Choice in Insurance Markets: A Pigouvian Approach to Social Insurance Design*

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Abstract

Should choice be offered in social insurance programs? The paper presents a conceptual framework that identifies the key forces determining the value of offering choice, reviews some existing evidence on these forces, and aims to guide further empirical research in different insurance domains. The value of offering choice is higher the larger the variation in individual valuations, but gets reduced by both selection on risk and selection on moral hazard. The implementation of choice-based policies is further challenged by the presence of adverse selection and choice frictions or the obligation to offer basic uncompensated care. These inefficiencies can be seen as externalities, which do not rationalize the absence of providing choice per se, but point to the need for regulatory policies and the potential value of corrective pricing à la Pigou.

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1 Introduction

A key distinguishing feature between social insurance programs across risk domains and countries is the extent to which they allow for choice. Predominantly, a single benefit is mandated, without offering any choice. But sometimes choice is given: individuals are offered a menu of contracts that differ in terms of coverage and price. When choice is allowed, its provision is sometimes decentralized to the market, while in other cases coverages and prices remain centrally determined or strongly regulated.

To illustrate this large variation in the extent of choice, Table 1 compares the design of social insurance systems across risk domains for two countries, the US and Sweden. Both are the focus of recent empirical work reviewed in this article. First, the table demonstrates the important differences in social insurance design across risks. In the US, unemployment insurance (UI) and workers compensation are examples of social insurance systems where no choice is provided over the level of coverage. In contrast, choice of coverage has become central in the design of the US health insurance (HI) system. This trend is most evident in the Affordable Care Act, which set up subsidized exchanges for private insurers to offer a range of regulated plans (e.g. "gold", "silver", and "bronze") in combination with the - now repealed - mandate to take up coverage. Over the past 30 years, various options for supplemental health insurance coverage have also been added for the elderly within and around the publicly-provided Medicare program. Second, Table 1 shows that there is significant variation across these two countries within each risk domain. Unemployment insurance is a case in point. Sweden is one of the very few countries, along with Denmark, Finland and Iceland, where choice is available in the UI system. Workers can purchase a generous public supplemental UI coverage on top of the UI mandate at subsidized prices. To the contrary, in the US, like in all other developed countries, workers are mandated into a single contract, and no supplemental coverage is available, neither in the public system, nor in the private market. While the US offers little choice compared to Sweden in unemployment insurance, the opposite holds when it comes to health insurance. In Sweden, the public HI system functions as a universal mandate, providing a unique level of coverage; besides, the private market for supplemental HI is very small. In the US to the contrary, there is a lot of choice in the HI public system. And there exists a large private market complementing the public system.

Why and when should we allow for choice in these social insurance contexts? And if choice is valuable, how should we design the contract space, i.e. the prices and coverage levels of insurance contracts? Responses to these questions have, until recently, been quite elusive. In social insurance contexts where no choice is available, it is by construction hard to identify the value and costs associated with providing insurance choice. This perhaps explains why the literature did not pay much attention to questioning whether restricting choice was indeed optimal in these contexts. In insurance settings where choice is available, the literature has studied extensively, although often in isolation, the various inefficiencies created by the presence of choice, like the possibility of adverse selection or the existence of choice frictions. But, while the presence of these inefficiencies does

not exclude the potential value of offering choice, the literature has mostly treated their existence has a rationale for limiting choice (e.g. imposing mandates) without trying to characterize when maintaining some degree of choice is actually valuable.

The present review summarizes recent work that aims to overcome these challenges. Building on this new body of research, we present a general framework as well as an empirical roadmap to evaluate the provision of choice in insurance markets.

We thus begin by laying out a theoretical framework that builds on prior work and outlines when choice is valuable. Our framework incorporates both moral hazard and adverse selection, two forces that have been mostly treated separately in the social insurance literature. This divide is apparent in the handbook chapter on social insurance by Chetty and Finkelstein (2013), showing that moral hazard has been the main focus of the literature on UI or DI, contexts where most countries have single mandates. In contrast, adverse selection is mostly a topic of interest in the literature on health insurance, a context where coverage choice is much more widespread, especially in the US.

Using our framework, we offer a simple characterization of the welfare effects of offering choice compared to a single mandated policy. Starting from an optimal level of uniform coverage, the value of offering the choice to purchase supplemental coverage will depend on the value and cost of those opting for the supplemental coverage relative to those who do not. Heterogeneity in the valuations of insurance is, evidently, the main reason why allowing for choice is potentially valuable. But this is counteracted by the fact that in insurance contexts there is a potential dependence between the take-up of coverage and risk. This can lead to adverse selection whereby riskier individuals take up insurance, but also to moral hazard in which take-up of insurance increases risk.

We show that the value of choice can be expressed as a function of two key forces. The value is larger the more individuals who take up extra coverage are willing-to-pay *relative to their risk* - i.e. their markup. The key limiter for the value of choice is when the extra coverage induces a strong moral hazard response for those selecting it and thus increases the net cost to the government. Despite the large body of empirical work studying adverse selection, our framework shows that adverse selection by itself is not sufficient to rationalize the absence of choice: adverse selection could be counterbalanced by substantial heterogeneity in preferences for insurance conditional on risk. Whether choice increases welfare, however, depends on a single core empirical object: the selection on moral hazard relative to the selection on the markup.

After having characterized the potential value of offering choice, we turn to potential inefficiencies when implementing choice-based policies or decentralizing choice to private markets. These inefficiencies have been well-documented in the literature but are largely studied in isolation. Most prominent is the evidence for adverse selection and its potential effect on prices, for example in health-related insurance contexts (e.g. Cutler and Reber 1998; Hendren 2013; Cabral 2016). Willingness to pay may also be depressed due to the presence of uncompensated care (e.g. Garthwaite et al. 2018) or distorted due to behavioral biases that prevent individuals from making utility-maximizing choices. The resulting choice frictions are documented in a large and growing literature, also with a focus on health insurance choices (see Ericson and Sydnor 2017, Chandra et al. 2019). In the context of our framework, each of these inefficiencies can be thought of as impos-

ing a standard externality in the sense of Pigou, which call for regulatory interventions. A single mandate is an extreme version of quantity regulation, but when there is value to offering choice, corrective pricing a la Pigou can be a preferable alternative to unlock some value from offering choice. In case of adverse selection, a Pigouvian subsidy that allows individuals on the margin of purchasing additional insurance to pay their own costs, as opposed to a price reflecting average costs, improves welfare over a single mandate. In the presence of uncompensated care, subsidies for additional coverage can overcome the low WTP displayed by those with those uncompensated options for insurance. Subsidies could also improve efficiency when individuals under-value insurance due to behavioral frictions. However, allowing for choice may not unlock its potential value when individuals have inherent difficulties to make choices that maximize their true underlying (heterogeneous) valuations of insurance.

Our framework characterizes the value of choice and optimal price subsidies as a function of moments that can be identified empirically. We illustrate this capability by applying our framework to the context of UI. This is a setting in which almost all countries have single UI mandates without choice. Whether this is desirable had, until recently, never been tested. We review an emerging stream of research that offers estimates of the moments necessary to assess the value of choice in UI. In particular, we distinguish between research that focuses on the few countries where some UI choice is available, but also papers that have developed clever techniques to identify risk-based selection and willingness-to-pay in the absence of choice data. The main takeaway from this body of research is that UI is characterized by severe adverse selection. But in spite of this, evidence from Scandinavian countries suggests that providing choice in UI can still be valuable. However, unlocking the value of choice requires large subsidies for more generous UI that overcome adverse selection. It also requires a simple choice environment to limit the scope for choice frictions.

Our framework allows one to evaluate the provision of choice in other social insurance settings too. Unfortunately, we lack evidence on several key sources of heterogeneity - risk, moral hazard, preferences and/or choice frictions - potentially driving insurance choices in these different domains. We provide a schematic review of the empirical literature, highlighting some existing gaps for evaluating choice-based policies, and hope this can serve as a guide for future empirical work that can address the value of choice in these other domains. A final gap we try to highlight throughout this review is the importance of equity concerns when evaluating the optimal choice structure of social insurance systems. When redistribution towards high-risk individuals is valuable for instance, larger subsidies for supplemental coverage, or even mandates of generous coverages may become desirable. Similarly, the social value of providing choice may strongly decrease when choice frictions strongly correlate with dimensions, such as income, along which society may want to redistribute.

The remainder of the paper is organized as follows. Section 2 presents the framework and characterizes the value of offering choice. Section 3 presents three sets of inefficiencies that can arise when allowing for choice and characterizes, in the context of our unifying framework, the optimal Pigouvian subsidies necessary to correct them. Section 4 implements empirically our approach in the context of UI, reviewing the recent literature estimating the different moments necessary to assess the value of choice. The final section provides some general takeaways for other social

Table 1: Summary Structure of Social Insurance Systems by Risk in the US and Sweden

	Unempl. Insurance		Disability Insurance		Workers' Comp.		Long-Term Care Ins.		Health Insurance	
	US	**Sw.**	**US**	**Sw.**	**US**	**Sw.**	**US**	**Sw.**	**US**	**Sw.**
Public Mandate	Yes[a]	Yes[b]	Yes	Yes	Yes[g]	Yes	No[i]	Yes	No[k]	Yes
Provision of Choice:										
Supplemental Public Coverage	No	Yes[c]	No	No	No	No	No	No	No	No
Supplemental Private Market	No[d]	No[e]	Yes[f]	No	No	No[h]	Yes[j]	No	Yes[l]	No[m]

Notes—

[a] All US states publicly mandate unemployment insurance (UI). Coverage varies across states, replacing roughly half of earnings on average.

[b] The public UI mandate in Sweden is a flat benefit that replaces only about 22% of the average salary as of 2019 (Statistics Sweden 2020 and own calculations).

[c] Sweden, along with Denmark, Finland and Iceland, are the only countries to provide public supplemental UI. The supplemental coverage replaces 80% of earnings up to a cap. The premium is heavily subsidized.

[d] In the US, some private supplemental UI is provided by unions and employers, especially in the manufacturing sector (see Oswald 1986). But in 1997, only 2% of the US work force was covered by private supplemental UI (Parsons 2002).

[e] As of 2017, roughly half the active labor force was estimated to be covered by a union-membership based, private complementary income insurance (*Inkomstförsäkring*) scheme, providing compensation above the benefit ceiling for the supplemental public coverage (Lindellee 2018). A few smaller private insurance companies such as *Accept*, *Jobbgarant* and *Solid* also offer such plans to those without labor union membership. Little data exists on the number of individuals purchasing these non-union based plans, but it is unlikely to be substantial (Rasmussen 2014; Lindellee 2018).

[f] As of 2019, 33% of US workers had a private long-term disability insurance plan (U.S. Bureau of Labor Statistics 2019).

[g] Note that Texas is the only US state that does not mandate workers' compensation (Cabral et al. 2019).

[h] A large part of the Swedish labor force has collectively organized supplemental workers' compensation. Employees are, however, not able to individually opt in or out of such agreements.

[i] While the US does not mandate long-term care insurance, long-term care is provided on a means-tested basis (through Medicaid).

