

# **Work, Subjective Well-being and Capabilities**

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To Tobe

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## List of Abbreviations

<b>CA</b>	Capability Approach
<b>CFA</b>	Confirmatory factor analysis
<b>EU</b>	European Union
<b>GDP</b>	Gross Domestic Product
<b>HILDA</b>	Household, Income and Labor Dynamics in Australia
<b>HWB</b>	Human Well-Being
<b>ILO</b>	International Labour Organization
<b>LSA</b>	Life Satisfaction Approach
<b>OECD</b>	Organisation of Economic Co-operation and Development
<b>SOEP</b>	Socio-Economic Panel
<b>SWB</b>	Subjective Well-Being
<b>UK</b>	United Kingdom
<b>UN</b>	United Nations
<b>UNDP</b>	United Nations Development Programme



# 1. Introduction

The last two decades have witnessed an increasing interest in the concepts and measures of human well-being. This development is essentially motivated by the deficits of national income-based approaches to a societies' welfare, which are well-known and by now already discussed in introductory text books of economics (e.g., Mankiw and Taylor, 2006). Major defects include, inter alia, the neglect of actual health conditions (e.g., longevity), the quality of social relations, economic and physical security, available leisure time, variation in wealth, and in general all non-market activities, such as household production. Additionally, ecological and other calamities, such as crime or war may even boost national incomes. Finally, aggregate-based accounts are usually insensitive to distribution and inequality, see e.g., Fitoussi *et al.* (2011) on this.

Great efforts have been made to devise alternative approaches. The Human Development Index, for the first time calculated in 1990, and since then published in the Human Development Reports (see e.g., UNDP, 1990), augments GDP per capita with information on life expectancy and educational achievements. The Millennium Development Goals, formulated in 2001 by the UN and others, admittedly contain some objectives expressed in monetary terms as well, such as to reduce the number of people living on less than \$1.25 a day. Most goals, however, are formulated according to the various domains of life, e.g., to achieve universal primary education, combat HIV / aids, malaria and other diseases, or to reduce child mortality (see UN, 2012).

The OECD's Better Life Index (OECD, 2011a,b) aims at both encouraging civil participation in discussion on welfare and strengthening the evidence base for policy making. Information deemed relevant includes aspects like a work-life balance, material conditions (e.g., housing, earnings, income, wealth), health status, social connections, civic engagements and governance. The chief concern of the Commission on the Measurement of Economic Performance and Social Progress, or Stiglitz-Sen-Fitoussi-Commission for short, created in 2008 by the French government, was to examine approaches to wel-

fare measures, not relying on GDP. To assess the quality of life the commission suggests to cover various life domains, including political voice and personal activities besides health, education, social relations and economic and physical security.

Currently, obtaining alternative approaches to well-being is also highly ranked on the agendas of other national governments. For instance, the Germany and Norway approved parliamentary commissions, Australia and Ireland set up dedicated statistical reports, national round tables have been introduced in Italy and Spain, and public consultations are promoted in the UK.<sup>1</sup> The European Commission issued a communication to the Council and the European Parliament titled “GDP and beyond: measuring progress in a changing world”, see COM (2009).

Finally, the focus on the lack of well-being, i.e. poverty, recently receives more attention in advanced economies as well. Leading examples, that go beyond the conventional monetary concepts are the German Reports on Poverty and Wealth (Bundesregierung, 2008) and the National Action Plans against social exclusion and poverty of the EU member states (Atkinson *et al.*, 2002).

### **The Relevance of Measures and Indicators**

The initiatives listed above document a general consensus about the significance of measurement for policy advice and evaluation, as Fitoussi *et al.* (2011, p.2) put it:

“What we measure affects what we do; and if our measurements are flawed, decisions may be distorted. [...] So too, we often draw inferences about what are good policies by looking at what policies have promoted economic growth; but if our metrics of performance are flawed, so too may be the inferences that we draw.”

In addition to this, the various approaches to measure well-being also reveal some agreement on both the multidimensional nature and, interestingly, also the selected dimensions. Finally, the aforementioned initiatives also highlight the plurality of purposes when it comes to assess human well-being or social welfare.<sup>2</sup> Bearing on this point, Fleurbaey

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<sup>1</sup> For the final report of the German commission see Bundestag (2013). Statistical reports are provided, e.g., by Economic and Council (2009) or Cummins *et al.* (2013); for the discussion in the UK see, e.g., Booth (2012).

<sup>2</sup> This plurality of purposes must also challenge any conceptual approach to well-being, since the respective aspects to account for, may well vary with the exercise at hand. Section 1.1 will briefly return to this issue.

(2009, p.1030) remarks

“the practical importance of a measure of social welfare can hardly be overstated. Policy decisions, cost-benefit analysis, international comparisons, measures of growth and inequality studies constantly refer to evaluations of individual and collective well-being.”

### **What exactly is the conceptual basis for our measures?**

A more fundamental problem, in some sense, relates to the theoretical foundation of welfare measures in two distinct, but related ways. First, in a survey on the measures of social welfare Slesnick (1998, p.2108) finds that “confusion persists concerning the relationship between commonly used welfare indicators and well-established theoretical formulations. For years it seemed that theoretical and empirical research developed along parallel lines with little, if any, cross-fertilization.” This observation is still valid, as reaffirmed by Fleurbaey (2009) in a recent survey.

Second, the underlying foundations themselves, based on a welfarist paradigm, are questioned for quite some time now; see the even older survey of Sen (1979). Thus, along with the efforts to improve welfare measures, alternative approaches to welfare on a conceptual level, i.e. welfare economics, are burgeoning as well. Influential directions of development include the theory of fair allocations by Fleurbaey (2008), equality of opportunity approach by Roemer (1998), the capability approach (CA) by Sen (1985a, 1992) and finally the subjective well-being approach (SWB), see e.g., Layard (2005), Frey (2008).

### **A Research Gap...**

Yet, despite these efforts, a consistent, unified, and commonly accepted approach towards well-being is still lacking. Although there seems to be some consensus about the indicators and dimensions in principle pertinent for assessing human well-being (HWB), there is, nonetheless, no agreement on the types or spaces of information, which are ultimately relevant, i.e. of intrinsic interest—an issue to be resumed in section 1.3.

In line with this, most contemporary studies and reports with a comprehensive claim refrain from employing a specific framework explicitly. For instance, Fitoussi *et al.* (2011,

pp.62–64) consider three approaches “as useful in thinking about how to measure the quality of life.”<sup>3</sup> Likewise, in a report for the EU, Atkinson *et al.* (2002, p.79) acknowledge that the capability approach “offers the possibility of a fuller theoretical grounding, but here we adopt a more pragmatic approach to identifying the essential dimensions.” Fleurbaey (2009, p.1070) concludes his survey of the literature by stating that “it probably makes more sense to abandon the illusion that a unique consensual measure of well-being will emerge.”

### **... and its Significance**

Being well-equipped with a plenty of good indicators is, however, only half the battle. A clear notion of what well-being is and how to measure it, is important for several reasons. First, a clear notion of well-being helps to address a set of problems originating from the very nature of well-being, namely its multidimensionality. The dimensions of life are, just as the respective deprivations, not only distinct and diverse, but also deeply interrelated. Indeed, Fitoussi *et al.* (2011, pp.88–89) precisely point at this, when they identify the “joint distribution” to be relevant as a cross-cutting issue in the assessment of the quality of life. Hence, a clear conception of well-being is crucial to analyse various interrelations of the life-domains involved.<sup>4</sup> Moreover, facing the necessity of action, there is a need to arbitrate between the various measures, or more precisely domains of life, to obtain some priority. In this respect, a clear notion of WB can pave the way for a reasonable and expedient public discussion by pointing towards the key trade-offs at stake. Both aspects are vital for providing clear policy advice. Thus, by implication, facing both complexity of the subject matter and innumerable available indicators, along with proponents for each, the public discourse is likely to go astray.

Second, a clear notion of well-being helps to tackle another major problem, which originates from the fact that individuals happen to be both beneficiaries and primary means of all production. “This dual role of human beings provides a rich ground for confusion of ends and means in planning and policy-making” (Sen, 1990, p.41). In fact, “GDP-fetishism” may serve as a case in point. Facing plenty of indicators, however, is likely to worsen the situation—for policy makers and researchers alike. The key role

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<sup>3</sup> The introduced approaches are the SWB-approach, the CA, and the theory of fair allocations.

