 per month (including no additional cost for accumulated unemployment). These figures assemble an MVPF of 9.46 for government-supported short training programs.

Publicly financed job training is also the subject of Bernhard's (2016) investigation, where he documented a similarly short lock-in effect for short-term training programs, with participants experiencing an average €274 reduction to their monthly income for the first six months but benefiting from €286 more income per month for the rest of the 104-month-long observation period. Moreover, this study use Lechner et al.'s (2011) cost estimate and align the observation period with theirs (8 years) for more accurate comparability, arriving at :

$$\text{MVPF} = \frac{-\text{€}274 \times 6 + \text{€}286 \times 90}{\text{€}4,439} = 5.428$$

For long-term training, Bernhard (2016) reported an average €340 monthly loss of income for the first two years, after which an average participant benefits from a €416 monthly earnings premium. While Bernhard (2016) assigned the label long-term for all observed training lasting more than six months, Lechner et al. (2011) distinguished them further into retraining and long training. Bernhard (2016) explicitly related his findings for long-term training with Lechner et al.'s (2011) accounts on retraining programs. This is the reason the study chose retraining's €20,983 average per participant cost for the MVPF calculation:

$$MVPF = \frac{-€340 \times 24 + €416 \times 72}{€20,983} = 1.039$$

As a robustness check, the study shows how using a long training cost per participant of €9,930 instead affects the calculation,

$$MVPF = \frac{-€340 \times 24 + €416 \times 72}{€9,930} = 2.944$$

3. Health Insurance

The following German health insurance policy calculation is an example of combining empirical findings from multiple sources to achieve a single MVPF. Hajek et al. (2020) reported an average monthly willingness to pay €240 for health insurance, representing approximately 14% of Germany's average monthly household income. German senior citizens display a slightly higher monthly willingness to pay for health insurance at €261, constituting 18% of their €1,433 average disposable income (Bock et al., 2016).

Federal Statistical Office's official health system databank (Gesundheitsberichterstattung des Bundes, 2021) documented an annual average government expenditure per public-health-insured individual of €2,057 in 2010, €2,090 in 2011 and €2,355 in 2014. Moreover, the study combines the latter two with Hajek et

al.'s (2020) willingness-to-pay estimate to form an $MVPF_{2011}$ of $\frac{€240 \times 12}{€2,090} = 1.378$, $MVPF_{2014}$ of $\frac{€240 \times 12}{€2,355} = 1.223$, and $MVPF_{Average}$ of $\frac{€240 \times 12}{€2,} = 1.296$. For seniors, their higher average willingness to pay is reflected in an $MVPF_{Seniors}$ of $\frac{€261 \times 12}{€2,057} = 1.523$.

"Join the Healthy Boat" is a health promotion program conducted as a randomized controlled trial among primary schools in the German state of Baden-Württemberg, focusing on obesity prevention. To motivate the cause, obesity has been among the most costly diseases with a mean total lifetime cost of nearly €150,000 per child (Hamilton et al., 2018).

Parents' mean willingness to pay for the program was reported at €335.52 p.a. (Lauer et al., 2020). Teacher's seminars, vocational training sessions and the accompanying costs for their travel accommodation and expenses to these training added to a yearly total of €36,506.41, which is €25.04 for each child annually (Kesztyüs et al. 2017). Combining these two estimates gives an MVPF of 13.3994.

For the same program, Kesztyüs et al. (2014) found an average yearly willingness to pay of €276.48. Even with a stricter assumption of counting in zero WTPs for non-participating parents, the average willingness to pay at €123.24 remains far above the annual costs. The marginal value of public funds in these cases is 11.0415 and 4.9217.

4. Unemployment Insurance

Several authors (e.g., Schmieder & von Wachter, 2017; Ye, 2018) examined the ratio between behavioral and mechanical costs (henceforth BC, MC) induced by an unemployment insurance policy. The rationale for adopting the BC/MC ratio in the unemployment insurance context can be compared to the motives behind the success of ETI as a measure of fiscal externalities due to a given tax change.

A key challenge in designing optimal unemployment insurance benefit programs is minimizing what the literature calls disincentive cost. Correspondingly, appropriate evaluation of such a policy must strongly depend on the success with which it strikes a balance between providing for the unemployed and keeping negative labor incentives scant (Schmieder & von Wachter, 2016).

In the language of MVPF, the mechanical cost is the amount the government spends to fund the program. In contrast, behavioral cost captures additional costs to the government due to behavioral responses of the beneficiaries toward the policy, a concept like fiscal externality.