[j] As of 2014, only 11% of the US population aged 65 and older and not living in nursing homes were covered by long-term care insurance (Johnson 2016).

[k] In 2018, 8.5% of the US population had no health insurance, despite the presence of a penalty for those without health insurance (with exemptions) (Berchick et al. 2019). As the penalty was removed in 2019, there is currently no public mandate to purchase health insurance.

[l] Medicare recipients can choose to purchase supplemental coverage (Medigap) and prescription drug coverage (Medicare Part D). Both are heavily regulated and provided by private companies (Keane and Stavrunova 2016; Polyakova 2016).

[m] Private supplemental health insurance exists but accounts for less than 1% of Swedish health care expenditures (Glenngård 2017).

insurance domains and concludes.

2 Value of Choice

This section presents a stylized framework and characterizes the value of choice and the optimal setting of prices and coverages as a function of empirically estimable moments. The analysis builds on Landais et al. (2020), which we refer the interested reader to for more detail and further results. The model features both moral hazard à la Chetty 2006 and adverse selection à la Einav et al. 2010, combined as in Einav et al. 2013.

2.1 Setup

We consider a population indexed by their type θ who face a binary risk that occurs with probability π. We will often refer to unemployment risk specifically, but this risk could also reflect a disability, health, or another type of shock. Throughout, we allow the likelihood of this risk to differ across people, θ, and also to respond to incentives, such as insurance.

We consider an insurance contract that provides $\$b$ in the event of unemployment, and we let P denote the price of this contract. We let $v_\theta(b)$ denote a type θ's WTP for insurance. For expositional simplicity, we assume quasi-linear utility so that $v_\theta(b) - P$ denotes the net utility to a type θ that is able to obtain coverage b at price P.

We denote the cost that a type θ imposes on the insurer by $c_\theta(b) = \pi_\theta(b)\, b$. The cost is the product of the likelihood of the risky event, $\pi_\theta(b)$, multiplied by the insurance payout, b. If the insurance is sold at price P, the net cost to the insurer is $c_\theta(b) - P$.

To measure welfare we limit our analysis to traditional social surplus. This means that the social value of insuring a type θ is given by

$$W_\theta(b) = v_\theta(b) - \pi_\theta(b)\, b, \tag{1}$$

and all individuals' utilities are weighted equally. One can accommodate more general environments by defining $W_\theta = \lambda_\theta v_\theta(b) - \pi_\theta(b)\, b$ where λ_θ is a generalized social welfare weight for type θ and conducting the analogous derivations below.[1]

2.2 No choice: universal coverage

The first question we aim to answer in this environment is: what is the optimal level of universal coverage, b? This establishes a benchmark to study the value of offering choice between different

[1] Alternatively, one can construct the marginal value of public funds (MVPF) of spending on a specific insurance program (Hendren and Sprung-Keyser 2020), which is given by the ratio of WTP of the beneficiaries to the net government cost of the spending,

$$MVPF = \frac{E[v_\theta(b)]}{\pi_\theta(b)\, b}$$

Because the conclusions are highly related to those generated by the concepts of policies that maximize net surplus in equation (1), we focus on that measure of well-being. But, we note the results readily extend to measuring the MVPF instead.

coverage levels. The optimal level of universal coverage maximizes social welfare in the population,

$$b^* = argmax_b \, E\left[W_\theta\left(b\right)\right]. \tag{2}$$

We define two key micro-foundations of the marginal value of coverage. Let $\eta_\theta\left(b\right)$ denote the markup a type θ is willing to pay for extra coverage:

$$\eta_\theta\left(b\right) = \frac{v'_\theta\left(b\right) - \pi_\theta\left(b\right)}{\pi_\theta\left(b\right)}. \tag{3}$$

Let $\varepsilon_\theta\left(b\right)$ denote the percentage increase in the likelihood of the event occurring in response to a percentage increase in benefits, b:

$$\varepsilon_\theta\left(b\right) = \frac{\pi'_\theta\left(b\right)}{\pi_\theta\left(b\right)} b. \tag{4}$$

The WTP mark-up $\eta_\theta\left(b\right)$ captures how much a worker is willing-to-pay for a marginal dollar of coverage relative to the probability it will get it. For example, with expected utility $\pi_\theta u_\theta\left(c_u\right) + \left(1-\pi_\theta\right) u_\theta\left(c_e\right)$ in the context of unemployment risk where u_θ is the von Neumann-Morgenstern (vNM) utility function and c_e (c_u) is the consumption level when employed (unemployed), this markup relates directly to the ratio of marginal utilities between unemployment and employment $\frac{u'_\theta(c_u)}{u'_\theta(c_e)}$.[2] The elasticity $\varepsilon_\theta\left(b\right)$ captures the *behavioral* effect of extra coverage on the cost of providing the insurance - due to the behavioral response of the individual - relative to its *mechanical* effect. This is also known as the "fiscal externality" in the public finance literature as it reflects the externality that the individual imposes on the insurer or government cost by changing the likelihood of the event in response to more generous coverage.

An increase in coverage for a given individual generates extra surplus as long as the markup the individual is willing to pay exceeds the fiscal externality to the insurer. At the population level, the welfare impact of an increase in coverage equals:

$$\begin{aligned}
\frac{d}{db} E\left[W_\theta\left(b\right)\right] &= E\left[W'_\theta\left(b\right)\right] && (5)\\
&= E\left[v'_\theta\left(b\right) - \pi_\theta\left(b\right) - \pi'_\theta\left(b\right) b\right] && (6)\\
&= E\left[\pi_\theta\left(b\right)\eta_\theta\left(b\right)\right] - E\left[\pi_\theta\left(b\right)\varepsilon_\theta\left(b\right)\right]. && (7)
\end{aligned}$$

[2] To be precise, with vNM utility we obtain $\frac{v'_\theta}{\pi_\theta}\frac{1-\pi_\theta}{1-v'_\theta} = \frac{u'_\theta(c_u)}{u'_\theta(c_e)}$. To see this, note that we can define $\Delta v'_\theta$ in the vNM framework as the WTP to get Δ units of extra coverage:

$$\pi_\theta u\left(c_u\right) + \left(1-\pi_\theta\right) u_\theta\left(c_e\right) = \pi_\theta u_\theta\left(c_u + \Delta - \Delta v'_\theta\right) + \left(1-\pi_\theta\right) u_\theta\left(c_e - \Delta v'_\theta\right).$$

Taking the derivative with respect to Δ and evaluating at $\Delta = 0$ yields

$$\pi_\theta u'_\theta\left(c_u\right)\left[1 - v'_\theta\right] = \left(1-\pi_\theta\right) u'_\theta\left(c_e\right) v'_\theta \Rightarrow \frac{u'_\theta\left(c_u\right)}{u'_\theta\left(c_e\right)} = \frac{v'_\theta}{\pi_\theta}\frac{1-\pi_\theta}{1-v'_\theta}.$$

We can re-scale the welfare impact of the extra coverage using the average likelihood of the event:

$$\frac{d}{db}E\left[W_\theta\left(b\right)\right]/E\left[\pi_\theta\left(b\right)\right]=\underbrace{E\left[\frac{\pi_\theta\left(b\right)}{E\left[\pi_\theta\left(b\right)\right]}\eta_\theta\left(b\right)\right]}_{\text{Avg. Markup}}-\underbrace{E\left[\frac{\pi_\theta\left(b\right)}{E\left[\pi_\theta\left(b\right)\right]}\varepsilon_\theta\left(b\right)\right]}_{\text{Fiscal Externality}}$$

Here, the first-term is simply the average markup individuals are willing to pay for insurance, weighted by their likelihood of experiencing the event, and the second term is the average fiscal externality, again weighted by the same likelihoods.

At the optimum, we have a standard Baily-Chetty (Baily 1978; Chetty 2006) formula:

Proposition 1. *Assuming social welfare $E\left[W_\theta\left(b\right)\right]$ is concave in b, the optimal universal coverage level b^* is given by*

$$E\left[\frac{\pi_\theta\left(b^*\right)}{E\left[\pi_\theta\left(b^*\right)\right]}\eta_\theta\left(b^*\right)\right]=E\left[\frac{\pi_\theta\left(b^*\right)}{E\left[\pi_\theta\left(b^*\right)\right]}\varepsilon_\theta\left(b^*\right)\right].$$

The optimal universal coverage level equates the average markup that individuals are willing to pay for insurance to the average percentage increase in cost arising from the behavioral response to the insurance provision. At the optimal level, additional coverage may well generate positive insurance value to individuals, but the optimal coverage needs to internalize the externality of insurance on its cost.

2.3 Value of Offering Choice

Can welfare be improved by offering different values of b instead of a single mandated level of benefits? In particular, we imagine offering a choice between b_0 and $b_0+\Delta$ at prices P_0 and P_Δ. This means the price per unit of additional coverage is $p=\frac{P_\Delta-P_0}{\Delta}$. For small Δ and in the absence of choice frictions, we expect individuals to buy extra coverage Δ if their marginal WTP for additional coverage exceeds its price, $v'_\theta\left(b_0\right)\geq p$.

To assess the welfare impact of choice, let $W_\theta\left(b_0,\Delta,p\right)$ denote the welfare of type θ when given the option to purchase policy b_0 or to obtain $b_0+\Delta$ at unit price p. Starting from the situation where there is no effective choice $\Delta=0$ and providing an infinitesimal amount of choice has an impact on welfare of:

$$\frac{d}{d\Delta}W_\theta\left(b_0,\Delta,p\right)|_{\Delta=0}=1\left\{v'_\theta\left(b_0\right)\geq p\right\}\pi_\theta\left(b_0\right)\left[\eta_\theta\left(b_0\right)-\varepsilon_\theta\left(b_0\right)\right], \tag{8}$$

which is equal to the event of purchasing the top-up insurance, $1\left\{v'_\theta\left(b_0\right)\geq p\right\}$ multiplied by the difference between the WTP and cost if they purchase. This latter component can be written as $\pi_\theta\left(b_0\right)\left[\eta_\theta\left(b_0\right)-\varepsilon_\theta\left(b_0\right)\right]$. To simplify notation, let $E_\Delta\left[\circ\right]=E\left[\circ|v'_\theta\left(b_0\right)\geq p\right]$ denote the conditional expectation over the set of people taking up top-up insurance when prices are p, $E_0\left[\circ\right]=E\left[\circ|v'_\theta\left(b_0\right)<p\right]$ for the set of people sticking to baseline coverage and $E_p\left[\circ\right]=E\left[\circ|v'_\theta\left(b_0\right)=p\right]$

for the set of people who are at the margin.[3]And, let $F_\Delta(b_0, p) = \Pr\left\{v'_\theta(b_0) \geq p\right\}$ denote the fraction of the population purchasing additional coverage at prices p when b_0 is the baseline level of coverage. Pooling across all types θ, the impact on social welfare of offering choice at prices p is given by

$$\frac{d}{d\Delta} E\left[W_\theta(b_0, \Delta, p)\right]|_{\Delta=0} = F_\Delta(b_0, p)\, E_\Delta\left[\pi_\theta(b_0)\left[\eta_\theta(b_0) - \varepsilon_\theta(b_0)\right]\right] \tag{9}$$