<sup>4</sup> This complication arises from the fact that certain achievements, such as education or political voice, are not only of intrinsic interest, but also of instrumental importance, see also Sen (1999).

of identifying the ultimate ends relates to the question of which space to use for the assessment of human well-being—an issue resumed later in Section 1.1. Hence, there is clearly a need for an overarching, but coherent and cogent framework, see also Sen (2000, p.18).

Finally, referring to the Bengal famine of 1943, Sen (1999, p.209) illustrates not only the interplay of measures, theory and policy advice, but also, and this in particular, the outstanding significance to have a proper understanding of an issue, allowing to focus on the right measures:

“Just as ‘Malthusian pessimism’ may be misleading as a predictor of the food situation in the world, what may be called ‘Malthusian optimism’ can kill millions when the administrators get entrapped by the wrong perspective of food-output-per-head and ignore early signs of disaster and famine. A misconceived theory can kill and the Malthusian perspective of food-to-population ratio has much blood on its hands.”

### **The Common Theme**

A common theme of this thesis is the conceptual clarification of human well-being. It contributes to a better understanding of well-being in two distinctive ways. First, chapters 2 and 3 explore specific aspects of the borderland of the life satisfaction approach (LSA) and the CA, two commonly adopted, but still not thoroughly related frameworks for analysing human well-being. While both potential synergies and critical issues have been recognised in the literature, previous studies also suggest two rather “hard-wired” proposals (introduced below). Contrary to these proposals, both chapters rest on the view that specific questions still have to be addressed in order to *establish* thorough links between both approaches, and that both approaches may well benefit from each other. To this end section 1.3 briefly reviews the relevant literature and identifies some key research questions, along with useful exercises, which help to bridge the gap. Thereby, chapters 2 and 3 receive an additional motivation and are, moreover, put in perspective.

Second, chapters 3 and 4 explore scope and usefulness of conceiving labour as a characteristic–providing activity. More specifically, I examine whether this notion, which neatly fits into the conceptual set up of the CA, may serve as a connecting piece for well-being analysis and traditional choice analysis. On one occasion the impact of labour on overall

SWB is analysed, on the other occasion the choice relevance of job characteristics is scrutinised. Thus, both chapters examine the relevance of “work as a source of well-being”. While they share the conceptual view on labour as characteristic–providing activity, the analysis is conducted in different empirical settings.

The remainder of this section is structured as follows: To facilitate the exposition of the subsequent reasoning and to highlight each chapters contribution, section 1.1 contains some preliminary remarks regarding the capability approach. Section 1.2 introduces the notion of labour as characteristic–providing activity and illustrates its relevance for analysing well-being. Section 1.3 briefly reviews the literature exploring the relations between the CA and the LSA and argues that a thorough link still requires more research. To this end, some relevant exercises are suggested. Finally, section 1.4 presents the research questions, main contributions and major results of the subsequent chapters in some more detail.

## 1.1. Introduction to the Capability Approach

This subsection contains some introductory remarks on the CA and briefly introduces the key concepts relevant for subsequent reasoning. The interested reader is referred to the more comprehensive introductions provided by Alkire (2002), Robeyns (2005), Schokkaert (2007b) or to the primary literature, in particular Sen (1985a, 1992, 1999). From a capability approach perspective well-being is considered to be constitutively multidimensional, as Sen (2000, p.18) puts it:

“Human lives are battered and diminished in all kinds of different ways, and the first task [...] is to acknowledge that deprivations of very different kinds have to be accommodated within a general overarching framework.”

A key concept of the CA is the so-called functioning, i.e. the beings and doings individuals have reason to value, such as being well-nourished, healthy and well-sheltered, respecting your-self, participating in social and political life, or more generally, choosing a life-style one has reason to value. It is these functionings that are constituent of well-being (Sen, 1992, p.39). All those functionings an individual can—de facto—choose are called the capability set. Consequently, the capability set represents an individuals’ substantial free-

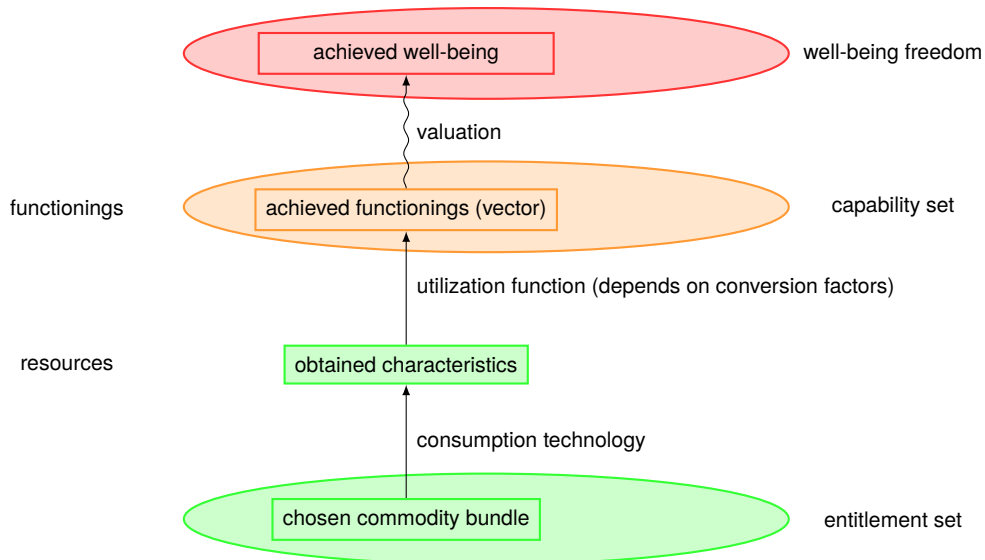
## 1. Introduction

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dom to choose a life, it has reason to value. Poverty, then, is understood as capability deprivation, i.e. a specifically reduced and contracted capability set.<sup>5</sup>

The conceptual set up of the CA (Sen, 1985a), however, also considers other quantities explicitly. In particular resources (e.g., goods and incomes) are viewed as means for functioning achievements. More precisely, goods are assumed to possess characteristics in the sense of Lancaster (1966a, 1971). For instance, food may provide some specific caloric content, a nutritional composition, but also the material basis for a social dinner. These characteristics in turn are converted into functioning achievements—depending on so-called conversion factors (e.g., the metabolic rate or metabolic diseases). Finally, a vector of functioning achievements may well be associated with both a certain amount of happiness and a valuation of these, i.e. the individual’s well-being. Both notions are sharply to be distinguished from each other. Figure 1.1 illustrates the previous considerations regarding the different informational spaces and the achievement-freedom distinction. Note that functionings, capabilities and capability deprivation happen to be in the same space. The CA also accounts for the fact that individuals may well pursue aims other than max-

Figure 1.1.: Informational spaces of the capability approach



<sup>5</sup> To be considered as truly poor, an individual is thus not only required to have a low achievement (e.g., being malnourished), but also the elusiveness of the achievement in question. Moreover, though exhibiting similar achievements with respect to their nutritional conditions, a fasting and a starving person can still be distinguished conceptually. Likewise, beggar monks are not necessarily poor. These and related aspects are discussed in Alkire (2002) and Sen (1992, ch. 7).

imising their own well-being. To this end the notion agency is introduced, also in the two varieties of achievement and freedom to achieve. While agency achievement may well be conceived as a functioning contributing inter alia to well-being, it may also go beyond.<sup>6</sup>

Why is it called capability *approach* and what does the CA *claim*? Alkire (2005, p.122) emphasises that the capability approach is a proposition, namely “that social arrangements should be evaluated according to the extent of freedom people have to promote or achieve functionings they value.” While this claim refers to the informational space, it is not confined to one specific evaluation of the social arrangements. Precisely because of this feature, it is called an *approach*. Instead of being tailored to one specific exercise, such as the analysis of poverty, it explicitly accommodates various other analyses well, e.g., assessing inequality or evaluating the standard of living.<sup>7</sup>

Notwithstanding, it allows to handle and process various types of information (plurality of information), e.g., of resources (such as command over goods and income), of rights or functioning achievements, but also utilities—whichever data is available. Thus, the CA is both a very broad and general approach (various exercises can be carried out within the CA) and yet conceptionally clear, as different types of information can be processed for the exercise at hand—without losing sight of the ultimately relevant space.<sup>8</sup> Along with this, however, comes a practical drawback of the CA, at least for the pioneering applications, as the single researcher is confronted not only with the practical and technical difficulties of the exercise at hand, but also with tailoring the whole approach to that exercise. This complication may help to explain certain discussions and confusions.