Recall the earlier established notion that for a marginal policy change, willingness to pay is defined as equivalent to mechanical cost, assuming the envelope theorem holds (following this assumption, any change to the individual's budget constraint is attributable to the policy change, and not to changes in labor effort). In other words, the MVPF can be equivalently defined as equation below (Based on Ye (2018).[5]

$$\text{MVPF} = \frac{\text{Mechanical cost}}{\text{Mechanical cost} + \text{Behavioral cost}}$$

Normalizing for mechanical cost gives an equivalent that expressed expressed in BC/MC ratio Based on Ye (2018), normalized definition as follows

$$\text{MVPF} = \frac{1}{1 + \frac{\text{Behavioral cost}}{\text{Mechanical cost}}}$$

1992 reform

In 1992, Germany increased pension benefits for low-income workers as part of the Pension Reform Act. Although, at first glance, this policy may seem to fit into the landscape of retirement insurance completely, a closer look at

retirement entry schemes of older German workers reveals another well-trodden path of entering retirement through periods of unemployment. The behavioral response to the policy, crucial to the MVPF concept, must, therefore, be incorporated into the efforts to mitigate excessive unemployment levels.

Ye (2018) evaluated this 1992 reform and found a behavioral-to-mechanical cost ratio 0.3. Translating this estimate into MVPF thus gives

$$\text{MVPF} = \frac{1}{1 + 0.3} = 0.769$$

It is to be noted that behavioral externalities are assumed to affect both income tax and unemployment insurance payroll, as opposed to solely impacting the unemployment insurance payroll. The former assumption is equivalent to MVPF's paradigm of incorporating comprehensive fiscal externalities.

1997 reform

Germany saw another reform on its unemployment insurance near the turn of the millennium. In 1997, designed to minimize the disincentive cost of unemployment benefits further, the eligibility age threshold for unemployment benefits was increased while its duration was reduced (Schmieder et al., 2012). Using regression discontinuity design, Schmieder and von Wachter (2016) calculated behavioral cost for each additional $1 transferred at three age cut-offs. These values are equivalent to the BC/MC ratio introduced earlier, normalized to $1 mechanical cost.

Table 2. MVPF of Germany's 1997 Unemployment Insurance Reform

Age discontinuity	UI extension	BC/MC ratio	MVPF
42	12–18 months	0.41	0.7092
44	18–22 months	0.38	0.7246
59	22–26 months	0.42	0.7042

The author's calculation is based on Schiefer and von Wachter (2016).

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[5] Relatedly, Ye (2018, p. 33) noted that marginal cost of efficiency funds can be expressed as $1 - \frac{BC}{BC+MC}$.

5. Retirement And Disability Insurance

Foundations for calculating MVPF in the context of retirement and disability insurance were provided by HSK (2020) in their calculations for the United States' disability insurance and Supplemental Security Income programs. In Germany, disability insurance is generally discussed in combination with retirement insurance. Moreover, a comprehensive review of the historical development of German retirement and disability insurance is given in Boersch-Supan and Juerges (2011) (see also Boersch-Supan & Schnabel, 1998). In the existing literature, studies that report empirical findings on the welfare effects of German retirement and disability insurance policy changes have employed different strategies to estimate individual welfare gain or loss.

1992: early retirement disincentive

Germany passed 1992 a retirement insurance reform that regulated a monthly 0.3% deduction (times the number of months difference between retirement entry and the threshold age 65) for early retirees. Lüthen (2016) reported for 2004–2011 an average of €23,000 decline in the inflation-adjusted sum of received pension. On the other hand, Bönke et al. (2018) estimated individual welfare loss through compensating variation, viz., the estimated size of extra income an average early retiree would have earned had the policy not taken place.

While individual early retirees suffer welfare losses due to the reform, did it benefit the general society (and if yes, in what magnitude)? Indeed, evidence showed that more workers were induced to stay in the active labour market until the designated retirement entry age (Bönke et al., 2018). Combining surpluses from retributed pension wealth and increases in pension contributions and tax payments from early retirees, Bönke et al. (2018) found a total

net public return of over €7 billion or an average of €18,309 per retiree.

Germany's introduction of early retirement disincentives in 1992 represents a unique if not contrasting, MVPF calculation exercise compared to the existing blueprint and examples. Here, the government does not exert any policy expenditure and mainly receives additional returns retributed from early retirees. In this case, the "willingness to pay" or "benefit" to the beneficiaries should be represented by early retirees' estimated earnings loss or their compensating variation. The net cost to the government would then be the estimated net public returns of the disincentive policy. This perspective would yield an MVPF of $\frac{-€6,274}{-€18,309}$ = 0.343 when Bönke et al.'s (2018) compensating variation is used as a proxy for willingness to pay. Using Lüthen's (2016) estimate of income loss instead[6], the study obtain an MVPF of $\frac{-€17,500}{-€18,309}$ = 0.956.