Does providing choice increase welfare? To assess this, we start from the optimal universal coverage point $b_0 = b^*$, characterized in proposition 1. This means that $\frac{d}{db} E\left[W_\theta(b^*)\right] = 0$ when averaging over the entire population, but it does not tell us whether $\frac{d}{db} E_\Delta\left[W_\theta(b^*)\right]$ is positive or negative when restricting to the set of people who purchase the additional Δ units of insurance. When $b_0 = b^*$, we can re-write equation (9) as

$$\begin{aligned}\frac{\frac{d}{d\Delta} E\left[W_\theta(b^*, \Delta, p)\right]|_{\Delta=0}}{F_\Delta(b^*, p)} = &\underbrace{E_\Delta\left[\pi_\theta(b^*)\,\eta_\theta(b^*)\right] - E\left[\pi_\theta(b^*)\,\eta_\theta(b^*)\right]}_{\text{Selection on WTP Markup}} \\ &- \underbrace{\left(E_\Delta\left[\pi_\theta(b^*)\,\varepsilon_\theta(b^*)\right] - E\left[\pi_\theta(b^*)\,\varepsilon_\theta(b^*)\right]\right)}_{\text{Selection on MH}}\end{aligned} \tag{10}$$

which is the difference between two "selection effects" governed by the difference in marginal vs average types (reflected in the different expectation operator, E_Δ vs. E). The first term is the extent to which those who choose more insurance are willing to pay a higher markup relative to the average population (Selection on WTP Markup). The second term is the differential fiscal externality they impose on the insurer (Selection on Moral Hazard). If social welfare $E\left[W_\theta(b_0, \Delta, p)\right]$, is strictly concave in (b_0, Δ), then one can assess whether additional choice increases welfare by setting b^* to satisfy the Baily-Chetty formula in proposition 1.

Proposition 2. *Suppose social welfare $E\left[W_\theta(b_0, \Delta, p)\right]$ is strictly concave in b_0 and Δ. Then, offering choice increases welfare if and only if there exists a price p such that*

$$E_\Delta\left[\pi_\theta(b^*)\,\eta_\theta(b^*)\right] \geq E_\Delta\left[\pi_\theta(b^*)\,\varepsilon_\theta(b^*)\right], \tag{11}$$

evaluated at the optimal universal coverage level b^*.

Social welfare is then increased through choice if and only if there exists a price for which those induced to purchase insurance are willing to pay a markup that covers their marginal cost on the insurer.

Intuition. The value of choice is higher when there is more heterogeneity in the markups and these are positively correlated with the WTP, so that those selecting the supplemental coverage

[3]We use the short-hand notation $E_\Delta[\circ]$, $E_0[\circ]$ and $E_p[\circ]$ for simplicity to refer to the expected outcomes of the three groups of individuals who respectively buy the extra coverage, stick to b_0 and are marginal between the two coverages, **at price** p. It is therefore important to note that these constructs all explicitly depend on p.

Δ are willing to pay a higher markup than the average population (i.e. $E_\Delta\left[\pi_\theta\left(b^*\right)\eta_\theta\left(b^*\right)\right] - E\left[\pi_\theta\left(b^*\right)\eta_\theta\left(b^*\right)\right]$ is larger). However, this needs to be compared to the heterogeneity in the moral hazard costs and how it relates to the WTP. If those selecting the supplemental coverage Δ also impose disproportionately large moral hazard costs on the insurer, this will lower the value of choice. However, if there is little variation in moral hazard, the selection on moral hazard will be small.

We can further decompose selection on markup into selection on WTP and selection on cost,

$$\underbrace{E_\Delta\left[\pi_\theta\left(b_0\right)\eta_\theta\left(b_0\right)\right] - E\left[\pi_\theta\left(b_0\right)\eta_\theta\left(b_0\right)\right]}_{\text{Selection on WTP Markup}} = \underbrace{E_\Delta\left[v'_\theta\left(b_0\right)\right] - E\left[v'_\theta\left(b_0\right)\right]}_{\text{Selection on WTP}} - \underbrace{E_\Delta\left[\pi_\theta\left(b_0\right)\right] - E\left[\pi_\theta\left(b_0\right)\right]}_{\text{Selection on Risk}}.$$

Combined with equation 10, this clearly illustrates that while heterogeneity in WTP increases the value of offering choice, this gets mitigated when either selection on risk or on moral hazard is strong.

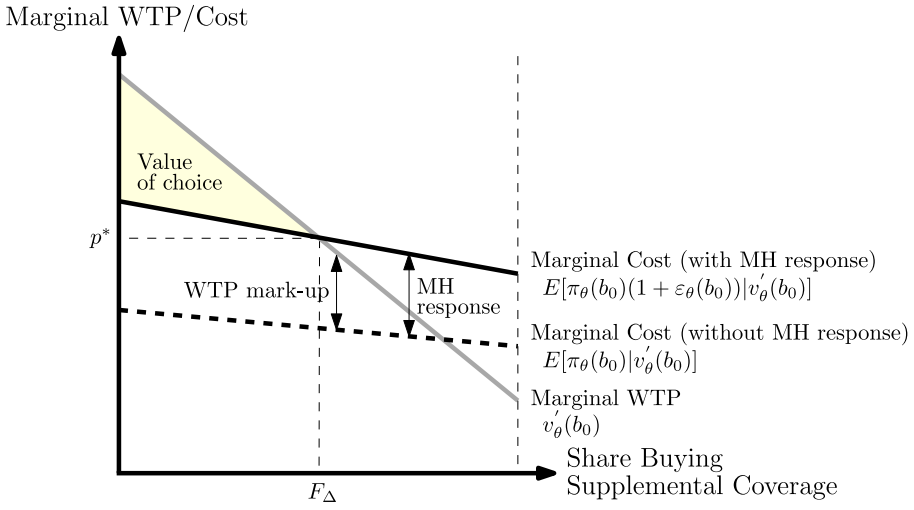
Figure 1 provides a graphical representation of the drivers of the value of choice. This corresponds to the well-known representation in Einav et al. 2010, comparing demand to cost curves, but now for the supplemental coverage that is offered and explicitly accounting for selection on moral hazard as in Einav et al. 2013. For any price p, the grey curve shows the share of individuals with higher marginal WTP $v'_\theta\left(b_0\right)$, who thus will buy the supplemental coverage. This can be interpreted as a demand curve that ranks individuals from high to low WTP on the horizontal axis. The graph then also plots the cost of providing the extra coverage for individuals ranked by their WTP, $E\left[\pi_\theta\left(b_0\right)\left(1+\varepsilon_\theta\left(b_0\right)\right)|v'_\theta\left(b_0\right)\right]$. This cost equals the mechanical cost of providing the supplemental coverage augmented with the behavioral cost due to the moral hazard response. The total area under both curves would be the same when evaluated at the optimal level of universal coverage b^*, following proposition 1. The difference between the demand and cost curve determines the surplus of getting the extra coverage. The value of offering choice is captured by the area between the demand and cost curve for those with WTP higher than the price, following proposition 2. For comparison, we also plot the mechanical cost of providing coverage $E\left[\pi_\theta\left(b_0\right)|v'_\theta\left(b_0\right)\right]$. The difference relative to the demand curve equals the "WTP markup" term, $E\left[\pi_\theta\left(b_0\right)\eta_\theta\left(b_0\right)|v'_\theta\left(b_0\right)\right]$. The difference relative to the cost curve indicates the moral hazard ("MH response") term, $E\left[\pi_\theta\left(b_0\right)\varepsilon_\theta\left(b_0\right)|v'_\theta\left(b_0\right)\right]$. The value of choice is higher for steeper demand curves and lower for steeper cost curves, with the former often being a result of the latter. Allowing choice therefore brings greater value if those with higher WTP for supplemental coverage do not have significantly higher costs."

2.4 Efficient Choice: Setting Prices and Coverages

So far we have asked whether and when offering choice can increase welfare. But, in practice, policy makers can also regulate the coverage levels and corresponding prices. We briefly discuss the key trade-offs, but refer to Landais et al. (2020) for a comprehensive characterization of the efficient coverage levels and prices.

We first consider the determination of the price for given coverage levels. To be efficient, the price should be equal to the cost of providing the additional coverage to the marginal buyers (as

Figure 1: Demand and Cost Curves



one might expect). By definition, the marginal types θ choosing to purchase at price p will be indifferent to that purchase, so that $v'_\theta(b_0) = p$. In the absence of choice frictions, the envelope theorem implies that individuals do not value the cost resulting from the increase in π_θ. This means that the optimal price must internalize this externality, so that the price equals the cost of providing additional coverage to the marginally indifferent types,

$$p^* = E\left[\pi_\theta(b_0)\left[1+\varepsilon_\theta(b_0)\right]|v'_\theta(b_0) = p^*\right]. \tag{12}$$

Graphically, this corresponds to the intersection of the WTP and cost curve in figure 1.[4] Alternatively, we can state the efficiency condition as,

$$E\left[\pi_\theta(b_0)\left[\eta_\theta(b_0) - \varepsilon_\theta(b_0)\right]|v'_\theta(b_0) = p^*\right] = 0, \tag{13}$$

setting the average net surplus from additional coverage for the marginal buyer equal to zero, which clearly illustrates the link with the characterization of the optimal uniform benefit level in proposition 1.

When offering choice is desirable, the policy maker needs to decide how much to differentiate the coverage levels. The same key forces as when evaluating choice at the margin are at work. Consider an increase in the comprehensive coverage level. The markup that individuals selecting it are willing to pay $E_\Delta\left[\pi_\theta(b_0+\Delta)\eta_\theta(b_0+\Delta)\right]$ needs to be traded off against the moral hazard cost for them $E_\Delta\left[\pi_\theta(b_0+\Delta)\varepsilon_\theta(b_0+\Delta)\right]$. Similarly, when considering increasing the basic coverage level, the markup $E_0\left[\pi_\theta(b_0)\eta_\theta(b_0)\right]$ and moral hazard $E_0\left[\pi_\theta(b_0)\varepsilon_\theta(b_0)\right]$ for individuals selecting basic coverage becomes relevant. Strong selection on markups makes differentiation more desirable. Strong selection on moral hazard does the opposite. A natural limit on the value of differentiating coverage levels comes from risk-aversion, which causes markups in the WTP for extra coverage to

[4]For non-marginal additional levels of coverage, this becomes $p^* = E_p\left[\pi_\theta(b_0+\Delta)(b_0+\Delta) - \pi_\theta(b_0)b_0\right]$.

be decreasing in the coverage level itself.

In addition to evaluating the value and cost of providing extra coverage for individuals already on that plan, any changes in coverage can cause further re-sorting of individuals. When plans are no longer marginally different, re-sorting imposes an additional cost externality on the insurer, determined by the difference in prices paid and insurance cost for the respective coverages. Hence, whether or not this externality is large will crucially depend on how prices are set. The interaction between price and coverage is thus key. This has been noted before in the literature (see Azevedo and Gottlieb 2017; Weyl and Veiga 2017; Landais et al. 2020; Geruso et al. 2019), in particular in relation to the use of minimum mandates. A minimum mandate can provide valuable coverage for low-risk individuals who are otherwise priced out of the market for comprehensive coverage. However, a more generous mandate will make the market for comprehensive coverage more adversely selected. This effect can be mitigated by reducing the price for comprehensive coverage. In what follows, we study insurance choices and the equilibrium determination of prices, taking coverage levels as given.