The much discussed issues mentioned in the following, are only briefly stated to exemplify current debates. First, there is the so-called aggregation or index problem, see e.g., Schokkaert (2007b), Fleurbaey (2009), Robeyns (2006) on this. In order to construct one well-being index for a society, two separate aggregation problems have to be dealt with, none of which, however, is unique to the CA. While the aggregation across individuals relates to the problems examined in the social choice literature inspired by Arrow (1951),

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<sup>6</sup> “A person’s agency achievement refers to the realization of goals and values she has reason to pursue, whether or not they are connected with her own well-being” (Sen, 1992, p.56). See also Sen (1985b, 1993a) on this.

<sup>7</sup> On this plurality of purposes, see Sen (1992).

<sup>8</sup> Moreover, this conceptual clarity allows to combine the merits of allegedly rival notions. For instance, both notions of poverty, the absolute and the relative view are convincing in some sense, but defective in other. A CA-perspective, for instance, suggests that relative deprivation in the resource space may cause absolute deprivation in the functioning space (Sen, 1983).



and thus are shared by all normative individualistic approaches, the aggregation over dimensions, or within individuals, is common to virtually all multidimensional approaches that aim at providing a unique number. Seminal contributions of this literature include Atkinson (2003), Bourguignon and Chakravarty (2003).

Second, there is the measurement issue, see e.g., Comim (2008b), Robeyns (2006). Not only well-being is conceived to be multidimensional, but also functionings themselves, such as being healthy or participating in social life. Even worse, when it comes to measuring capabilities, counter-factual information (the availability of not-chosen options), becomes (more) relevant.<sup>9</sup> In fact, this issue attracted most of the critique, directed to the CA in general, summarised by Comim (2008b, p.160) as follows: “the ‘multidimensional-context-dependent-counterfactual-normative’ nature of the CA might prevent it from having practical and operational significance.”<sup>10</sup>

Related to the difficulties of measurement as such, there also seems to be some confusion regarding the exact concept to be measured, i.e. functionings or capabilities, see Robeyns (2006), but also Sen (1992). To some extent this clearly depends on the specific exercise at hand. For instance, if the goal is to examine poverty, the researcher should try to measure capability deprivation, i.e. specific forms of contracted capability sets. If the goal is, instead, to analyse achieved living standards one might aim at measuring functioning achievement, or if the subject matter is the substantial freedom individuals enjoy, the focus should shift towards capability sets. Finally, regarding measurement, CA scholars are uncomfortable with employing subjectively reported data, since there is a deep concern that individuals may come to terms with adverse conditions and exhibit biased desires, pleasures, and assessments.<sup>11</sup> Understandably, one may easily reach an impasse here, together with the exacting informational demands.

Third, any applied study has to choose relevant functionings, or dimensions—also a common feature of all multidimensional approach to well-being, see Robeyns (2003, 2005), but also Alkire (2002, 2008). While Nussbaum (2001a), for instance, suggests a list of ten key capabilities, Sen (2004) argues deliberately against a unique and fixed

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<sup>9</sup> Strictly speaking the assessment of an individual's achieved well-being, based on functionings, may already require information about truly available options, e.g., to distinguish the fasting and the starving (see Sen, 1992)

<sup>10</sup> Originally, this critique was formulated among others by Sugden (1993), Ysander (1993), Srinivasan (1994), Roemer (1996).

<sup>11</sup> This issue is addressed in more rigorously in chapter 2.

list of valuable functionings. Instead, he emphasises that the functionings considered are contingent upon the purpose of study or the society in question. Moreover, it is not the theorist alone who chooses the dimension. Rather Sen (2004, 2010) assigns a key role to the public discussion in this context. Nonetheless, for the single researcher it may be hard to get started and challenging to choose.

### 1.2. Work and the capability approach

This subsection briefly introduces the notion of work as a *charprov* activity, also called a Lancaster-good for short, along with an emphasis of aspects relevant for well-being. Chapter 4 contains a more formal treatment—however, with a focus on choice rather than on well-being. The principal relevance of work for human well-being is by now widely accepted, see Fitoussi *et al.* (2011), Atkinson *et al.* (2002), OECD (2011b), but also the concept of decent work suggested by the ILO (2012). While the propounded concepts and measures are similar in content and objective, there is, however, no commonly accepted framework, in particular with respect to human well-being. Moreover, even within the CA, a conceptional framework that is deliberately designed to assess human well-being, the role of work does not seem to be entirely clear, as recently noted by Leßmann (2012).<sup>12</sup>

To fill this gap, I draw on the so-called characteristics approach, suggested by Lancaster (1966a, 1971), which primarily aims at developing a fine-grain theory of consumer demand. According to this approach, not goods as such, but the characteristics these goods provide give reason to purchase and consumption. Characteristics in this sense are required to be objectively attached to the goods, observable and measurable, at least in principle (Lancaster, 1971, p.15). The approach allows to obtain new testable hypotheses (e.g., regarding efficiency substitution effect) and provides, moreover, intuitions for observations, otherwise attributed to the realm of preferences.<sup>13</sup> Consequently, Lancaster defined a utility function on the characteristics space, rather than on the goods space. Thus at the heart of his proposal is the so-called consumption technology, which

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<sup>12</sup> Even though, Sen (1985a) explicitly refers to Lancaster's characteristics approach, his early discussion of work (Sen, 1975) only distinguishes (i) the production aspect, (ii) the income aspect and the (iii) recognition aspect of work.

<sup>13</sup> For instance, the common textbook example for substitutes of butter and margarine, then receives a conceptual underpinning of *why* we essentially expect them to be substitutes, namely because of the characteristics they share, see Lancaster (1966a, p.132).

## 1. Introduction

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describes the technological good-characteristic relationship. More specifically, a good may provide several characteristics, whereas a certain characteristic may well be obtained from consuming different goods. Finally, demand for goods can be derived indirectly via the available consumption technology.

From this perspective work is best viewed as a basal activity, meaning a way of spending time, which serves as an input for some form of production. Each basal activity then provides a specific amount of characteristics per hour spent, for instance, the calorie consumption, the time being exposed to harmful conditions, the risk of an injury, or the workload, but also the type of working contract (e.g., none, permanent or temporary). Drawing on this consumption technology, occupations, or various forms of labour in general, can be defined implicitly by the quantities of characteristics they provide. Thus, when the consumption technology is conceived as matrix with the number of characteristics as rows and the number of activities or goods as columns, each occupation is represented by one column the of matrix as illustrated by figure (1.2).

Figure 1.2.: The technology of job characteristics

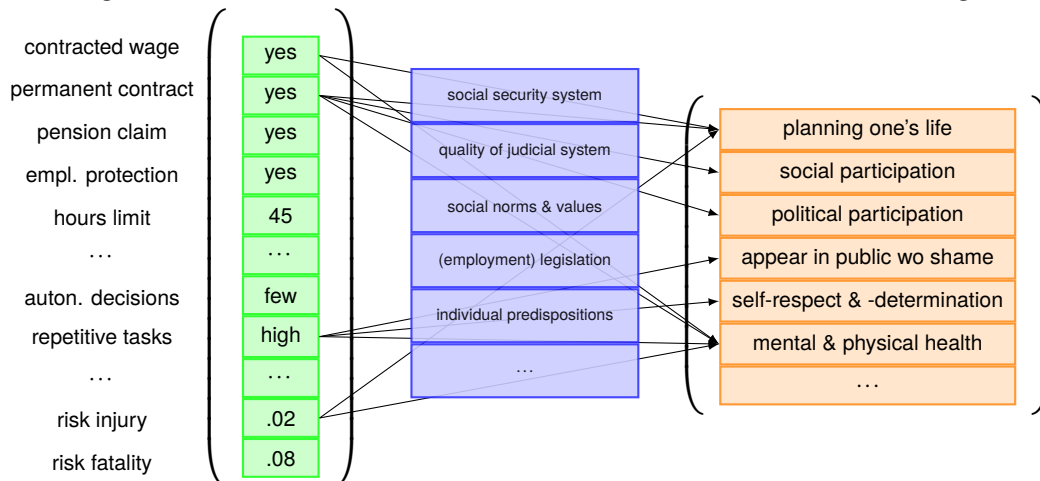
	wage labour	self-employed	domestic work
contracted wage	yes	yes	no
permanent contract	yes	no	no
pension claim	yes	yes	no
empl. protection	yes	no	no
hours limit	45	none	none
...	...	...	...
auton. decisions	few	many	med
repetitive tasks	high	med	few
...	...	...	...
risk injury	.02	.5	.04
risk fatality	.08	.15	.01

It is noteworthy, that in this perspective, however, not all aspects related to work are understood as characteristics in the Lancaster–sense. More specifically, crucial non–characteristics related to work are in particular the hours worked and the income aspect of work. Both hours worked and income relate the activity work in a decisive way, via the budget constraints, to other domains of life. A detailed discussion of these aspects is,

however, beyond scope and purpose of this subsection.