Moreover, the findings suggest two alternatives of interpretation. First, the negative numerator of the equation means the MVPF can be interpreted as the extent to which the policymaker is willing to concede the welfare loss of the early retirees. This would align with the more extensive the estimated individual earnings loss is, the larger its corresponding MVPF value. One caveat to this interpretation alternative is the degree of carefulness with which these MVPFs must later be compared to those of other 'normal' cases (cases where willingness to pay is cheerful). It is solely with vigilant regard to the social weights, i.e., the policy incidence, that these MVPFs can be juxtaposed alongside the 'regular' MVPFs.

The second possibility of interpreting the MVPF results above is strictly adhering to HSK's (2020) adage of defining MVPF as infinite in all negative denominators cases. In a sense, the

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[6] Lüthen's (2016) specified his estimates of income loss for each gender. The value used for MVPF calculation here is the average income loss of both genders.

circumstances would speak for HSK's (2020) arguments for an infinite MVPF: The positive net public returns could mean the disincentive policy 'perfectly pays for itself', or in other words, the reform represented a Pareto improvement. On the other hand, the examples they provided throughout their original library that had indeed negative costs were confined to public policies that generate positive benefits to its beneficiaries—a feature the 1992 German pension reform cannot claim to own. This is why the second alternative interpretation is not entirely unproblematic either.

Furthermore, there is some reconsideration on whom the benefits of introducing early retirement disincentives apply. Once accrued, the gained net public returns can be administratively redistributed, stabilizing the Statutory Pension Scheme. From this perspective, society (or at least those within the public pension scheme) merits the place as the policy's beneficiaries. With that in mind, the net public returns can be readdressed as MVPF's numerator at the expense of the acknowledged welfare loss of the early retirees. To be concrete, using Bönke et al.'s (2018) estimates of net public returns and compensating variation would yield, in this case, an MVPF of 2.896.

2014: retirement at 63

Germany started in 2014 granting exceptions to the aforementioned early retirement income deduction, namely, individuals who have contributed to the pension scheme for at least 45 years were then given the option to enter retirement at age 63, four years earlier than the standard threshold. Krolage (2020) reported a total yearly increase in transferred pension benefits due to new retirements at 63 and accompanying opportunity costs to the government in the form of foregone social contributions and tax payments. While technically MVPF refers to individual willingness to pay and net cost, reformulating the aggregate values is unnecessary because both of Krolage's

estimates already refer to the same group of beneficiaries. MVPF of exempting long-term-contributors from early retirement deductions is, thus, $\frac{€0.82 \text{ billion}}{€1.51 \text{ billion}} = 0.54$ for 2014 and respectively for 2015, 2016, and 2017 $\frac{2.31}{4.42} = 0.52$, $\frac{3.51}{6.64} = 0.53$, and $\frac{3.74}{7.26} = 0.52$.

Toward 2040: double threshold

Germany's continually increasing population presents problems, not least regarding retirement expenditures. The rising old-age dependency ratio (the population's share of seniors) and ever-expanding life expectancy threaten to overburden future generations' fiscal obligations. The German government attempted 2018 a countermeasure to the bleak macroeconomic outlook in the form of a so-called double threshold: the pension contribution rate is to be held at most 20%, and the benefit ratio (ratio of average pension to average wage) should not fall under 48% (Börsch-Supan & Rausch, 2018). Baksa et al. (2020) projected the welfare effects of enacting and extending the policy until 2040. For recipients of pension benefits, willingness to pay is reflected through the government's pension expenditure, which was previously used when calculating MVPF of the 2014 reform. Also, Baksa et al. (2020) utilized the public debt-to-GDP ratio as a proxy for estimating the double threshold's net cost to the government to incorporate behavioural responses such as changes in tax revenue. The research calculates benefit and net cost components as different to estimates in the scenario without a double threshold:

$$\text{MVPF} = \frac{3.1\% - 1.9\%}{157.5\% - 100.3\%} = 0.021$$

6. Infrastructure
1994 regional railway reform

In Germany, regional passenger railway service expanded by 28% between 1994 and 2004. The Federal budget for overall regional

passenger railway services subsidies amounted in 2004 to €6.8 billion. To shed light solely on the surface of this service growth, however, would neglect the endogeneity issue in the sense that more substantial investment for mass transportation may have been indicative of regions anticipating growing traffic volume—and subsequently public environmental concern—in the first place (Lalive et al., 2013).

To curb this problem, the calculation of MVPF focuses on the welfare effects of the 1994 regional railway passenger service reform. Assuming a proportional cost increase, costs of €1.9 billion are attributed to the 28% expansion of regional railway service between 1994–2004. The benefit to society was estimated at €3.39 billion, measured through a reduction in air pollution and prevented infant deaths (Lalive et al., 2013). Taken together, these yield an MVPF of 1.7842.