2.5 Ex-ante vs. Observed Measures of WTP

The previous sections characterize the optimal amount of insurance using individuals' hypothetical WTP for insurance. This has the advantage of writing the optimality formulas using estimable parameters. But an important caveat is that measures of WTP for insurance can be complicated by the fact that individuals may learn over time about their risk. This tends to lower the average WTP for insurance in the population (Hirshleifer 1971). Individuals who may have ex-ante value for insurance may no longer be willing to pay a markup for insurance over their costs after they learn their costs. More broadly, "willingness to pay" is generally not stable over time.

The question of when to measure WTP corresponds to imposing a classification for what is "insurance" versus "redistribution". In general, the observed choices one might use to measure WTP occur after some information has been revealed – in this sense, it will incorporate an insurance value only against the risk that remains at the time of observing choices. In contrast, measuring WTP from behind the veil of ignorance incorporates this additional WTP that individuals might have from a redistributive value of insurance. The framework can be easily extended to accommodate this option value and also allowing for redistributive effects more generally (see Landais et al. 2020 and Hendren 2020). In general, ex-ante perspectives tend to deliver higher values of insurance because it incorporates an option value that individuals get from being able to purchase insurance at lower prices.

While the framework can be extended to incorporate an ex-ante notion of WTP, an important direction for future work is to explore *when* individuals should be allowed to purchase insurance (e.g., Ghili et al. 2020). For example, should the open enrollment period for insurance covering risk in the year 2022 be in September 2021? How about September 2020? Or earlier? Allowing for choice at a point that is closer to when individuals use the insurance increases the scope for adverse selection[5] but also can allow for the realization of preference heterogeneity and help increase the

[5]See Cabral (2016) for evidence of this in the dental insurance context.

value of choice. Exploring this tradeoff is an interesting and policy-relevant direction for future work.

3 Limits to Choice

While Section 2 showed when offering choice can increase welfare, this section asks whether markets can provide these choice opportunities and/or individuals can leverage them. An often-cited advantage of markets is the variety producers can offer to consumers with heterogeneous tastes. This section, however, outlines sources of externalities documented in existing work that prevent private markets from reaching efficient outcomes. In particular, we characterize inefficiencies that arise from adverse selection, uncompensated care, and behavioral frictions. By presenting them as externalities, we point to Pigouvian pricing as a key policy to complement the offering of choice through markets.

3.1 Adverse Selection

We begin with the classic case of adverse selection. The simplest case to consider in our framework is one without baseline insurance, $b_0 = 0$ with private firms attempting to sell a small amount of insurance, Δ, at some price p. For any price, all those with $v'_\theta(0) \geq p$ will choose to purchase the insurance and they will impose an expected cost of $\Delta E\left[\pi_\theta(0) | v'_\theta(0) \geq p\right]$. A competitive insurance market for a given policy Δ would expect to generate zero profits, $p\Delta = \Delta E\left[\pi_\theta(0) | v'_\theta(0) \geq p\right]$, or satisfy the fixed point:

$$p = E\left[\pi_\theta(0) | v'_\theta(0) \geq p\right]$$

However, Akerlof (1970) shows that it is possible that no such fixed point exists. As prices rise, the set of people purchasing insurance (those with $v'_\theta(0) \geq p$) may have higher risk (i.e. higher values of $\pi_\theta(0)$). In the extreme case, it could be that

$$p < E\left[\pi_\theta(0) | v'_\theta(0) \geq p\right] \quad \forall p \tag{14}$$

so that the market "unravels" and no private market can profitably provide insurance. Any time the insurance company tries to set prices at p, the costs they have to pay ($E\left[\pi_\theta(0) | v'_\theta(0) \geq p\right]$) exceed p.

To assess the magnitude of this type of selection in the context of unemployment, Hendren (2017) makes the simplifying assumption that there is no preference heterogeneity conditional on the likelihood of employment. In this case, the average probability of those who purchase when prices are p are simply the average probability of those who are at least as likely to experience unemployment as the marginal purchaser. Equation (14) can then be written as

$$v'_{\tilde{\theta}}(0) > E\left[\pi_\theta(0) | \pi_\theta(0) \geq \pi_{\tilde{\theta}}(0)\right] \quad \forall \tilde{\theta}$$

where the expectation $E\left[\pi_\theta(0) | \pi_\theta(0) \geq \pi_{\tilde{\theta}}(0)\right]$ is the average probability (across values of θ) for

which the probability exceeds the probability of the marginal type, $\pi_{\tilde{\theta}}(0)$. Subtracting $\pi_{\theta}(0)$ and dividing by $\pi_{\tilde{\theta}}(0)$ on both sides yields the expression:

$$\eta_{\tilde{\theta}}(0) > \frac{E\left[\pi_{\theta}(0) - \pi_{\tilde{\theta}}(0) \,|\, \pi_{\theta}(0) \geq \pi_{\tilde{\theta}}(0)\right]}{\pi_{\tilde{\theta}}(0)} \quad \forall \tilde{\theta} \tag{15}$$

The LHS is the markup that individuals are willing to pay for insurance. The RHS is the markup that individuals have to pay in order to cover the pooled cost of worse risks. Unless some type in the economy is willing to pay the cost imposed by higher risks purchasing insurance, the market will completely unravel.[6] For risks that have probabilities closer to 0 than 1 (like the onset of unemployment), this ratio (plus 1) is analogous to the "pooled price ratio" in Hendren (2017). This ratio can be measured if one observes the distribution of π_{θ} across the population. It can be inferred from revealed preference choices, or, as we detail in Section 4.2 below, it can potentially be inferred from data on subjective probability elicitations.

The analysis above assumes $b_0 = 0$ and considers a market for a single insurance contract. One can also consider the impact of adverse selection in settings where there are both $b_0 > 0$ and $\Delta > 0$. In this case, one might want to have prices equal the average cost of enrolled (e.g. as in Azevedo and Gottlieb 2017). This would mean they satisfy the equation:

$$\begin{aligned} P_0 &= b_0 E_0\left[\pi_{\theta}(b_0)\right] \\ P_{\Delta} &= (b_0 + \Delta) E_{\Delta}\left[\pi_{\theta}(b_0 + \Delta)\right] \end{aligned}$$

where $E_0[\circ] = E[\circ | v'(b_0) < p]$ is the conditional expectation with respect to the set of types θ that purchase b_0 coverage. Hence, the marginal equilibrium price p satisfies the fixed point,[7]

[6] Hendren (2017) makes the additional assumption that individuals have a common vNM utility function so that the ratio of marginal utilities between insured and uninsured states of the world is common across individuals, $\frac{v'_{\theta}}{\pi_{\theta}} \frac{1-\pi_{\theta}}{1-v'_{\theta}} = \frac{u'(c_u)}{u'(c_e)}$. With this additional assumption, Hendren (2017) shows that one can then write the no trade condition in equation (15) as

$$\frac{u'(c_u)}{u'(c_e)} = \frac{v'_{\theta}}{\pi_{\theta}(0)} \frac{1-\pi_{\theta}(0)}{1-v'_{\theta}} < \min_{\tilde{\theta}} \frac{1-\pi_{\tilde{\theta}}(0)}{\pi_{\tilde{\theta}}(0)} \frac{E\left[\pi_{\theta}(0) \,|\, \pi_{\theta}(0) \geq \pi_{\tilde{\theta}}(0)\right]}{1 - E\left[\pi_{\theta}(0) \,|\, \pi_{\theta}(0) \geq \pi_{\tilde{\theta}}(0)\right]} \tag{16}$$

The RHS of this equation is the "minimum pooled price ratio" in Hendren (2013) and Hendren (2017). It differs from the RHS of equation (15) by 1 plus a multiplicative factor $\frac{1-\pi_{\tilde{\theta}}(0)}{1-E\left[\pi_{\theta}(0) | \pi_{\theta}(0) \geq \pi_{\tilde{\theta}}(0)\right]}$. Note that when the distribution of π is concentrated near 0 (as it is in the unemployment context where average yearly entry into unemployment probabilities are around 5%), then $\frac{1-\pi_{\tilde{\theta}}(0)}{1-E\left[\pi_{\theta}(0) | \pi_{\theta}(0) \geq \pi_{\tilde{\theta}}(0)\right]} \approx 1$ so that the RHS is approximately equal to $\frac{E\left[\pi_{\theta}(0) | \pi_{\theta}(0) \geq \pi_{\tilde{\theta}}(0)\right]}{\pi_{\tilde{\theta}}(0)}$, which is equivalent to 1 plus the RHS of equation (15).

[7] Note that the approximation relies on $\Delta \times \{E_{\Delta}[\pi_{\theta}(b_0 + \Delta)] - E_{\Delta}[\pi_{\theta}(b_0)]\} \cong 0$.

$$
\begin{aligned}
p\Delta &= P_\Delta - P_0 && (17)\\
&= (b_0+\Delta)\, E_\Delta\left[\pi_\theta\left(b_0+\Delta\right)\right] - b_0 E_0\left[\pi_\theta\left(b_0\right)\right] && (18)\\
&= b_0 \times \left[E_\Delta\left[\pi_\theta\left(b_0\right)\right] - E_0\left[\pi_\theta\left(b_0\right)\right]\right] + \Delta \times E_\Delta\left[\pi_\theta\left(b_0+\Delta\right)\right] \\
&\quad + b_0 \times \left[E_\Delta\left[\pi_\theta\left(b_0+\Delta\right)\right] - E_\Delta\left[\pi_\theta\left(b_0\right)\right]\right] && (19)\\
&\cong \underbrace{b_0 \times \left[E_\Delta\left[\pi_\theta\left(b_0\right)\right] - E_0\left[\pi_\theta\left(b_0\right)\right]\right]}_{\text{Adverse Selection on Baseline Coverage}} + \underbrace{\Delta \times E_\Delta\left[\pi_\theta\left(b_0\right) \times \left[1+\varepsilon_\theta\left(b_0\right)\right]\right]}_{\text{Cost of Extra Coverage for } F_\Delta}. && (20)
\end{aligned}
$$

Hence, the equilibrium price reflects the difference in costs of providing the baseline coverage plus the marginal cost of providing the additional Δ coverage for all who buy the extra coverage (accounting for both the mechanical and behavioral cost). In contrast, the efficient price reflects only the cost of providing the additional Δ coverage and this for those at the margin of buying the extra coverage, $p^* = E_{p^*}\left[\pi_\theta\left(b_0\right) \times \left[1+\varepsilon_\theta\left(b_0\right)\right]\right]$.