As emphasized in the previous section, the CA claims functionings to be the constitutive elements of well-being. This perspective implies characteristics to be of instrumental relevance only, as they are understood as means for functioning achievements—though possibly crucial ones. For instance, it is not the employment protection itself, that is of intrinsic value, instead, it is its contribution to enable somebody to deliberately plan his life, rather than being subjected to myopia. Clearly, a rather complex picture rapidly emerges, as certain characteristics may reasonably affect several functionings, or even some, seemingly unrelated to the domain of work. Figure 1.3 illustrates some of these aspects. Moreover, figure 1.3 illustrates common problems when dimensional break-

Figure 1.3.: The influence of characteristics of labour on well-being



downs are based on rather vague concepts of life domains, since work may well affect health—both themselves frequently chosen life domains. Occupational hazards and diseases, which recently receive more attention (see ILO, 2013), may serve as a point in case. Likewise, the content of domain-specific satisfactions, is neither entirely clear, nor do domain-specific satisfactions appear to be appropriate representations of well-being. It is far from certain whether such intermediary issues like occupational hazards and diseases are captured either by job or health satisfaction or by both or none of them.

Another prominent example are the number of hours worked, which are commonly recognised as relevant for well-being (OECD, 2011a). However, as the activity of work attracts more time, the actually suffered deprivations may show up in shortfalls of seem-

ingly unrelated functionings like social or political participation. These issues underline the importance of both a holistic and consistent approach to assess human well-being and, moreover, their understanding may greatly benefit from exploiting the joint distribution of suffered deprivations.

Finally, the CA highlights the role of conversion factors, which may be specific to the environment, the society or the individual (see also figure 1.3). For instance, whether a certain occupation is associated with a stigma, and thus affects the functioning “to appear in public without shame”, clearly depends *inter alia* on the norms of the society in question. Whether an employment protection is vital or required at all, in order to plan one’s life, depends on the institutional settings and the judicial system alike. While some of these relationships have already been studied, others are to be scrutinised in future research. Issues like these are not discussed in this thesis.

To sum up, the merits of this conception include, first, that it reflects and captures the manifold effects of work on well-being, even the more subtle and awkward ones. Second, it clearly distinguishes between means and ends, i.e. characteristics versus functionings, and, moreover, emphasises the key role of conversion factors. Third, it can easily be applied to various other forms of work, such as informal work—depending on the respective exercise. Thus the activity of work is made accessible to a thorough analysis with respect to human well-being. Preliminary insights are that the content of job satisfaction might be incomplete and thus a deficient well-being indicator, as interactions with “other domains” like being healthy, planning one’s life or play might be neglected. Likewise, indicators related to vague domains appear to be questionable, redundant or incomplete. In line with this, both the importance to account for the joint distribution and the requirement of a consistent and well-founded framework is emphasized.

### **1.3. Bringing together life satisfaction and capabilities**

#### **Previous literature**

The fact that both approaches, the CA and the LSA, might benefit from each other has already been recognised, see e.g., Comim (2005), Bruni *et al.* (2008), Binder (2013); although Comim (2008a) observed a tendency, that scholars of each field tend to ignore each others’ contributions. Common features include the (i) the objective to assess human

well-being, (ii) the emphasis of non-monetary aspects being relevant for well-being, (iii) the finding of similar results, as e.g., regarding the deprivations of bad health or being unemployed. Moreover, there are complementarities regarding (i) the main informational spaces or (ii) the methods and the preferred data, but also regarding (iii) their origins, i.e. the rather normative, conceptual focus of the CA and the rather empirical orientation of the LSA. Conceptual issues, which so far received most attention, include whether happiness or life satisfaction is best conceived as functioning (e.g., Comim, 2005) as well as the key relevance of both adaptation<sup>14</sup> and the CA's critique of SWB concepts and measures (e.g., Teschl and Comim, 2005, Clark, 2009).

In the first place, however, one may believe that both approaches are irreconcilable: as some prominent scholars from SWB field advocate for Gross National Happiness accounts as preferred measures for HWB, with Layard (2005) leading the way. Furthermore, Kahneman *et al.* (2004a) explicitly aim at devising Edgeworth's hedonimeter, whereas Diener (2000), Kesebir and Diener (2008) champion a more balanced claim.<sup>15</sup> Contrary to these, Sen's CA explicitly argues for a broader informational basis, i.e. to go beyond utilities when it comes to exercises like the evaluation of social arrangements. Moreover, Sen (1985a) among others (e.g., Rawls, 1982, Elster, 1982) is deeply sceptical of utilities to be an adequate representation of well-being—irrespective of whether understood as happiness or desire-fulfilment. However, Sen (2008, pp.26–27) does not deny the principal relevance of happiness, since it is both a “momentous achievement in itself” and a useful device to detect whether individuals successfully achieve what they have reason to value, which is why it is of “evidential interest”.

In addition to this, Sen (1985a, p.14) offers two more pieces of critique. The first, termed *physical condition neglect*, also embodies aspects like “expensive tastes” (Roemer, 1996), whereas Sen emphasised the neglect in the other direction:

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<sup>14</sup> Most studies on this issue use adaptation, adaptive preferences and adjusted aspirations interchangeably. I follow the literature in this respect, unless otherwise noted. Strictly speaking, however, adaptation refers to a reduction of the hedonic stimulus, adjusted aspirations, instead, to a cognitive process, see Kahneman (1999).

<sup>15</sup> However, the exclusive reliance on subjective measure is disputed for various reasons and shortcomings of such measures, see e.g., Booth (2012), Duncan (2010), Frey (2008), Frey and Stutzer (2012), Huschka and Wagner (2010). Fleurbaey (2009, p.1068) notes “The idea of ‘Gross National Happiness’ appears to be supplanted in the literature by the idea that separate data on the various components of SWB should be produced, with special care about the difficulties of comparing statements of satisfaction and happiness across populations.”

“A person who is ill-fed, undernourished, unsheltered and ill can still be high up in the scale of happiness or desire-fulfilment if he or she has learned to have ‘realistic’ desires and to take pleasure in small mercies.”

Second, there is the so-called *valuation neglect*, i.e. “avoiding any direct reference to the persons’s own valuational exercise—the mental activity of valuing one kind of life rather than another” (Sen, 1985a, p.14). More specifically, the problem is that “[c]onsiderations of ‘feasibility’ and of ‘practical possibility’ enter into what we dare to desire and what we are pained not to get” (Sen, 1985a, p.15). It is precisely because of these concerns, which explains the CA scholars’ scepticism to rely on self-reported data in general, and subjective well-being in particular. Despite all that, there is no fundamental conflict between the approaches, as the CA allows various types of information to be processed—provided that there is no claim for life satisfaction data to contain all the relevant information to assess an individuals’ well-being.

In order to relate the approaches more closely to each other, two rather hard-wired attempts have been suggested so far. The first attempt conceives happiness as a functioning, see e.g., Anand and van Hees (2006), Anand *et al.* (2009a), Stewart (2012), but also Sen (2008). Following this perspective, happiness is not only a specific functioning on its own, but also depends on the vector of functionings achieved.<sup>16</sup> Psychological research (e.g., Diener *et al.*, 1999) suggests, however, that happiness and life satisfaction are distinct, but complementary concepts of SWB. Thus, measures of happiness, such as experienced positive and negative affect (e.g., Kahneman *et al.*, 2004b) may well fill the role of the functioning *being happy*—not so however life satisfaction.<sup>17</sup> More specifically, life satisfaction is considered to be part of the cognitive component of SWB (e.g., Diener *et al.*, 1999), suggesting to be a more comprehensive, stable and reflective activity. Indeed, the second attempt to tie life satisfaction research and the CA, builds on this insight. In this perspective life satisfaction is considered to provide information about the individuals valuation function, and, thereby, appears as a solution to the index problem mentioned in section 1.1. In particular, Anand *et al.* (2009a), Schokkaert (2007a), Fleurbaey *et al.* (2009) explore this route. Sen (1992, p.54) acknowledges this in principle:

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<sup>16</sup> The approach of Binder (2013) is similar to this one, but focuses finally on so-called “subjective well-being capabilities”.

<sup>17</sup> The clear distinction between happiness and life satisfaction, which is only occasionally mentioned, turns out to be crucial in this context. Fleurbaey (2009, p.1069) finds that their “interaction remains to be clarified.”