D. RESULTS AND DISCUSSION

Among 18 public policies listed, the double threshold for retirement insurance enacted in 2018 had the lowest MVPF, while the highest belongs to the 1990 top marginal tax rate reform. Leaving the latter out yields for the rest: median = 1.22, mean = 2.67, and standard deviation = 3.41.

The 1990 top marginal tax rate reform yields negative net cost and thus infinite MVPF. As HSK (2020) noted, an infinite MVPF value in the context of marginal tax rate reform indicates that the pre-reform tax rate lay "on the wrong side of the Laffer curve". This argument would further support the suitability of the tax reform.

None of the three subsequent tax reforms was found to generate negative net cost to the government, but all yielded positive, more significant than 1 MVPF value. Therefore, extending favorable welfare verdicts to the 2004, 2005, and 2007 reforms would be justifiable.

However, it is also worth noting that for each estimation strategy (i.e., comparing only MVPF values with the same superscript in the table), the reforms appear to display a trend of decreasing MVPF over time. For example, based on Schmidt and Müller's (2012) estimate for the elasticity of taxable income among married German households, the MVPF of the 2005 reform (3.25) was lower than its 2004 counterpart (2.54).

A notable exception to this trend is the 2007 reform, for which the only available ETI estimate was that of Doerrenberg et al. (2017), whose shorter-term estimation strategy yielded consistently higher estimates[7]. A plausible explanation for this anomaly can be derived from Schmidt and Müller's (2012) robustness check, which found more excellent elasticity using 1- and 2-year-difference specifications instead of their preferred specification's 3-year difference. Schmidt and Müller further noted that this was in line with the more significant ETI estimates (0.58 and 0.44, respectively) of their two immediate predecessors (Gottfried & Witczak, 2009; Schellhorn & Gottfried, 2004), who both employed 2-year difference. ETI estimates with a 3-year difference model align better with Saez et al.'s (2012) summarizing literature, which concluded that plausible estimates should be within the range of 0.12–0.40. In other words, current evidence would seem to caution against using too compact a period between the pre-and post-reform observations. Schmidt and Müller argue for short-term behavioural responses such as income shifting within adjacent years as one of the plausible reasons why shorter time lags yield more fantastic elasticity results.

Interestingly, HSK (2020) documented a similarly downward trend for top marginal tax reforms in the United States during 1981–2013. The top marginal tax reform in 1981 resulted in an infinite MVPF, whereas the most recent

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[7] MVPFs for 2004 and 2005 reforms based on their ETI estimate are also considerably higher than the ones based on Schmidt and Müller's (2012) or Werdt's (2015).

reforms in 2001 and 2013 yielded MVPF of 1.37 and 1.16, respectively.

Table 3. Cited studies and MVPF of policies—author's calculation.

Policy	Cited Study(s)	MVPF
Top taxes		
Top tax 1990	Schellhorn & Gottfried (2004)	∞
Top tax 2004[a]	Gottfried & Witczak (2009)	2.77
Top tax 2004[b]	Gottfried & Witczak (2009)	5.42
Top tax 2004	Schmidt & Müller (2012)	1.89
Top tax 2004[c]	Schmidt & Müller (2012)	3.22
Top tax 2004[d]	Schmidt & Müller (2012)	3.25
Top tax 2004	Werdt (2015)	2.12
Top tax 2004[d]	Werdt (2015)	2.83
Top tax 2004[e]	Doerrenberg et al. (2017)	9.12
2004 average		3.83
Top tax 2005	Schmidt & Müller (2012)	1.70
Top tax 2005[c]	Schmidt & Müller (2012)	2.53
Top tax 2005[d]	Schmidt & Müller (2012)	2.54
Top tax 2005	Werdt (2015)	1.86
Top tax 2005[d]	Werdt (2015)	2.31
Top tax 2005[e]	Doerrenberg et al. (2017)	3.40
Top tax 2005[f]	Doerrenberg et al. (2017)	7.65
2005 average		3.14
Top tax 2007[e]	Doerrenberg et al. (2017)	3.40
Top tax 2007[f]	Doerrenberg et al. (2017)	7.65
Job training		
One Euro Job[g]	Harrer & Stockinger (2019)	0.21
One Euro Job[h]	Harrer & Stockinger (2019)	0.23
Short trainings	Bernhard (2016), Lechner et al. (2011)	5.43
Short trainings	Lechner et al. (2011)	9.46
Retrainings	Lechner et al. (2011)	1.76
Long trainings[i]	Bernhard (2016),	2.94
Long trainings[j]	Lechner et al. (2011) Bernhard (2016), Lechner et al. (2011)	1.04
Health insurance Public health	Gesundheitsberichterstattung des Bundes, (2021), Hajek et al. (2020)	1.38
Public health	Gesundheitsberichterstattung des Bundes, (2021), Hajek et al. (2020)	1.22
Public health[m]	Gesundheitsberichterstattung des Bundes, (2021), Hajek et al. (2020)	1.30
Public health[n]	Gesundheitsberichterstattung des Bundes, (2021), Bock et al. (2016)	1.52
Join the Healthy Boat (anti-obesity children)	Kesztyüs et al. (2017), Lauer et al. (2020)	13.40
	Kesztyüs et al. (2014, 2017)	11.04
Unemployment insurance		
1992 reform	Ye (2018)	0.77
1997 reform[o]		0.71
1997 reforms	Schmieder et al. (2012), Schmieder & von Wachter (2016)	0.72
1997 reform		0.70
Benefit increase	Schmieder & von Wachter (2017)	0.74
Duration level	Schmieder & von Wachter (2017)	0.63
Retirement insurance		
1992 early retirement disincentive	Bönke et al. (2018)	0.34
	Bönke et al. (2018), Lüthen (2016)	0.96
2014 retirement at 63[r]	Krolage (2020)	0.54
2014 retirement at 63[s]	Krolage (2020)	0.52
2018 double threshold	Baksa et al. (2020)	0.02
Infrastructure		
1994 railway reform	Lalive et al. (2013)	1.78