In our framework with two coverages, the pricing inefficiency will cause too few people to get the more generous coverage. Even worse, the adverse selection can lead to no differentiated coverage being provided, even when offering choice is valuable. To see why this is the case, it is perhaps most useful to consider the empirical example in Cutler and Reber (1998). They study the impact of Harvard HR moving to a health insurance pricing regime that requires their more and less generous health insurance policies to break even. This quickly led to an unraveling of the market for the more generous insurance because those with higher expected costs chose the more generous plan, corresponding to the first term in equation (20).

In some settings, prices are not required to break even. One example of this is the market for Medigap, which provides top-up insurance beyond the Medicare's basic coverage of 80% of costs for individuals over age 65. Cabral and Mahoney (2019) show that the provision of Medigap coverage - which insures the remaining 20% of risk - leads individuals to use additional healthcare. This in turn increases the cost to Medicare of insuring the base 80% of costs, corresponding to the moral hazard response in the second term of equation (20). While the private Medigap insurers must cover their costs in order to make a profit, they do not need to compensate Medicare for this externality. In this sense, Medicare implicitly subsidizes Medigap coverage. An interesting direction for future work is whether this implicit subsidy is too large or small relative to the optimal subsidy.

3.2 Uncompensated Coverage

Individuals can often rely on some basic level of implicit insurance coverage. The most natural example comes from uncompensated care, like emergency care, in the context of health insurance (e.g. Garthwaite et al. 2018; Finkelstein et al. 2018; Finkelstein et al. 2019). But this issue generalizes to social insurance programs where individuals who did not contribute (or are not eligible) for standard social insurance can fall back on some social assistance or basic protection from the government, friends, hospitals, or other private charitable organizations. The issue of non-contributory coverage

has also been particularly relevant during the Covid crisis as many governments have scaled up existing programs or offered ad hoc support against the unforeseen health and employment risks.

In our framework the non-contributory protection can be interpreted as some baseline coverage b_0 that is always available for free ($P_0 = 0$). This naturally gives rise to pricing inefficiencies. Consider again the case where competition requires each (standard) plan to break even, then

$$\begin{aligned}\Delta p &= P_\Delta - P \\ &= (b_0 + \Delta) E_\Delta \left[\pi_\theta (b_0 + \Delta)\right] \\ &\cong b_0 E_\Delta \left[\pi_\theta (b_0)\right] + \Delta E_\Delta \left[\pi_\theta (b_0) \times \left[1 + \varepsilon_\theta (b_0)\right]\right].\end{aligned}$$

As the offered insurance crowds out previously uncompensated care, $b_0 E_\Delta \left[\pi_\theta (b_0)\right]$, the insurer will want to cover this cost. Neither do those purchasing insurance internalize the cost reduction, $b_0 E_\Delta \left[\pi_\theta (b_0)\right]$, on those who otherwise would have provided some degree of informal insurance. This again drives the market price p up relative to its efficient level, which would again be $p^* = E_{p^*} \left[\pi_\theta (b_0) \times \left[1 + \varepsilon_\theta (b_0)\right]\right]$. A Pigouvian subsidy could induce more individuals to buy the supplemental coverage and reduce the wedge between WTP and the marginal cost from providing the supplemental coverage.

3.3 Behavioral Frictions

The previous two sources of inefficiencies were coming from the supply side preventing the efficient pricing of plans. The inefficiencies can come from the demand side as well. A growing empirical literature documents the presence of behavioral frictions distorting individuals' insurance choices (see Ericson and Sydnor 2017, Chandra et al. 2019). This can include inertia, optimistic beliefs, information frictions, limited attention, cognitive ability, etc. We can introduce choice frictions $f_\theta (b)$ in our framework as driving a wedge between the true value $v'_\theta (b)$ and the WTP $\hat{v}'_\theta (b)$, following Spinnewijn (2017). The latter is the value individuals reveal through their choices. That is, an individual buys the extra coverage if $v'_\theta (b) + f_\theta (b) \geq p$, while her consumer welfare continues to be maximized by buying the extra coverage if $v'_\theta (b) \geq p$. For example, the presence of biased beliefs - where the perceived risk $\hat{\pi}_\theta (b)$ differs from the true risk $\pi_\theta (b)$ - would induce a wedge between the WTP and the expected value from insurance (e.g., Stephens 2004 and Spinnewijn 2015 in the context of unemployment).

As choice frictions distort the selection into plans, they will crucially affect the value of providing choice. The condition for choice to be welfare improving remains that the selection on (true) markups is stronger than the selection on moral hazard. In the presence of choice frictions, the selection on markups can be decomposed as:

$$\begin{aligned}\underbrace{E_\Delta \left[\pi_\theta (b_0)\, \eta_\theta (b_0)\right] - E\left[\pi_\theta (b_0)\, \eta_\theta (b_0)\right]}_{\text{Selection on Value Mark-up}} &= \underbrace{E_\Delta \left[\hat{v}'_\theta (b_0)\right] - E\left[\hat{v}'_\theta (b_0)\right]}_{\text{Selection on WTP}} \\ &\quad - \underbrace{E_\Delta \left[\pi_\theta (b_0)\right] - E\left[\pi_\theta (b_0)\right]}_{\text{Selection on Risk}} - \underbrace{E_\Delta \left[f_\theta (b_0)\right] - E\left[f_\theta (b_0)\right]}_{\text{Selection on Frictions}}. \quad (21)\end{aligned}$$

As shown by Spinnewijn (2017), the selection into insurance based on frictions tends to reduce the selection on value $v'_\theta(b)$. For example, when individuals' risk perceptions are noisy measures of their true underlying risk, overly pessimistic individuals are over-represented among those buying comprehensive coverage. This also implies that the demand curve will over-state the value the supplemental coverage generates for those selecting it. However, when considering whether to introduce corrective pricing a la Pigou, it is the average friction among the marginal buyers that is relevant. Indeed, the efficient price now equals

$$p^* = E_{p^*}\left[\pi_\theta(b_0)\left[1+\varepsilon_\theta(b_0)\right]+f_\theta(b_0)\right]. \tag{22}$$

The role of choice frictions goes beyond this, as selection based on frictions tends to reduce the selection on risk $\pi_\theta(b)$. In particular, when individuals under-react to their differences in risk, the choice of supplemental coverage will be clearly less adversely selected. This then will also affect the equilibrium price (e.g., Handel 2013; Polyakova 2016; Handel et al. 2019). Hence, inefficiencies from the demand and supply side interact, affecting the efficient and equilibrium price respectively, and can aggravate or mitigate each other in welfare terms. [8]

Finally, the incidence of choice frictions is likely to be unequally distributed. Exploiting health insurance choices in the Netherlands, Handel et al. (2020) show how individuals with higher socioeconomic status and income are more likely to realize the value of the offered choice. Equity considerations are important when considering to offer choice, but especially so when choice frictions are at play.

3.4 A Pigouvian Perspective

While Section 2 showed the potential value of choice, this section outlined three reasons why enabling choice may lead to inefficiencies. Broadly, these inefficiencies arise from externalities: individuals do not face the right prices. Adverse selection occurs when individuals do not internalize not only the cost they impose on the provider of the plan they buy, but also the costs they reduce for the provider of coverage they no longer get. Externalities also arise from the existence of uncompensated care that can depress WTP. More problematic, individuals may impose externalities on themselves (better referred to as "internalities") in the presence of choice frictions. Importantly, these externalities may be orthogonal to the potential of offering choice. A single mandate can be too blunt as a policy response. Instead one can try to overcome these externalities through appropriate Pigouvian taxes/subsidies so that prices reflect the optimal incentives outlined in Section 2. As with any effort of policy to correct externalities, implementation may be complicated in practice. Nonetheless, the conceptual tools for combatting these inefficiencies are rooted in the ideas of Pigou: internalize the externality.[9]

[8] Note that the presence of frictions can also affect the moral hazard response (e.g., Baicker et al. 2015; Spinnewijn 2015). This can affect the selection on moral hazard determining the value of choice, but also introduces extra corrective externalities when individuals change behavior in response to coverage changes.

[9] Externalities are often individual-specific and lead not only to over- or underinsurance, but also to inefficient sorting across plans. Rather than using a uniform subsidy or taxes, the highest welfare potential may be realized by price or quantity corrections that are individual-specific. This may call for individual-risk rather than community rating in the

4 Empirical Application: Evaluating Choice in UI

We illustrate the implementation of our framework using two empirical pathways. First, in Section 4.1 we leverage the unique Scandinavian context where the UI system allows for choice. We show there how we can identify all the relevant moments necessary to determine the value of giving choice. And we also discuss how different policy parameters (prices and coverage levels) should be set in order to regulate UI choices optimally. Second, in Section 4.2 we focus on contexts where no choice is actually observed. We present the innovative approaches that have been recently developed in these settings to identify the sources of heterogeneity that are relevant to determine the costs and benefits of offering insurance choice.

4.1 Using Choice Data: Evidence from Scandinavia

The ideal context to identify all the moments to evaluate the value of choice (see equation (10)) is of course one in which it is possible to observe insurance choices. While UI in almost all countries is organized along a single mandate, four countries - Iceland, Denmark, Finland and Sweden - do offer choice. These UI systems have recently been studied in a series of papers (e.g. Parsons et al. 2015; Khomenko 2018; Landais et al. 2020; Landais and Spinnewijn forthcoming) and constitute a fruitful setting to evaluate the value of providing choice in UI.

The Scandinavian UI systems share a similar, two-tier feature. The first part of the UI system is mandated and provides basic coverage funded by a payroll tax. The benefit level that the unemployed receive with this basic coverage is non-contributory (i.e., do not depend on the unemployed earnings prior to displacement) and generally low (e.g., a median replacement rate of about 20% in Sweden). The second part of the UI system is voluntary. By paying an insurance premium to UI funds (on top of the payroll tax), workers can opt for more comprehensive coverage. Upon displacement, workers who have been paying the premium get, in lieu of the basic coverage, more generous benefits, replacing their pre-unemployment earnings proportionally up to a cap (e.g., a replacement rate of 80% in Sweden).

Historically, this two-tier organization can be traced back to the "Ghent system", in which labor and trade unions played an important role in providing UI.[10] Today, the comprehensive UI coverage is often administered by UI funds that originated from funds set up by unions. However, central governments overtook the responsibility of supervising the entire UI system long ago, and the links between UI funds and unions have loosened progressively (see Carroll 2005). This, in practice, means that there is no competition between UI funds: the coverage, premia, and eligibility conditions for supplemental UI are all set by the central government, without variation across fund.[11]

context of adverse selection and for choice aids (e.g., smart defaults) in the context of choice frictions. See for example Handel et al. (2015) and Handel et al. (2020).

[10] Union administration offered a variety of advantages. Unions could require that union members join UI funds, limiting adverse selection. Today, requiring union members to buy supplemental UI is generally no longer possible, but union members can often benefit from an extra rebate on the premium for the comprehensive UI coverage. Moreover the union had obvious advantages monitoring its own members, e.g. for slackness in job seeking, thus also limiting moral hazard.