“There is indeed no reason why such a desire-based accounting could not be seen as a possible part of the capability approach. There is indeed no reason why such desire-based accounting of capabilities and functionings could not count as a specific version of the capability approach broadly defined.”

As Sen usually criticises utility as desire-fulfilment or pleasure, one could argue life satisfaction to go beyond these, since psychological research suggests it to be a reflective, cognitive activity. However, several points may object this procedure. First, life satisfaction may in principle still contain affective components, such as emotions—depending on the particular circumstances when the question is asked (Kahneman, 1999, Schwarz and Strack, 1999). This is less a problem for large surveys, since a fair amount of information is usually activated prior to asking for the satisfaction with life in general. Moreover, respondents in panel data sets become more experienced in answering such questions.

Second, to some extent agency achievement may well be considered as functioning and thus to increase well-being and, for that matter, life satisfaction, see e.g., Sen (1985b) and Sen (1992, ch. 4.7).<sup>18</sup> However, life satisfaction may then also contain aspects of agency achievements, such as the state of affairs regarding the independence of a country, which could be argued to be irrelevant for the exercise of assessing somebody’s well-being. Other agency achievements, instead, that better indicate some form of agency success, i.e. largely based on one’s own effort, may well be deemed relevant. Moreover, Sen (1992, p.72) points out that agency objectives affect the use of well-being freedom. It remains unclear how to deal with these issues, as they have not been addressed so far.

Third, although life satisfaction is a reflective activity, it may still suffer from the same defect as desire-fulfilment, since aspiration, a much discussed issue in life satisfaction research,<sup>19</sup> still contains considerations of feasibility or realism—individuals may well dare to aspire. Sen (1985a) argues that there is a need to consider “[...] the person’s valuational activity (under actual or *counterfactual* circumstances), going beyond what the person is pleased or pained and going beyond what he or she actually desires” (emphasis added).<sup>20</sup>

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<sup>18</sup> Diener (2000), indeed, surveys psychological evidence lending support to this hypothesis.

<sup>19</sup> Contributions addressing this issue, in particular with respect to income include Easterlin (1995, 2001), Frey and Stutzer (2002), Kahneman (1999). Frequently, the mechanisms at work are called treadmills within this literature, see e.g., Kahneman (1999, p.14) or Layard (2005, ch.10).

<sup>20</sup> Notably, utilitarian philosophers acknowledged this issue as well, when claiming that a “cool hour”, in which there is time for unlimited investigation” (Hare, 1982, p.31), “full understanding” (Mirrlees, 1982, p.69), or ‘true preferences’ under ‘ideal conditions’ are required (Harsanyi, 1982, p.55–56). Sen



Fourth, as Fleurbaey *et al.* (2009) point out, only average or group-specific valuation can be calculated in these kind of exercises. Thus, there is the risk of undervaluation, if a significant part of respondents have adjusted their aspirations downward. Moreover, group-specific valuations run the risk of confusing differences in valuation, which may well exist, with severe and entrenched forms of deprivation. Sen (1992, p.55) illustrates the last two points:

“A return to the old conformism as a supplement to the capability perspective would tend to wipe out—at least partially—the gains from the change especially by undervaluing those capabilities which the chronically deprived dare not to covet.”

Finally, Sen (1992, pp.54–55) emphasises that “any mechanical use of a metric of desires rather than facing the problem of reasoned assessment does injustice to the exercise of normative evaluation.” Indeed, it is a merit of the capability approach, that the required normative judgements are uncovered and thus have to be discussed explicitly, rather than being concealed by some technical procedures. On these grounds, the two polar, hard-wired routes, at least for now turn out to impracticable. Relating the approaches more closely is, therefore, contingent upon further research, i.e. the links are to be established.

### **Which way now?**

That said, a key question to be addressed is the following: To what extent can information on valuation be inferred from life satisfaction? Several distinct aspects have to be distinguished. First, what other components are echoed in life satisfaction (e.g., emotions, ‘irrelevant’ agency aspects) and may thereby confound inferences on valuation? Second, to what extent are adaptation or realistic aspirations obscuring actual valuation? Third, to what extent can observed differences in valuation be attributed to different positional parameters?<sup>21</sup> Although still subject to future research, a reasonable working hypothesis adopted here is, that life satisfaction contains *some* information on individual valuation.

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and Williams (1982), however, argue these concepts still to be insufficient.

<sup>21</sup> Different valuations (and likewise aspirations), but also any other subjective assessments, may not result from subjective arbitrariness, but instead depend on certain parameters, e.g., experience, knowledge of certain concepts, etc. Sen (1993b) pioneers this idea of positional objectivity and Comim (2005) emphasized its relevance for linking life satisfaction and capabilities. Indeed, this poses yet another useful exercise, which is, however, not covered in this thesis.

More generally, I suggest to adopt a CA-view on the rather empirical life satisfaction research, thereby furnishing the latter with conceptually thorough underpinnings. Naturally, it is beyond the scope and purpose of this subsection to present a fully-fledged research agenda. Instead, two types of exercises are suggested, that help to close the gap; chapters 3 and 4 present instances of these.

The first type of exercise aims at extracting some information on valued objects out of self-reported life satisfaction. It is based on Sen's "evidential interest" argument, i.e. that humans may derive pleasure or satisfaction from achieving what they value. Therefore, value is reflected in pleasure, desire or aspiration, see in particular Sen (1985b) on this. The valuation of several objects, in particular of certain functioning achievements, can thus be studied. Moreover, the valuation of not chosen, though in fact available functionings, i.e. the 'mere' opportunity to participate in political decisions (see Sen1992IR), could be demonstrated empirically as well. Still in the functioning space, capability sets, which happen to be contracted in a specific way may also be analysed, by documenting unfulfilled desire—reflecting the absence of a valued achievement. Finally, also characteristics, the inputs for producing functioning achievement, may be analysed, though they are of a derived and instrumental interest only. This approach is convenient when measuring functionings is difficult or adequate data is unavailable. Additionally, to focus on characteristics may appear useful if they plausibly affect several functioning achievements. In this way, one can adopt a more parsimonious approach to modelling without losing sight of the real value objects, i.e. not confusing means and ends.

Two distinct aspects render this type-I-exercise relevant: First, it allows to elicit some information on what individuals do, in fact, value and thereby it provides back up for the choice of well-being relevant dimensions. Second, in the reverse direction it may help to explain some results of the life satisfaction research, such as the dissatisfaction of the unemployed or differential life satisfactions among employed. Sen (2010, p.276) puts it as follows:

“reasons that we have for the valuation of our objectives for achievement [...] actually help to explain why we may sensibly feel happy about achieving what we are trying to achieve and frustrated when we do not succeed”

Additionally, exercises of this kind foster accuracy in research questions, as they require analysts to clearly state why something should be valued. Thereby, they also help to

combat throwing everything and the kitchen sink into a regression.

The second type of exercise examines adaptation to adverse condition in terms of life satisfaction empirically. More specifically, it allows to examine (i) to which deprivations do individuals adapt and (ii) under what conditions this may happen. This exercise is, in fact, vital for the significance of inferential exercise suggested previously, since only the absence of adaptation allows the extraction of information on values. Hence, it is essential for providing support on the dimensions to choose.<sup>22</sup> However, this type of analysis is not applicable to all forms of deprivations, since a thorough empirical analysis requires within variation for a valid inference, i.e. the respective individual has to be observed undeprived as well. While this is in principle possible for some deprivations, it is not at all for others.

### **Learning from each other**

The aforementioned exercises may be instructive for both approaches. The CA may, first, learn something new about the seriousness of adaptive preferences in common empirical exercises. More specifically, these information allow us to identify domains which are susceptible for adaptational biases. Consequently, the performance of new indicators based on subjective assessments can be explored, and thus the general concern about subjective indicators as being impracticable, may be weakened. Second, insofar life satisfaction contains information about valuation, it may help to choose and possibly weight dimensions, even though not in a mechanical way. The analyst can draw on evidence that suggests valuation in order to justify his choice of dimension—however, an inversion of the argument is invalid. Moreover, this information provides additional support for potential indicators of well-being, as it demonstrates that they capture valid information. The life satisfaction approach, in turn, may benefit from receiving thorough conceptual underpinnings, in particular regarding the quantities individuals do value and have reason to do so. This may help to explain and understand certain empirical results. Related to this, the LSA may also benefit from the CA's normative awareness. As Fleurbaey (2009, p.1064) phrased it:

“A better connection between the recent happiness literature and earlier debates about liberalism and utilitarianism would be welcome because the hap-

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<sup>22</sup> In addition, results suggesting adaptation to be operative would undermine the cogency of the life satisfaction approach for calculating the willingness to pay or compensations; examples for this type of exercise are, e.g., Lüchinger and Raschky (2009), Lüchinger (2009).

piness literature is replete with normative conclusions that do not seem sufficiently founded.”