[a] Income control
[b] Rent/lease control
[c] > €50,000 income
[d] Married households only
[e] 2-year difference
[f] 1-year difference

[g] Duration 4.5 months
[h] Duration 1 year
[i] Retraining cost
[j] Long training cost
[k] 2011 cost
[l] 2014 cost

[m] 2011–2014 average cost
[n] Seniors
[o] Cut-off age 42
[p] Cut-off age 44; [q] 59
[r] Retirees 2014
[s] Retirees 2014–2017

Moreover, akin to the tendency of higher elasticity of taxable income concerning the change in net-of-tax rate among top earners observed in US studies of the new tax responsiveness literature, Schmidt and Müller (2012) found more robust tax response from the top 50% of German incomes 0.335 (0.135), top 10% 0.329 (0.303), and top 5% 0.340 (0.288) specifications. However, there was some anomaly with the top 1% 0.271 (0.324).[8] However, there is one particular aspect in which empirical findings for German tax reforms differ from their US counterparts: Whereas nonmarried households in the US yield more robust responses than married households to a change in tax policy (e.g., (Kopczuk, 2005), Schmidt and Müller (2012) found the opposite phenomenon in Germany (ETI = 0.471 for married and 0.116 for

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[8] Numbers in brackets indicate the respective counterpart for each specification (e.g., ETI 0.271 for top 1% and 0.324 for the 99% rest).

single households). The more robust tax response of German married households is reflected in Table 4.1 through the higher MVPFs with superscript [d] (using ETI of married households) compared to MVPFs without superscript (using overall ETI).

One caveat of the MVPF approach in the taxation context that becomes clearer through this exercise of implementing MVPF framework for the German top marginal tax rate reforms is the inability of MVPF framework to distinguish the direction of behavioural response between a tax cut and a tax hike. Because the final fiscal externality is calculated as an average of the fiscal externality of the tax rate before reform and after reform, and because, in most cases, both fiscal externalities turn out to be of negative values, the averaged fiscal externality is subsequently almost always negative. An obvious observation would be the comparison between the 2005 tax rate cut of 45% to 42% and the 2007 additional introduction of the top marginal tax rate at 45% using ETI estimates by Doerrenberg et al. (2017), which resulted in the same MVPF values. It is an essential avenue of future research to develop the MVPF framework further in the direction of making it capable of distinguishing the effects of opposite directions of tax rate reforms.

Short-term training (less than six months) for publicly administered job training programs tends to display significantly higher MVPF than longer-term training. It is worth noting that the author's calculations inevitably depended on the available timeframe of earnings projection in the source studies. For example, it could be argued that since retraining programs, as defined by Lechner et al. (2011), award their participants upon completion of a new professional degree, their benefits in the form of income surplus will continue to be reaped years into the future, well beyond the observation period currently available—eventually inflating the program's MVPF. On the other hand, the relative ineffectiveness of the One-Euro-Job program is relatively unambiguous since their estimated

MVPFs are much smaller than other programs, even smaller than 1. This would appear to concur with the findings of Vooren et al. (2019) that public employment/job creation generally creates more persistent adverse employment effects than other program types, such as subsidized labour or job search assistance.

MVPF results for German public health insurance imply a positive welfare effect, albeit at around 1.30, a relatively small one. Slightly higher MVPF (1.52) for senior citizens reflect this cohort's higher willingness to pay, as Bock et al. (2016) discovered. These figures are remarkably similar to HSK's (2020) MVPF findings for the United States health insurance policies, the highest of which was 1.63. Also, much in line with each other are MVPF findings for the two countries' health insurance policies whose primary concern is children—out of four US child health policies, the lowest MVPF found was 10.24, which is relatively close to the average MVPF of German school-based campaign Join the Healthy Boat (12.22).