[11] In 2008, Sweden implemented an extra risk adjustment fee, differentiated across UI funds, thus introducing average cost pricing within funds. However, as membership in riskier funds started to unravel, the government reverted to equal

Separating Adverse Selection and Moral Hazard The presence of choice data allows to test whether workers who choose more generous UI coverage are also more likely to be unemployed. This follows the traditional "positive correlation test" (PCT) approach that has been widely applied in the empirical insurance literature since the seminal work of Chiappori and Salanié (2000) (see reviews in Chiappori and Salanié 2013 and Cohen and Siegelman 2010). In practice, there is evidence of a strong positive correlation in the Scandinavian UI systems. Landais et al. (2020) find for instance that workers buying the supplemental UI coverage in Sweden over the period 2002-2006 have an unemployment risk that is at least twice as large as workers who are on basic coverage. Parsons et al. (2015) obtain similar results in the Danish context.

But it is well known that the PCT cannot separate moral hazard and adverse selection, let alone identify selection on moral hazard. So in itself, a PCT is not sufficient to evaluate the optimality of the UI choice structure. Following our earlier notation, the PCT statistic can be decomposed between the moral hazard effect of providing more generous coverage to individuals selecting supplemental UI, and the differential risk of those selecting the supplemental UI evaluated under basic coverage:

$$\underbrace{E_\Delta\left[\pi_\theta\left(b_0+\Delta\right)\right]-E_0\left[\pi_\theta\left(b_0\right)\right]}_{\text{PCT Statistic}} \cong \frac{\Delta}{b_0}\underbrace{E_\Delta\left[\pi_\theta\left(b_0\right)\varepsilon_\theta\left(b_0\right)\right]}_{\text{MH for Comprehensive Buyers}} + \underbrace{E_\Delta\left[\pi_\theta\left(b_0\right)\right]-E_0\left[\pi_\theta\left(b_0\right)\right]}_{\text{Selection on Risk in Basic Coverage}}.$$

These effects correspond to the terms in proposition 2 needed to evaluate the value of offering choice at the margin (starting from the optimal uniform benefit level). An alternative way of decomposing the PCT statistic is between the moral hazard effect for individuals sticking to basic coverage, and their differential risk when on comprehensive coverage:

$$\underbrace{E_\Delta\left[\pi_\theta\left(b_0+\Delta\right)\right]-E_0\left[\pi_\theta\left(b_0\right)\right]}_{\text{PCT Statistic}} \cong \frac{\Delta}{b_0}\underbrace{E_0\left[\pi_\theta\left(b_0\right)\varepsilon_\theta\left(b_0\right)\right]}_{\text{MH for Basic Buyers}} + \underbrace{E_\Delta\left[\pi_\theta\left(b_0+\Delta\right)\right]-E_0\left[\pi_\theta\left(b_0+\Delta\right)\right]}_{\text{Selection on Risk in Comprehensive Coverage}}.$$

Interestingly, the two decompositions combined correspond to the terms needed to evaluate the value of more differentiation in offered choice, and in particular the difference in moral hazard between workers who select the supplemental coverage and those who do not, as briefly discussed in Section 2.3, but fully developed in Landais et al. (2020).

Now to separate the respective moral hazard and selection effects, one can rely on exogenous price variation that allows identifying individuals with different WTP and studying their unemployment risk under the same coverage. Alternatively, one can rely on exogenous benefit variation and study how the unemployment risk changes for a given group of workers. In practice, this variation can be combined with some structural assumptions on how demand and risk depend on coverage, prices and observables. Landais et al. (2020) exploit a sharp and unexpected increase in the premium charged for the supplemental coverage in Sweden in 2007. The surge in premium, which more than quadrupled, did generate a significant (although somewhat modest) demand re-

premia across funds in January 2014.

sponse, with around 10% of Swedish workers switching out of the comprehensive plan as a result, and allows to rank workers in three groups based on their WTP. They combine this price variation with a model predicting individuals' unemployment risk based on a rich set of observables under the comprehensive and basic coverage respectively.[12]

Figure 2 reports their estimated demand curve using the 2007 premium variation, but expressed as the WTP per krona of supplemental coverage for each day spent unemployed in the next year. In the absence of any demand frictions, this scaled WTP for the supplemental coverage can be seen as an approximation of the marginal value of coverage $v'_\theta(b_0)$. Following Figure 1, figure 2 then compares the WTP to the marginal cost of providing the extra krona of coverage, showing both its cost in the absence of any moral hazard response, $E\left[\pi_\theta\left(b_0\right)|v'_\theta\left(b_0\right)\right]$, and its cost accounting for the moral hazard response, $E\left[\pi_\theta\left(b_0\right)\left(1+\varepsilon_\theta\left(b_0\right)\right)|v'_\theta\left(b_0\right)\right]$. The risk term $\pi_\theta\left(b_0\right)$ corresponds to the expected days spent unemployed under basic coverage in the next year. The moral hazard elasticity $\varepsilon_\theta\left(b_0\right)$ is approximated using the increase in expected days spent unemployed under comprehensive coverage relative to basic coverage. All estimates are shown for three groups: those who continued to buy the supplemental coverage after the price increase, those who stopped buying it after the price increase, and those who did not buy it even before the price increase. Several insights emerge from the figure.

First, as evidenced by the somewhat modest demand response, the WTP curve for supplemental UI is quite vertical, i.e. demand is quite rigid. In other words, individuals opting for basic coverage are characterised by a very low WTP for the supplemental coverage, while individuals under comprehensive coverage are willing-to-pay a very high price for the supplemental coverage. Significant heterogeneity in valuation is *a priori* a strong argument in favor of offering coverage choice. However, this also assumes the absence of choice frictions, while the modest demand response could be driven by inertia.

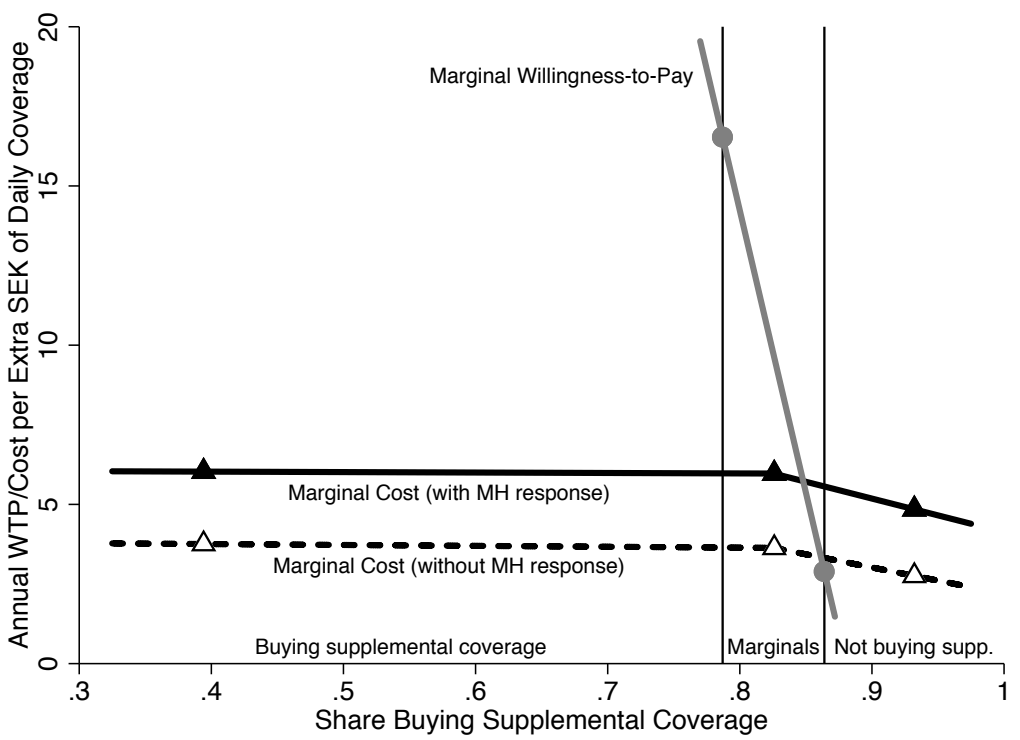
As shown in formula 10, the demand curve (and its steepness) must be evaluated against two forces, the importance of risk-based selection, and the magnitude of selection on moral hazard. Intuitively, strong adverse selection counters the presence of strong heterogeneity in WTP. If people with large WTP also have high risk $\pi_\theta\left(b_0\right)$, then, this will make the cost curve - not accounting for moral hazard - very steep, thus significantly reducing the selection on the WTP markup. Graphically, the markup is represented by the distance between the WTP and cost under basic coverage). Similary strong selection on moral hazard will also reduce the value of choice: if individuals who value UI more are also much more responsive in their risk to an increase in UI coverage, this will increase the cost of providing additional coverage to individuals with high WTP. Schematically, this will make the cost curve even steeper once we account for moral hazard, potentially resulting in a cost curve that exceeds WTP for individuals with high WTP.

[12] In theory, one could just identify the average cost curve under the basic (resp. comprehensive) plan, by regressing average risk in the basic (resp. comprehensive) plan on the fraction of workers buying comprehensive coverage, using the price variation as instrument. A problem in practice comes from the fact that most price variation in Scandinavian UI systems is time-series. There is almost no variation across similar individuals over time, that would allow for a Difference-in-Difference type of identification. Time-series estimation runs the risk of being confounded by aggregate unemployment risk, i.e. business-cycle variation in labor market conditions. To alleviate this issue, Landais et al. (2020) combine price variation -to identify WTP, with a model of predicted risk under both coverages: the correlation between WTP and predicted risk under basic and comprehensive coverage is thus immune to the presence of aggregate risk.

Interestingly, figure 2 shows that the choices into supplemental coverage are indeed adversely selected, but the magnitude of adverse selection is relatively modest in the Swedish context. This in turn implies that the WTP mark up is significantly larger for individuals who buy the comprehensive coverage than for individuals who do not.

Finally, there is also substantial moral hazard, shifting up the cost of providing coverage uniformly. In fact, expressed as elasticities, there is some "advantageous "selection on moral hazard. That is, the relative cost increase of providing extra coverage is larger among individuals with low WTP than among workers with high WTP for more UI. This "advantageous" selection on moral hazard is therefore also a force pushing for coverage differentiation.

Figure 2: Estimated Demand and Cost Curves in Swedish Two-Tier UI policy



Notes: The figure corresponds to the empirical implementation of figure 1 in the context of the Swedish unemployment insurance (UI) system, using estimates from Landais et al. (2020). The grey-line plots the WTP per additional krona of UI, identified using a large variation in the premium charged for supplemental UI in 2007. The dark curves correspond to the marginal cost per krona of additional coverage without moral hazard response (dashed curve), and when accounting for moral hazard responses (plain curve). The steepness of the willingness-to-pay curve is evidence of significant heterogeneity in the value of additional UI. The decreasing marginal cost curves indicate the presence of significant adverse selection, but this adverse selection is small relative to moral hazard. Furthermore, there is slight advantageous selection on moral hazard. These estimates imply that there is value of providing choice in UI in the Swedish context. See text for details.

Evaluating Choice in the Scandinavian Context What can we conclude from these estimates regarding the value of offering choice, and the optimal structure of the Scandinavian two-tier UI system?