Finally, a more detailed decomposition of life satisfaction into aspects of valuation, aspiration, emotions, agency aspects, and their dependence on positional parameters may help to better understand the various treadmills.

### 1.4. Research Questions and Contributions

#### Chapter 2: Capability Deprivation and Life Satisfaction

This chapter examines whether capability deprivation, i.e. a specifically contracted capability set, reduces life satisfaction significantly and, moreover, whether individuals adapt to these adverse conditions. The CA understands poverty as capability deprivation and, thus, this is the first paper analysing the poverty-life satisfaction nexus; does poverty indeed bite and do individuals quietly adapt this persistent misery?<sup>23</sup>

Methodologically, this study, moreover, improves the measurement of capability deprivation. Previous studies employ either information on nonconsumption of specific goods or low functioning achievement or both (e.g., Alkire and Foster, 2011, Klasen, 2000). Specifically, to detect capability deprivation, I suggest to combine the notion of inadequate income (an implication of the CA, see Sen, 1992), and nonconsumption data of certain goods, augmented with the respective underlying self-reported reason. Originally, the literature on material (or relative) deprivation devised these indicators (see Mack and Lansley, 1985). However, this literature is both basically unrelated to the capability approach and lacking a conceptual underpinning of their measures (Nolan and Whelan, 2011).

The empirical analysis employs German panel data and adopts the econometric framework common in life satisfaction research. The results suggest both that capability deprivation reduces current life satisfaction and that individuals fail to adapt to the adverse conditions under consideration. The accumulated effect proves to be of roughly the same size as the psychic costs associated with unemployment. The main findings are robust in particular to (i) other functional form specifications of income and to (ii) accounting for a

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<sup>23</sup> While an earlier version of this paper was already circulating, Clark *et al.* (2013) also address the question of adaptation to poverty in terms of life satisfaction. However, Clark *et al.* (2013) employ a conventional monetary poverty definition.

merely low income. Thus, the results show that it is an income's *inadequacy*, rather than its *lowness* that matters from life satisfaction point of view.

The results are important, since poverty as capability deprivation is added to the major determinants of life satisfaction and, in addition, to those conditions individuals fail to adapt to. Moreover, as an instance of the type-II-exercise, the results are important to relate the life satisfaction and capability approach more closely. Evidence in favour of adaptation, as argued above (section 1.3), would invalidate potential uses of life satisfaction data for CA applications and problems (e.g., devising an index), since valuation would no longer be reflected in satisfaction with one's life. However, the results are interesting, even without the temporal analysis, since the evidence indicates that individuals, indeed, aspire and, thereby, value the functionings they are deprived of. Thus, it consequently also supports, an informed choice of dimensions in more comprehensive assessments of human well-being (type-I-exercise).

The methodological innovation is important, as it not only proposes a novel way of how to detect capability deprivations, but also demonstrates that subjective indicators *can* be used to examine deprivation. Therefore, this chapter adds to the ongoing discussion on the measurement issues of the CA. In particular, devising subjective indicators specifically aiming at detecting capability deprivation may constitute both a promising and valid approach.

### **Chapter 3: Job Characteristics and Subjective Well-Being**

This chapter scrutinises whether job characteristics increase satisfaction with life in general. A specific feature of this study is a shift in focus. So far, studying job characteristics or job satisfaction was mostly motivated by boosting workers' performance. Contrary to this "human resource management"-perspective, the present study assumes work to be a potential source of HWB. To this end, I adopt a CA perspective, which not only supports the interpretation of the results, but also guides the operationalisation of job characteristics.

The present paper contributes in three ways to the previous literature. Empirically, I demonstrate the economic significance of several specific job characteristics, such as autonomy or variety, for the first time within a linear life satisfaction fixed effects framework. Thus, these job characteristics are added to the major determinants of life satisfaction. Previous research either used cross-sectional data (Helliwell and Huang, 2010)

or analysed job rather than life satisfaction (Benz and Frey, 2008a) or both (Benz and Frey, 2008b). Methodologically, the present paper extends the claim of Ferrer-i-Carbonell and Frijters (2004)—the key relevance of accounting for fixed effects in life satisfaction analysis—by demonstrating that controlling for unobserved heterogeneity significantly affects the influence of job characteristics on both job and life satisfaction. Conceptually, I make for the first time use of the CA to support both the interpretation of the life satisfaction results and the operationalization of job characteristics.<sup>24</sup> The latter translates into a refined measurement of job characteristics, based on the approach developed by Lancaster (1966a).

More specifically, the explored hypothesis are motivated by understanding (i) work as a characteristic—providing activity, and (ii) characteristics as means for functioning achievements. The empirical analysis uses Australian panel data and borrows the empirical framework common in life satisfaction research. Job characteristics are operationalized using a confirmatory factor analysis. Indicators are selected in compliance with Lancaster’s approach. The results suggest, that job characteristics indeed increase life satisfaction in general. It turns out, that the accumulated effect of several unfavourable job characteristics even amounts to 50% of the psychic cost associated with being unemployed. Thus, the presented evidence indicates that non-monetary aspects of work are relevant for overall satisfaction with life. Thereby, the results not only emphasise the role of work as crucial source of well-being, but they also document the importance of a holistic approach for well-being, as discussed in section 1.2.

To assess the cogency of the suggested operationalisation, I furthermore demonstrate that the so-called procedural utility (“being one’s own boss”), found for self-employed in terms of job satisfaction, in fact, originates from job characteristics. Adopting a CA view on these results offers a natural way to accommodate this finding, rather than introducing non-outcome aspects by the backdoor to an utilitarian perspective. Specifically, the characteristic of access to autonomous choice is a means for achieving the functioning of agency. This achievement then ultimately gives satisfaction. Accounting more generally for procedural utility, one can argue that *choosing* what one has reason to value is a functioning itself and thus its achievement gives reason to satisfaction.

Finally, as an instance of type-I-exercise, this study helps to close the gap between

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<sup>24</sup> Strictly speaking the previous chapter is the first explicitly drawing on the CA for life satisfaction analysis, however, it has a focus on poverty rather than on the work-well-being link.

the CA and life satisfaction research, by demonstrating how to combine the conceptual framework of the former with the empirical set up of the latter. Therefore, this study helps setting the stage for a more comprehensive and compelling approach to human well-being.

#### **Chapter 4: Job Characteristics and Labour Supply**

This chapter inquires into the influence of job characteristics in labour supply decisions. The link with the previous chapter is that if individuals value job characteristics, then we expect them to be choice relevant as well.

So far, only two studies addressed the impact of job characteristics on labour supply. Atrostic (1982) estimates a system of demands including one for job characteristics and finds wage and income elasticities of labour supply to differ from those usually found in the literature. Altonji and Paxson (1986) refrain from explicitly modelling job characteristics, but suggest them to account for observed differences in hours worked. Evidently, neither it is entirely clear how to model job characteristics in labour supply decisions, nor there is conclusive evidence on this link. The aim of this chapter is to fill both the empirical and the conceptual gap. Thus, this is the first paper analysing the influence of job characteristics on labour supply elasticities systematically—theoretically based on Lancaster's (1966a) characteristics approach and empirically using a discrete choice model.

To obtain the main hypothesis, the notion of labour as characteristic-providing activity is applied to the conventional neoclassical labour supply decision. The empirical analysis uses Australian data and employs a discrete choice model, the work horse in this literature. Job characteristics are, as in the previous chapter, operationalized using a confirmatory factor analysis. The results show, that the responsiveness of labour supply, in terms of wage and income elasticities, is significantly smaller for more favourable job characteristics. The results are robust to an array of modifications.

The results of this study are important for several reasons. First, the results indicate that non-monetary aspects of work are not only relevant for workers' well-being, but also for labour supply responses, or choice. Thus, both valuation through life satisfaction and through revealed preference indicate relevance for human well-being. Second, the explicit use of Lancaster's approach illustrates that the standard neoclassical labour supply model can be easily modified to account for non-pecuniary job characteristics; rather than

assuming specific utility functions, introducing new goods or rejecting it completely. In conjunction with the previous chapter, it also demonstrates that the view of work as characteristic-providing activity can link the studies of well-being and traditional economic choice analysis in a fruitful way.