MVPF results for German unemployment insurance display a comparatively limited variation between themselves, averaging 0.71 with a standard deviation of 0.043. These results appear aligned with HSK's (2020) findings for unemployment insurance policies in the United States, which had an average MVPF of 0.61 without significant variations.

Finally, while drawing welfare conclusions based on the head-to-head ranking of MVPFs across domains, it is necessary to remember that this framework inherently implies quantifying intergroup tradeoffs. To see this mechanism in a concrete example, recall the stark MVPF contrast between One Euro Job and other types of public job training. One Euro Job lasts, on average, 4.5 months (Harrer & Stockinger, 2019), a training period most comparable to Lechner et al.'s (2011) definition of short training. The former has an MVPF of 0.21 and the latter 5.43, over 25 times higher. Strictly speaking, the policymaker prefers a marginal increase in expenditure for

One Euro Job funded through a marginal decrease in expenditure for short training if and only if she values providing 0.21 monetary units to One Euro Job beneficiaries more than providing 5.43 monetary units to beneficiaries of the competitor program, i.e., if and only if $\frac{\overline{\eta}_{\text{One Euro Job}}}{\overline{\eta}_{\text{Short training}}} \frac{\text{MVPF}_{\text{Short training}}}{\text{MVPF}_{\text{One Euro Job}}} = \frac{5.43}{0.21} = 25.86$.

Here, the left-hand side of the inequality is the crucial takeaway. Without keeping in mind the necessary consideration of social incidence when comparing MVPFs, one risks running into a false, or at least premature, conclusion. Here, a background check on the designated beneficiaries of each program would serve us well: the One Euro Job was designed for unemployed individuals with (under certain criteria) the most desperate outlook for self-reintegration into the labour market, i.e., as an ultima ratio. On the other hand, the short training, per Lechner et al.'s (2011) definition, is not strictly confined to individuals most in need. The final question of whether spending €25.86 toward One-Euro-Job-eligible individuals is preferable to spending €1 toward the beneficiary group of the short training program is ultimately of a less economical than political nature (or philosophical, cf. (Finkelstein & Hendren, 2020; Saez & Stantcheva, 2016)

E.   CONCLUSIONS

The first key takeaway is, as this paper demonstrates for Germany, that the MVPF framework developed by HSK (2020) is justifiable and viable for conducting comparative welfare analysis for countries outside the United States. Key similarities could be characterized from the results, such as tax reforms' generally positive welfare effect and the superior performance of children programs among health insurance policies. Particular anomalies, on the other hand, represent intriguing cases for further investigation.

Secondly, the availability of empirical welfare findings in various domains of German public policies varies considerably, juxtaposed against each other and compared to HSK's (2020) US findings. This discrepancy can, in large part, be attributed to diverse levels of disaggregation and to observation timeframe.

Lastly, the suitability of MVPF for assessing the welfare effects of policies that require quantifying intergenerational trade-offs is arguably imperfect. Because in MVPF, a policy's willingness to pay corresponds to the average social utility of its beneficiaries, it offers limited possibility to specify each generation's exact share of the burden and how much they are willing to pay for it. Another promising research direction is to address heterogeneity in the individual welfare impact of a policy, which is prevalent across domains. A recent literature strand (e.g., Athey & Wager, 2021) develops an empirical welfare maximization method using statistical decision rules and machine learning support to determine optimal policy allocation rules in heterogeneity. Whether and how policy lessons from this method can be incorporated into comparative welfare frameworks such as MVPF remains to be seen.

F.   REFERENCES

Athey, S., & Wager, S. (2021). Policy learning with observational data. Econometrica, 89(1), 40. https://doi.org/10.3982/ECTA15732

Atkinson, A. B., Piketty, T., & Saez, E. (2011). Top Incomes in the Long Run of History. Journal of Economic Literature, 49(1), 3–71. https://doi.org/10.1257/jel.49.1.3

Auerbach, A. J., & Hines, J. R. (2002). Taxation and Economic Efficiency. In Handbook of Public Economics (Vol. 3, pp. 1347–1421). Elsevier. https://doi.org/10.1016/S1573-4420(02)80025-8

Autorengruppe Bildungsberichterstattung. (2020). Bildung in Deutschland 2020. wbv Media. https://doi.org/10.3278/6001820gw

Baksa, D., Munkacsi, Z., & Nerlich, C. (2020). A Framework for Assessing the Costs of Pension Reform Reversals. IMF Working Papers, 20(132). https://doi.org/10.5089/9781513550497.001