The first immediate implication is that mandating all workers to buy the generous comprehen-

sive coverage would not be optimal: a significant fraction of workers (about 15%) have a WTP for supplemental coverage that is below the cost of providing this extra coverage to them. As shown in figure 2, this discrepancy is partly driven by the large moral hazard cost of providing extra coverage for these workers. At the same time, the largest share of workers (about 85%) seem to value the supplemental coverage above the cost of providing the extra coverage. Hence, offering the option to buy comprehensive coverage seems to generate substantial value for them.

Of course, we are evaluating an option between coverage levels that are significantly different. Proposition 2 makes clear though, that to identify the value of giving choice, we should consider a marginal option evaluated at the optimal uniform benefit level b^*. In other words, even if a mandate of the comprehensive coverage would not be optimal, can we rule out that some single mandate, with coverage level between the basic and the comprehensive plan, does better than a design with choice?

To shed light on this, one should evaluate the desirability of further coverage differentiation at current levels of the basic coverage, b_0, and of the supplemental coverage, $b_0 + \Delta$. If further differentiation is desirable, then, under standard concavity assumptions, a universal mandate, at some intermediate level between b_0 and $b_0 + \Delta$, cannot do better than giving choice. As discussed in Section 2.4, the cost of further differentiation depends on the relative fiscal externalities created when decreasing b_0 and when increasing Δ. These fiscal externalities are direct functions of the relative moral hazard effects for workers with high vs low WTP, but also the selection responses the changes in coverages would entail. On the other hand, the welfare benefit is captured by the relative value of marginal coverage for individuals under basic vs comprehensive coverage. Importantly, this relative value of marginal coverage depends on the amount of heterogeneity in WTP, but must now also account for diminishing marginal utility, as this value is evaluated at b_0 for individuals under basic coverage, and at $b_0 + \Delta$ for individuals under supplemental coverage. The empirical implementation of the formula in Landais et al. (2020) suggests that the level of coverage differentiation is probably close to optimal at current prices. This result is driven by the significant heterogeneity in WTP for insurance and the presence of some advantageous selection on moral hazard in the Swedish context. An important implication is that the presence of significant adverse selection is not enough to justify mandating UI in the Scandinavian context: giving the option between strongly differentiated coverages seems to be optimal.

Of course, it is important to remember that these welfare statements on coverage differentiation are conditional on price levels. In Scandinavia, it turns out that the price of the supplemental coverage tends to be heavily subsidized, so that the premia that workers have to pay represent a relatively small fraction of the average cost of the comprehensive coverage. Is this subsidy too large? As shown in formula 13, the efficient price can easily be determined as the intersection between the markup and fiscal externality curves. In figure 2, the efficient price would therefore be somewhere in between the pre- and post-2007 prices. This suggests that, in order to mitigate the adverse selection externality created by significant coverage differentiation, it is necessary to subsidize premia quite heavily.

The Scandinavian experience therefore suggests that offering choice in UI can dominate a universal mandate. It is of course important that this conclusion ignores equity considerations and

relies on the absence of important choice frictions. It is important to highlight some specificities of Scandinavian labor markets. First, a rich set of institutions regulate layoffs and the search effort of unemployed workers is closely monitored by public employment services, thus reducing the scope for risk-based selection in this particular context. Second, the choice environment is tightly controlled by the central government: its simple structure may limit the scope for choice frictions, but cannot rule them out. Landais and Spinnewijn (forthcoming) for example find that workers' UI choices are correlated with scores on IQ tests, but also more responsive to salient differences in risk.

4.2 Evaluating Choice Without Choice Data

Looking only at contexts where choice data is available bears the risk of running into a "lamppost problem". It is precisely in situations where UI is mandated and where no choice is available that policymakers would benefit from assessing the welfare consequences of providing choice. So how can we still assess the value of providing choice in situations where markets do not exist and revealed preference cannot shed light on WTP? A recent literature has been trying to push the frontier, and offers important insights on the potential selection on the the relevant dimensions in contexts with a single UI mandate.

Identifying Selection on Risk There is significant and well-documented heterogeneity in unemployment risk, by income, education levels, occupations, across space and time, etc. To what extent would this heterogeneity in risk translate into adverse selection if one were to offer individuals choice over their amount of UI? This depends on whether this information is private information to workers, and also whether they would be able to act on this knowledge.

Following Stephens (2004) and Manski (2004), a recent literature illustrates how subjective probability elicitations from surveys can be used to answer these questions. Most related to this context, Hendren (2017) shows that elicited beliefs are strongly predictive of future unemployment status, even after controlling for a rich set of observable characteristics that could be priced by insurers in the market. Figure 3a displays the correlation between subjective probability elicitations in the Health and Retirement Study (HRS) in the US and realized unemployment, controlling for job industry categories, job occupation categories, log wage, log wage squared, job tenure, and job tenure squared, along with a set of demographic characteristics: census division dummies, gender dummies, age, age squared, and year dummies. The graph suggests that the predictive content of private beliefs, conditional on public information, is very strong. Most strikingly, Hendren (2017) shows that individuals do actually act on the basis of such private information and self insure against their perceived risk of job loss: spousal labor supply and consumption dynamics both significantly correlate with elicited unemployment risk. These results provide solid evidence of the presence of significant adverse selection in UI.

Would a market be able to exist? To explore this, Hendren (2017) uses subjective probability elicitations to estimate the markup individuals would have to be willing to pay for a market to exist, as shown in equation (15). The estimate suggests individuals would have to be willing to pay

at least a 300% markup (i.e. 4-1 ratio of marginal utilities between unemployed and employed) in order for a private market to be able provide additional UI beyond what the government currently provides (plotted with confidence intervals in the rightmost column in figure 3b). In contrast, estimates of individuals' willingnesses to pay for UI suggest individuals are willing to pay a markup of at most 60%. This means that left to the invisible hand, private markets would not provide the ability of individuals to choose their desired level of UI: decentralized private markets for supplemental UI coverage would unravel. But, this does not imply that a market would not exist if it were subsidized, as in the Scandinavian example above. Nor does it rule out that there could be value of providing choice. The core empirical result, however, is that these markets will unravel unless the choices are subsidized.

Hendren (2017)'s implementation assumes that individuals have rational beliefs about their likelihood of unemployment. This contrasts with a growing literature suggesting that individuals exhibit biased beliefs about their unemployment and job prospects (e.g. Stephens 2004; Spinnewijn 2015), which may be important to be factored in. Mueller et al. (2020) recently proposed an extension of the method in Hendren (2013; 2017) to account for biases in beliefs, but studying heterogeneity in re-employment prospects of unemployed workers rather than in the unemployment risk of employed workers.

The main limitation though is at the core of the challenge when choice data is absent. Ultimately, one needs an assumption on how the heterogeneity in risks translates into insurance choices. While higher risk increases the demand for insurance and the risk heterogeneity estimated in Hendren (2017) is very substantial, this mapping depends on the heterogeneity in other drivers of insurance choice and how they are correlated with the risk heterogeneity. In particular, the empirical calculation of the pooled price ratio in Hendren (2017) requires an absence of preference heterogeneity conditional on risk – it assumes that if an individual with a likelihood π of experiencing unemployment purchases insurance, then all types $\pi_\theta > \pi$ purchase insurance. Future work could expand the derivation of the no trade condition in the presence of other sources of demand heterogeneity.

Identifying Selection on Moral Hazard Estimating the moral hazard response to UI coverage has been the subject of a long, still ongoing literature (see Krueger and Meyer 2002, and Schmieder and Wachter 2016). Although individuals are not making choices, one can use policy changes to the mandated coverage to identify the impact of UI expansions on the cost of providing such insurance. From the perspective of our framework, two key insights emerge from this vast literature. First, the average behavioral responses are generally very large in all UI settings. Schmieder and Wachter (2016) summarize estimates from 18 studies from 5 different countries, and find a median estimate for the elasticity of unemployment duration with respect to mandated benefit coverage of 0.53. Second, there is some significant heterogeneity in estimates across contexts and individuals. For instance, responses vary significantly across unemployed workers depending on whether they are expecting recall from their previous employer (Katz and Meyer 1990), across long term vs short term unemployed (Kolsrud et al. 2018), or across workers depending on their access to liquidity (Chetty 2008).

But, from the perspective of evaluating choice, there is unfortunately little work relating this

heterogeneity in moral hazard to WTP for insurance in the UI context, which would help assess the extent of selection on moral hazard. The empirical challenge is the same as for gauging the importance of risk-based selection, and is especially difficult to estimate in the absence of choice data. Nonetheless, it is a key parameter for understanding the value of choice. If individuals who attach little value to UI also impose large moral hazard externalities, then mandating them into generous coverage runs the risk of driving costs above WTP. In such a context, offering choice could increase welfare.

Quantifying Selection on the Markup Large variation in WTP conditional on an individuals risk increases the value of allowing for choice. In the presence of adverse selection on risk and moral hazard, heterogeneity in the markups workers are willing to pay for insurance becomes a crucial ingredient for offering choice. But WTP markups, let alone the variation therein, are notoriously complicated to estimate in contexts where no choice is observed.

As noted before, the WTP markup relates directly to the ratio of marginal utilities when unemployed vs. employed $\frac{u'_\theta(c_u)}{u'_\theta(c_e)}$. To measure this marginal rate of substitution between consumption when unemployed and employed, the literature has mostly focused on the "consumption-based" approach, pioneered by Gruber (1997) . This approach relies on translating the drop in consumption at unemployment into a welfare value of insurance using an assumption on risk preferences. While the original literature, constrained by statistical power, was focused on measuring the average drop in consumption, recent studies, helped by the availability of more granular consumption data, have been able to document the presence of significant heterogeneity in consumption drops at unemployment (e.g. Ganong and Noel 2019; Gerard and Naritomi 2019; Landais and Spinnewijn forthcoming). Translating this heterogeneity in consumption patterns into heterogeneity in WTP for insurance is potentially problematic however, because consumption dynamics is endogenous to risk preferences: Individuals who value insurance more may find ways to insure themselves against the risk of job loss, thus experiencing a smaller drop in consumption at unemployment (Chetty and Looney 2006; Andrews and Miller 2013).

To circumvent the issues faced by the "consumption-based" approach, a number of "optimization-based" approaches have been developed, relying on the logic of revealed preferences arguments. These approaches have inferred the value of insurance from responses in various observable behaviors, from search effort (e.g. Chetty 2008, Landais 2015), to labor supply (Hendren 2017), UI take-up (e.g. Fontaine and Kettemann 2019, Landais and Spinnewijn forthcoming), or marginal propensities to consume (Landais and Spinnewijn forthcoming). Although most of these studies also focus on identifying the average value of insurance, these methods could be fruitfully employed to document heterogeneity in valuation. One should note however that these approaches maintain an assumption of individual optimization, which may fail in the presence of frictions. In other words, like for standard Revealed Preference methods, it is difficult to disentangle heterogeneity in WTP from heterogeneous frictions.

In general, the strands of research described above exemplify that, even without choice data, it remains possible to identify the relevant dimensions of heterogeneity. However, to evaluate selection into insurance, also the selection on markups, one needs to deal with a fundamental difficulty,

which is to figure out how it correlates with the WTP itself. Future work could try to use elicitations to measure the extent of selection on different dimensions, building on the methodologies used to capture risk-based selection.