Third, the results are highly policy relevant, as they suggest the labour supply response, vital for any evaluation of a tax-transfer reform, to critically depend on job characteristics. Related to this, the assessment of any policy measure directly aiming at working conditions has to account for the differential labour supply responses adequately. Finally, job characteristics may help to explain differences in labour supply responses, recently documented in cross-country studies.



## 2. Capability Deprivation and Life Satisfaction. Evidence from German Panel Data<sup>1</sup>

### *Abstract*

*This chapter explores the link between poverty as capability deprivation and current life satisfaction. Using German panel data, I examine both whether capability deprivation does hurt and whether individuals eventually adapt. To detect capability deprivation I draw on the notion of an inadequate income together with nonconsumption data of specific commodities. Assumptions and conditions rendering this approach valid are scrutinised. The results indicate that capability deprivation reduces life satisfaction significantly. Moreover the evidence also suggests that individuals fail to adapt within the subsequent four to six years. Finally, the mere lowness of income fails to capture its inadequacy.*

### 2.1. Introduction

Along with the increasing interest in concepts and measures of human well-being (HWB), particularly two lines of research have received their credit: The capability approach (CA), developed essentially by Amartya Sen (1985a, 1992); and the life satisfaction approach (LSA), inspired by advancements of positive psychology.<sup>2</sup> Currently, both frameworks are deemed useful for studying issues of well-being (e.g., Fitoussi *et al.*, 2011).

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<sup>1</sup> This paper has benefited from comments made by participants at Finanzwissenschaftliches Kolloquium (Seminar on Public Economics) in Osnabrück, Germany in 2011; at the biennial conference of HEIRS (Happiness and Interpersonal Relations) in Milan, Italy in 2011; and at the annual conference of the Human Development and Capabilities Association in The Hague, Netherlands in 2011.

<sup>2</sup> I use the term life satisfaction *approach*, since within this literature various exercises are conducted. For surveys confer Frey and Stutzer (2002), Frey (2008).

## 2. Capability Deprivation and Life Satisfaction

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Comim (2008a), however, observes that, by and large, both fields of research tend to ignore each others contributions. Accordingly, only a rather small literature explores their interrelations—predominantly on a conceptual level (e.g., Bruni *et al.*, 2008). Insights, these studies provide, include in particular (i) the key role adaptation plays for linking both literatures more closely and, related to this, (ii) the contrasting views on subjective evaluations, especially pertaining to subjective well-being (SWB). On the one hand the life satisfaction literature involves the belief that subjective evaluations in general capture valid and reliable information of the respondent’s well-being. In contrast, scholars of the CA are deeply sceptical about employing subjective evaluations, since a severely deprived person may have learned to “have ‘realistic’ desires and to take pleasures in small mercies” (Sen, 1985a, p.14).<sup>3</sup> The critical implications of building on subjective evaluations for normative exercises are stated by Sen (1984b, p. 309) as follows:

“Quiet acceptance of deprivation and bad fate affects the scale of dissatisfaction generated, and the utilitarian calculus gives sanctity to that distortion.”

Few studies, however, addressed this issue empirically. Within the capability literature, Burchardt (2005) analyses the influence of income changes on satisfaction with income to identify adaptive preferences. In psychological research, however, adaptation is empirically well-studied, at least since the seminal work by Brickman and Campbell (1971),<sup>4</sup> and receives more recently attention in life satisfaction research as well (e.g., Clark *et al.*, 2008a). Yet, none of these refer directly to the CA’s notion of poverty as capability deprivation, although some results, e.g., regarding unemployment, allude to capability deprivation.<sup>5</sup> The present study aims at filling this gap, by providing empirical evidence precisely on Sen’s concern: Does capability deprivation reduce life satisfaction significantly and, moreover, do individuals quietly adapt to adverse conditions? Put differently, this is the first paper analysing the poverty-life satisfaction nexus, specifically whether individuals adapt to persistent poverty.<sup>6</sup>

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<sup>3</sup> Similar concerns were actually raised by scholars from various disciplines; for instance Festinger (1970) Berlin (1995, ch.3), or Elster (1982). Occasionally, reference is given to Aesop’s fable of the fox and the sour grapes.

<sup>4</sup> For a survey see, e.g., Frederick and Loewenstein (1999).

<sup>5</sup> On unemployment and capability deprivation, see in particular Sen (1997, 1999).

<sup>6</sup> While an earlier version of this paper was circulating Clark *et al.* (2013) also address the question of adaptation to poverty in terms of life satisfaction. However, Clark *et al.* (2013) employ a conventional monetary poverty definition.

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The significance of this undertaking arises from the empirical relevance of adaptation being of paramount importance for a cogent integration of the CA and the life satisfaction research. Specifically, if individuals adapted to each and any hostile condition in terms of life satisfaction, obtaining empirical support for what people actually do value would become extremely complicated, if not impossible at all. More generally, this study therefore contributes to a more comprehensive and compelling approach to human well-being; and a better understanding thereof.<sup>7</sup>

Additionally, I suggest a refined approach to identify individuals, who are deprived of fundamental capabilities. More specifically, to detect capability deprivation I rely on non-consumption data of goods pivotal for certain functioning achievements. For instance, nowadays, a phone is a pivotal means to socialise, thereby promoting the functioning of participation in social life. A warm meal with meat every other day can be a key part of a healthy diet, thereby promoting the functioning of being well nourished. This example, however, illustrates a flaw of approaches resting solely on (non)consumption data, viz., nonconsumption need not indicate deprivation, but may, for instance, simply indicate a reasonable preference instead. Therefore, I additionally exploit information on the reported reason for going without a particular good. More precisely, I argue that going without a pivotal good for purely financial reasons indicates an inadequate income, a notion the CA provides a profound meaning for (Sen, 1992). An inadequate or insufficient income, in that view, is accompanied by capability deprivation. The significance of this methodological innovation is that it allows to distinguish *empirically* between, e.g., a vegetarian and someone who is *prevented* from eating a warm meal with meat every other day; it is only the latter who has a difficulty and is actually deprived. Thus this methodological refinement advances so far applied techniques for detecting capability deprived persons (e.g., Klasen, 2000, Alkire and Santos, 2011). Moreover, by providing a discussion of the underlying assumptions, I also contribute to the prominently debated conceptual issues in measuring functionings, capabilities and capability deprivation (e.g., Comim, 2008b, Leßmann, 2012, Anand *et al.*, 2009b).

Within the literature on material or relative deprivation, which originally proposed the indicators I employ, both the cogency and the empirical performance of these indicators have recently been questioned (e.g., McKay, 2004). Nolan and Whelan (2011) find common applications to have rather weak and ad hoc conceptual underpinnings. As this field

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<sup>7</sup> For more details on this issue see section 1.3.

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of research is currently only loosely related to the CA, I argue that the advancement of indicators may benefit from the understanding of poverty as capability deprivation. More specifically, I contribute to this literature by suggesting the concept of an inadequate income as conceptual underpinning for what has been called “enforced lack” (Mack and Lansley, 1985) in this field of research. Additionally, I provide empirical evidence of the indicators’ performance with respect to life satisfaction to the ongoing discussion (McKay, 2004, Halleröd, 2006, Pantazis *et al.*, 2006, Hick, 2013)

Since I make use of German panel data, I finally add to the studies applying the CA to more advanced economies as well.<sup>8</sup> The fact the German reports on poverty and wealth draw explicitly on the CA not only illustrates the CA’s increasing acknowledgement, but also renders the involved intricate measurement issues more urgent, as their proper handling is vital for the CA to be operative.<sup>9</sup>

The results are as follows: First, capability deprivation does indeed hurt, indicating that the persons affected are well aware of—and suffer from—being deprived. Moreover, capability deprivation, resulting from an inadequate income, hurts also in an economically significant way; similar to widowhood (compared to marriage) or unemployment (compared to employment). Thus poverty as capability deprivation is added as a major determinant of overall life satisfaction. Second, the persons affected fail to adapt to capability deprivation within the four to six years after being placed in that situation. Thus, capability deprivation, resulting from an insufficient income, ranks among those conditions individuals fail to adapt to—besides unemployment (Clark *et al.*, 2008a). Third, the results suggest that, the mere lowness of income fails to capture its inadequacy. Thus this study also contributes to the debate on externally fixed, uniform poverty line, see e.g. Ruggeri Laderchi (2008). More specifically, the results dispute the view that a uniform threshold captures, by and large, all poverty-relevant aspects.