Bernhard, S. (2016). Berufliche Weiterbildung von Arbeitslosengeld-II-Empfängern. Langfristige Wirkungsanalysen. Sozialer Fortschritt, 65(7), 153–161. https://doi.org/10.3790/sfo.65.7.153

Bock, J.-O., Heider, D., Matschinger, H., Brenner, H., Saum, K.-U., Haefeli, W. E., & König, H.-H. (2016). Willingness to pay for health insurance among the elderly population in Germany. The European Journal of Health Economics, 17(2), 149–158. https://doi.org/10.1007/s10198-014-0663-8

Boersch-Supan, A., & Juerges, H. (2011). Disability, Pension Reform and Early Retirement in Germany (No. w17079; p. w17079). National Bureau of Economic Research. https://doi.org/10.3386/w17079

Boersch-Supan, A., & Schnabel, R. (1998). Social Security and Declining Labor-Force Participation in Germany. American Economic Review, 88, 7.

Bönke, T., Kemptner, D., & Lüthen, H. (2018). Effectiveness of Early Retirement Disincentives. Labour Economics, 32.

Diamond, P., & Saez, E. (2011). The Case for a Progressive Tax: From Basic Research to Policy Recommendation. Journal of Economic Perspectives, 25(4), 165–190. https://doi.org/10.1257/jep.25.4.165

Doerrenberg, P., Peichl, A., & Siegloch, S. (2017). The elasticity of taxable income in the presence of deduction possibilities. Journal of Public Economics, 151, 41–55. https://doi.org/10.1016/j.jpubeco.2015.10.001

Finkelstein, A., & Hendren, N. (2020). Welfare Analysis Meets Causal Inference. Journal of Economic Perspectives, 34(4), 146–167. https://doi.org/10.1257/jep.34.4.146

Gahvari, F. (2006). On the marginal cost of public funds and the optimal provision of public goods. Journal of Public Economics, 90(6-7), 1251-1262. https://doi.org/10.1016/j.jpubeco.2005.11.001

Gesundheitsberichterstattung des Bundes. (2021). Gesundheitsausgaben in Deutschland. Statistisches Bundesamt. https://www.gbe-bund.de/gbe/pkg_olap_tables.prc_set_hierlevel?p_uid=gast&p_aid=76630471&p_sprache=D&p_help=2&p_indnr=863&p_ansnr=51503225&p_version=2&p_dim=D.733&p_dw=4438&p_direction=drill. Accessed on March 26th, 2021, 21:58.

Gottfried, & Witczak. (2009). The responses of taxable income induced by tax cuts: Empirical evidence from the German taxpayer panel. IAW-Diskussionspapiere, 57. http://hdl.handle.net/10419/39211

Hajek, A., Enzenbach, C., Stengler, K., Glaesmer, H., Hinz, A., Röhr, S., Stein, J., Riedel-Heller, S. G., & König, H.-H. (2020). Determinants of Willingness to Pay for Health Insurance in Germany—Results of the Population-Based Health Study of the Leipzig Research Centre for Civilization Diseases (LIFE-Adult-Study). Frontiers in Public Health, 8, 456. https://doi.org/10.3389/fpubh.2020.00456

Hamilton, D., Dee, A., & Perry, I. J. (2018). The lifetime costs of overweight and obesity in childhood and adolescence: A systematic review: Lifetime costs of childhood obesity.

Obesity Reviews, 19(4), 452–463. https://doi.org/10.1111/obr.12649

Harrer, T., & Stockinger, B. (2019). Ein-Euro-Jobs nach der Instrumentenreform 2012: Zielgruppe besser erreicht – erste Ergebnisse zur Wirkung. IAB-Kurzbericht, 22, 8.

Heckman, J. J., Moon, S. H., Pinto, R., Savelyev, P. A., & Yavitz, A. (2010). The rate of return to the HighScope Perry Preschool Program. Journal of Public Economics, 94(1–2), 114–128. https://doi.org/10.1016/j.jpubeco.2009.11.001

Hendren, N., & Sprung-Keyser, B. (2020). A Unified Welfare Analysis of Government Policies*. The Quarterly Journal of Economics, 135(3), 1209–1318. https://doi.org/10.1093/qje/qjaa006

Hendren, N., & Sprung-Keyser, B. (2022). The Case for Using the MVPF in Empirical Welfare Analysis. NBER Working Paper 30029. https://www.nber.org/papers/w30029

Höffler, F. (2007). Cost and benefits from infrastructure competition. Estimating welfare effects from broadband access competition. Telecommunications Policy, 31(6–7), 401–418. https://doi.org/10.1016/j.telpol.2007.05.004