5 Takeaways for Other Insurance Contexts

Governments provide a large set of social insurance programs beyond UI. What can we say about the value of offering choice in disability insurance (DI), workers' compensation, health insurance or long-term care insurance (LTCI)? Should countries allow for choice in these social insurance contexts? Our framework identifies the key micro-foundations that are required to evaluate choice, which includes heterogeneity in preferences, selection on risk and moral hazard, and choice frictions. Our framework can thus be used to provide a roadmap for the empirical work that needs to be done to fill the gaps in all these contexts.

Table 2 aims to identify some gaps in the empirical literature. While this is no attempt to provide a comprehensive review of the rich body of literature evaluating social insurance programs, we believe that some general lessons can be drawn.

A first lesson is that, despite the rich body of literature evaluating important features of each of the social insurance programs, we know relatively little on the key ingredients to evaluating choice. Indeed, for all the insurance programs, there is abundant work measuring the incentive effects (see reviews in Krueger and Meyer 2002, Schmieder and Wachter 2016 for UI, Low and Pistaferri 2020 for DI and Einav and Finkelstein 2018 for HI), but in general we know much less about how much individuals value the social insurance, let alone what dimensions of heterogeneity would drive selection.

A second related lesson is that we know more about these key ingredients in insurance contexts that embed choice. This explains the large literature on the different dimensions of selection in HI and LTCI choices, especially in the US. For the other insurance contexts, our knowledge is limited to a few exceptions leveraging offered choice in a particular setting. We discussed at length the UI choice offered in Sweden and studied by Landais et al. (2020) and Landais and Spinnewijn (forthcoming). Other notable exceptions are Cabral and Cullen (2019), studying private long-term DI, supplementing public DI in the US and Cabral et al. (2019), studying voluntary workers' compensation in Texas. Much more work is needed to improve our understanding of selection and the importance of preferences in frictions in all these domains. As discussed, survey elicitations can be a crucial instrument in the absence of private markets or choice data. In particular, Hendren (2013) uses subjective probability elicitations to find that private information can prevent markets from selling any insurance at all to some populations, notably those with "pre-existing conditions." Figure 3b shows the markup individuals would have to be willing to pay for a market to exist, broken out separately for the sample of people who have pre-existing conditions versus those who do not (and can therefore purchase insurance in private markets). The pattern shows that the markup individuals would need to pay to overcome adverse selection is significantly higher for those with pre-existing conditions; unsubsidized private markets seem to operate only when individuals do not have significant amounts of private information.

Table 2: Summary of Existing Applied Work

	Unemployment Insurance	Disability Insurance	Workers' Compensation	Long-Term Care Insurance	Health Insurance
Preference Heterogeneity	✔[a]	–[b]	–	✔[c]	✔[d]
Risk-Based Selection	✔[e]	✔[f]	✔[g]	✔✔[h]	✔✔[i]
Selection on Moral Hazard	✔[j]	–	–	–	✔✔[k]
Choice Frictions	✔[l]	–	–	✔[m]	✔✔[n]

Notes—

[a] While a large literature analyses the average value of unemployment insurance, evidence on preference heterogeneity in unemployment insurance is scarce. A notable exception is Landais and Spinnewijn (forthcoming), finding substantial heterogeneity.

[b] Note that Einav et al. (2012) and Coppola (2014) relate risk preferences to disability insurance choices.

[c] Using proxies of risk preferences, Finkelstein and McGarry (2006) find substantive heterogeneity, potentially explaining the observed advantageous selection. But this ignores the role of insurer's rejection practices (Hendren 2013).

[d] See, for example, Barsky et al. (1997), Einav et al. (2013), Hackmann et al. (2015), Handel and Kolstad (2015), and Ottaviani and Vandone (2015) with mixed results. Fang et al. (2008), Cutler et al. (2008), and Keane and Stavrunova (2016) study risk preferences related to Medigap coverage.

[e] Using elicitations, Hendren (2017) finds private unemployment insurance to be too adversely selected to be profitable, at any price. Landais et al. (2020) find evidence of significant risk-based selection in the public provision of supplemental unemployment insurance in Sweden.

[f] Using elicitations, Hendren (2013) finds substantive private information among applicants with pre-existing conditions. See also Soika (2018) and Cabral and Cullen (2019).

[g] One notable exception is Cabral et al. (2019), finding no evidence of adverse selection in the Texan workers' compensation market.

[h] Most research points towards the presence of risk-based selection (Sloan and Norton 1997; Finkelstein et al. 2005; Finkelstein and McGarry 2006; Hendren 2013; Browne and Zhou-Richter 2014; Boyer et al. 2017). See also Zick et al. (2005) and Oster et al. (2010) linking it to genetic testing.

[i] Risk-based selection in health insurance continues to be the focus of much research. For a selection that is by no means exhaustive, see Cutler and Reber (1998), Cardon and Hendel (2001), Einav et al. (2010), Einav et al. (2013), Handel (2013), Hackmann et al. (2015), Polyakova (2016), Finkelstein et al. (2019), Ghili et al. (2020), and Powell and Goldman (2020).

[j] One notable exception is Landais et al. (2020).

[k] A small but growing literature looks at selection on moral hazard in the market for health insurance (Einav et al. 2013; Shepard 2016; Péron and Dormont 2018; Alessie et al. 2020).

[l] Some evidence on choice frictions in Landais and Spinnewijn (forthcoming) and on biased beliefs in Spinnewijn (2015) and Mueller et al. (2020).

[m] Some evidence that limited awareness and risk misperceptions are responsible for reduced demand for long-term care insurance (Cramer and Jensen 2006; Zhou-Richter et al. 2010; Boyer et al. 2017).

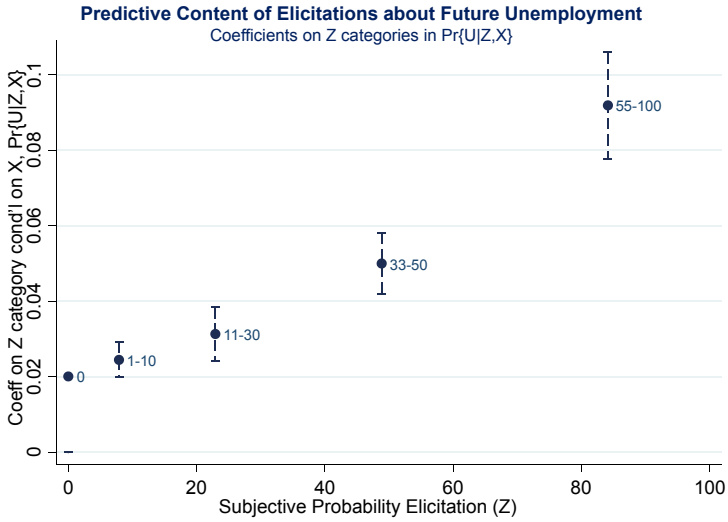
[n] There exists substantial evidence of choice frictions in the context of health care insurance (see Abaluck and Gruber 2011; Handel 2013; Heiss et al. 2013; Loewenstein et al. 2013; Marzilli Ericson 2014; Polyakova 2016; Ho et al. 2017; Handel and Kolstad 2015; Bhargava et al. 2017; Wright et al. 2017; Handel et al. 2020).

Finally, even when choice data is available, the traditional focus of the literature has been on adverse selection, both in HI and LTCI. In the context of HI, a rapidly growing literature documents the importance of choice frictions distorting plan choices (see Ericson and Sydnor 2017; Chandra et al. 2019) and a recent literature has started analyzing the role of selection on moral hazard (e.g., Einav et al. 2013, Shepard 2016). Still relatively little is known about the importance of heterogeneity in the preferences underlying choices, even though offering choice only has value when there is significant heterogeneity in valuations that is uncorrelated with people's risk and choice frictions (e.g., Handel and Kolstad 2015; Handel et al. 2019).

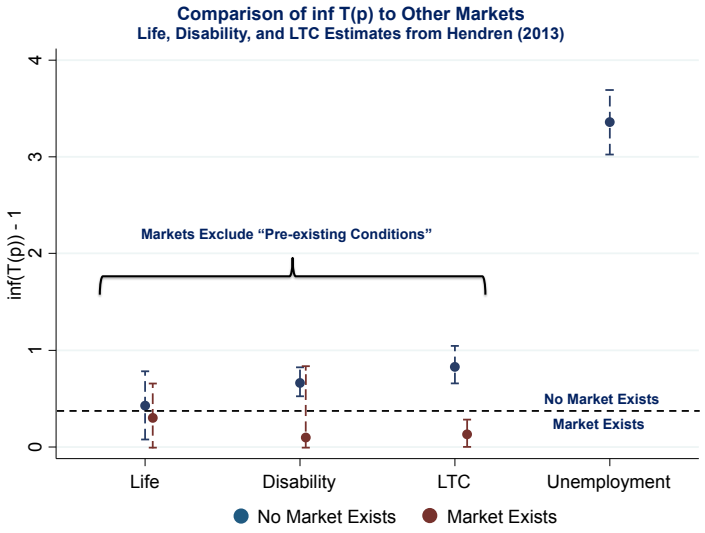
Our framework, combined with existing empirical estimates in the context of UI, suggests that expanding choice must be done carefully and with appropriate subsidies on those choices. While appropriately subsidized choices can help increase welfare, it is important to also note that it need not always be the case that choice increases welfare, as outlined in Section 2.3. Choice increases welfare only if the value of supplemental coverage to those selecting it exceeds the costs, but brings the possibility of inefficient allocations due to behavioral biases and choice frictions. An ongoing challenge is to separate preference heterogeneity from choice frictions when using Revealed Preference methods (e.g., Handel and Kolstad 2015). A final dimension on which we know too little in basically all insurance contexts is how the dimensions of choice relate to income, which will be crucial to evaluate the equity implications of embedding choice in social insurance design (e.g., Handel et al. 2020).

Figure 3: Private Information and Estimated Pooled Price Ratios (from Hendren 2017)

(a) Predictive Content of Elicited Unemployment Beliefs



(b) Estimated Pooled Price Ratio Across Markets



Notes: This figure illustrates the methodology of Hendren (2013) and Hendren (2017) to identify adverse selection in the absence of choice data using elicited risk beliefs. Panel A shows the predictive content of unemployment risk elicitation. The graph reports the mean rate of job loss in each elicitation category controlling for demographics, job characteristics, and year controls. it shows a strong positive correlation between beliefs and actual job loss conditional on these controls. Panel B shows the inferred minimum pooled price ratio (T(p)) minus 1, constructed from these estimates. This corresponds to the minimum markup that an individual would have to be willing to pay for a market to exist. The graph compares the estimates of inf T(p) – 1 in the unemployment context to the estimates in Hendren (2013) for three other insurance markets: Life Insurance, Disability Insurance and Long Term Care. For these markets, the graph reports separately estimates for the sample of individuals who are unable to purchase insurance due to a preexisting condition (blue dots) and in the sample of individuals whose observables would allow them to purchase insurance in each market (red dots). In the latter, one cannot reject the null hypothesis of no private information.

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