Kesztyüs, D., Lauer, R., Kesztyüs, T., Kilian, R., Steinacker, J. M., & on behalf of the "Join the Healthy Boat" Study Group. (2017). Costs and effects of a state-wide health promotion program in primary schools in Germany – the Baden-Württemberg Study: A cluster-randomized, controlled trial. PLOS ONE, 12(2), e0172332. https://doi.org/10.1371/journal.pone.0172332

Kesztyüs, D., Lauer, R., Schreiber, A. C., Kesztyüs, T., Kilian, R., & Steinacker, J. M. (2014). Parents' willingness to pay for the prevention of childhood overweight and obesity. Health Economics Review, 4(1), 20. https://doi.org/10.1186/s13561-014-0020-8

Kitagawa, T., & Tetenov, A. (2018). Who should be treated? Empirical Welfare Maximization methods for treatment choice. Econometrica, 86(2), 591–616. https://doi.org/10.3982/ECTA13288

Kopczuk, W. (2005). Tax bases, tax rates and the elasticity of reported income. Journal of Public Economics, 89(11–12), 2093–2119. https://doi.org/10.1016/j.jpubeco.2004.12.005

Krolage, C. (2020). Essays in Empirical Public Economics. LMU.

Lalive, R., Luechinger, S., & Schmutzler, A. (2013). Does Supporting Passenger Railways Reduce Road Traffic Externalities? SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2212735

Lauer, R., Traub, M., Hansen, S., Kilian, R., Steinacker, J. M., & Kesztyüs, D. (2020). Longitudinal changes and determinants of parental willingness to pay for the prevention of childhood overweight and obesity. Health Economics Review, 10(1), 15. https://doi.org/10.1186/s13561-020-00266-z

Lechner, M., Miquel, R., & Wunsch, Conny. (2011). Longrun effects of public sector sponsored training in West Germany. Journal of the European Economic Association, 9(4), 742–784.

Lüthen, H. (2016). Rates of Return and Early Retirement Disincentives: Evidence from a German Pension Reform. German Economic Review, 17(2), 206–233. https://doi.org/10.1111/geer.12070

Mirrlees, J. A. (1971). An Exploration in the Theory of Optimum Income Taxation. The Review of Economic Studies, 38(2), 175. https://doi.org/10.2307/2296779

Pigou, A. C. (1920). The Economics of Welfare.

Saez, E., Slemrod, J., & Giertz, S. H. (2012). The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review. Journal of Economic Literature, 50(1), 3–50. https://doi.org/10.1257/jel.50.1.3

Saez, E., & Stantcheva, S. (2016). Generalized Social Marginal Welfare Weights for Optimal

Tax Theory. American Economic Review, 106(1), 24–45. https://doi.org/10.1257/aer.20141362

Schellhorn, & Gottfried. (2004). Empirical Evidence on the Effects of Marginal Tax Rates on Income: The German Case. IAW-Diskussionspapiere, 15. http://hdl.handle.net/10419/21854

Schmidt, T.-P., & Müller, H. (2012). Die Elastizität des zu versteuernden Einkommens in Deutschland. Arqus Discussion Paper, 142, 36. http://dx.doi.org/10.2139/ssrn.2088106

Schmieder, J. F., & von Wachter, T. (2016). The Effects of Unemployment Insurance Benefits: New Evidence and Interpretation. Annual Review of Economics, 8(1), 547–581. https://doi.org/10.1146/annurev-economics-080614-115758

Schmieder, J. F., & von Wachter, T. (2017). A Context-Robust Measure of the Disincentive Cost of Unemployment Insurance. American Economic Review, 107(5), 343–348. https://doi.org/10.1257/aer.p20171026

Schmieder, J. F., Wachter, T. V., & Bender, S. (2012). The effects of extended unemployment insurance over the business cycle: Evidence from regression discontinuity estimates over 20 years.

Quarterly Journal of Economics, 52. https://doi.org/10.1093/qje/qjs010

Slesnick, D. T. (1998). Empirical Approaches to the Measurement of Welfare. Journal of Economic Literature, 36(4), 59. https://www.jstor.org/stable/2565048

Statistisches Bundesamt. (2021). Vierteljährliche Kassenergebnisse des Öffentlichen Gesamthaushalts (No. 2140200203234; Fachserie 14). Statistisches Bundesamt.

Vooren, M., Haelermans, C., Groot, W., & Maassen van den Brink, H. (2019). The effectiveness of active labor market policies: A meta-analysis: the effectiveness of active labor market policies: a meta-analysis. Journal of Economic Surveys, 33(1), 125–149. https://doi.org/10.1111/joes.12269

Werdt, C. (2015). The elasticity of taxable income for Germany and its sensitivity to the appropriate model (No. 2015/5; Diskussionsbeiträge). http://hdl.handle.net/10419/106825

Ye, H. (2018). Essays on the economics of unemployment and retirement [Thesis (PhD)]. Boston University.