The remainder is structured as follows: section 2.2 briefly reviews the related literature, whereas section 2.3 illuminates the underlying assumptions for a valid inference of capability deprivation based on consumption data. Subsequently, section 2.4 presents the empirical approach and section 2.5 the results. A further discussion of both methodological aspects and implications is provided by section 2.6, while section 2.7 offers some

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<sup>8</sup> A survey is provided by Volkert and Schneider (2011).

<sup>9</sup> For the reports see, e.g., Bundesregierung (2005); background information is provided by Volkert (2005), Arndt and Volkert (2007).

concluding remarks.

## 2.2. Previous Literature

A first literature this study relates to, is the work addressing the CA–LSA link explicitly. Most contributions focus on conceptual issues; see in particular Comim (2005, 2008a), Schokkaert (2007a), but also the contributions in Bruni *et al.* (2008). Specifically, this literature identified the adaptation issue as critical for linking the CA with life satisfaction research and explores primarily normative implications of adaptation (Comim, 2005, Teschl and Comim, 2005, Clark, 2009). Moreover, in particular Anand and van Hees (2006), Anand *et al.* (2009a) explore the CA–LSA link empirically, also by employing life satisfaction regressions and using data from advanced economies. Beyond some technical issues, a major difference is in their prime objective. The present paper focuses explicitly on capability deprivation, whereas Anand *et al.* (2005, 2009a) aim at measuring functioning achievements and capabilities, to prove the CA to be operative.

Finally, previous studies in this field of research suggested two, rather hard-wired attempts, for relating the SWB-literature and the CA more closely. On the one hand, e.g. Anand and van Hees (2006), Anand *et al.* (2009a), Stewart (2012), but also Sen (2008), proposed SWB, more precisely happiness, to be best conceived as one functioning itself. More specifically, self-reported happiness is considered as data on the happiness function  $h(\cdot)$ , an integral element of the CA (cf. Sen, 1985a). On the other hand Anand *et al.* (2009a), Schokkaert (2007a), Fleurbaey *et al.* (2009) adopt the view that self-reported life satisfaction proxies the valuation function  $v(\cdot)$ , another key feature of the CA. In contrast, this study holds the belief that the links between both approaches are still to be established by future research, i.e. the borderland of life satisfaction research and the CA is, as yet, unexplored. In fact, this study precisely aims at pioneering this field by both adopting a CA view and applying techniques from life satisfaction research, see section 1.3 for more details.

A second literature the present study relates to is that on the problems of measuring functionings, capabilities, and capability deprivation (see e.g. Comim, 2008b).<sup>10</sup> The exacting informational demands required by the CA led critics to question the CA's functionality in general. Comim (2008b, p. 160) summarizes this critique as “that the ‘multi-

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<sup>10</sup> See also Leßmann (2012), Anand *et al.* (2009b) for overviews and applications.

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dimensional-context-dependent-counterfactual-normative' nature of the CA might prevent it from having practical and operational significance".<sup>11</sup> This is, moreover, aggravated by the CA scholar's discomfort to rely on subjectively assessed information, implying a further reduced set of potentially useful measures.

What are, therefore, the so far applied measurement strategies, particularly for capability deprivation? One approach is to start on the functioning level and collect data on, say, being well-nourished. In case a person exhibits symptoms of malnutrition, she is *assumed* to be deprived. Likewise, observing a person with low or even without any years of schooling, she is *assumed* to be incapable of enjoying more schooling and thus deprived. For instance, Klasen (2000), Anand *et al.* (2005), but also the Human Development index and the recently developed Multidimensional Poverty Index,<sup>12</sup> implement this strategy. Although this approach builds upon a surmise about the unavailability of evidently not chosen options (functionings), it is nevertheless adequate in many applications (cf. Robeyns (2005) and Sen (1992)).<sup>13</sup>

Alternatively, for example, Klasen (2000) employs both functioning data (e.g., years of education) and commodity data (e.g., type of water access, type of sanitation facility, transport to work) to examine deprivation in South Africa. Such an approach, analogously, requires a surmise on the commodity level. For instance, a household without a toilet is assumed to be incapable of obtaining a flush toilet. Moreover, another assumption on the commodity–functioning link has to be made, viz., going without a certain item is assumed to imply some form of deprivation, which by definition is located in the functioning space. Depending on the exercise at hand, this approach may be reasonable as well. The present paper elaborates precisely on this issue and proposes a refined approach, accompanied by a discussion of the underlying assumptions. Moreover, I demonstrate that subjective assessments in principal *can* be used to detect capability deprivation, despite the general scepticism.

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<sup>11</sup> For the original critique see Sugden (1993), Srinivasan (1994), Roemer (1996) and Ysander (1993).

<sup>12</sup> See, e.g., UNDP (1990) and Alkire and Santos (2011), respectively.

<sup>13</sup> To be clear about the conceptual level, two motivations for using data on functionings are not to be confused, namely an intrinsic interest and a derived interest—the latter owing to a lack of data. This distinction originates from being a capability *approach*, in that it explicitly allows for different exercises. Accordingly, the appropriate space for evaluation is contingent on the exercise at hand. For instance, a study of standards of living has to focus on functioning achievements; an analysis of poverty, on capability deprivation. It is, however, only the latter that discriminates between a starving and a fasting person, although both persons may exhibit the same functioning achievement. See Sen (1985b, 1993a), but also Robeyns (2005, 2006).

Third, I draw on the literature of material or relative deprivation, in the tradition of Townsend (1979), which originally devised the indicators on nonconsumption of goods. More recently, economists used these indicators as well to devise deprivation indices (e.g., Bossert *et al.*, 2007). Furthermore, the investigation of the deprivation indices' relation to SWB already commenced in distinct ways. For instance, Haisken-DeNew and Sinning (2010) use life satisfaction weights to construct deprivation indices, whereas Blázquez Cuesta and Budría (2012) analyse the influence of relative deprivation on life satisfaction. Although occasionally related to the CA literature, essentially no explicit reference to poverty as capability deprivation is made.

Anyhow, already Piachaud (1981) argued the simple consumption data-based approach to be flawed, since nonconsumption may result from preference as well. Consequently, since Mack and Lansley (1985), the nonconsumption data is augmented with the follow-up questions for the underlying reasons; called *enforced lack* in this literature. Recently, however, this refined approach has been criticised as well. For instance, McKay (2004) argues *inter alia* that this procedure introduces subjective aspects (i.e. self-perceived deprivation) into poverty measurement and questions its validity in general.<sup>14</sup> Moreover, also within this literature, e.g., Halleröd (2004, 2006), raised concerns that adaptation might cause distorted responses. The present paper, therefore, contributes to this literature, by both suggesting a profound meaning for the questioned responses (as indication of an inadequate income) and by providing evidence on the (i) selectivity in general and the (ii) sensitivity to adaptation of the indicators in question. Contrary to these studies, I concentrate on the single indicators' conceptual cogency and empirical performance, rather than devising an index.

Finally, there is the vast literature on adaptation within psychological research, that studies adaptation empirically—at least since the seminal work of Brickman and Campbell (1971). This field of research addresses in particular the process, the domains, and the conditions of adaptation; for a survey see Frederick and Loewenstein (1999). Within life satisfaction research adaptation to income in general attracted considerable attention.<sup>15</sup> Going beyond income, the pioneering work of Clark *et al.* (2008a) analyses adaptation to various events in terms of life satisfaction, employing panel data techniques. Clark

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<sup>14</sup> This is not to be confused with approaches explicitly aiming at subjective or perceived deprivation, e.g., Runciman (1966).

<sup>15</sup> Important work, following the seminal contribution of Easterlin (1974) is, for instance, provided by Clark *et al.* (2008b), Di Tella *et al.* (2010).

*et al.* (2008a), Clark and Georgellis (2013) find, for instance, that individuals adapt to divorce, marriage, and widowhood, but fail to adapt to unemployment. Powdthavee (2009) provides evidence that we adapt to mild forms of disabilities, whereas we fail to adapt to serious ones. Recently, Clark *et al.* (2013) analyse adaptation to conventional income poverty, finding no evidence in favour of adaptation. The present study borrows the empirical approach to adaptation from life satisfaction research, i.e. of Clark *et al.* (2008a) and applies it to CA-specific notion, i.e. capability deprivation.

### 2.3. Commodities and Capability Deprivation

This section discusses briefly the key concepts of the CA, relevant issues of the commodity–functioning link, and the notions of capability deprivation and inadequate income. The section concludes with the informational requirements for valid detection of capability deprivation using consumption data.<sup>16</sup>

The CA argues that functionings and capabilities are the appropriate materials to assess well-being, the standard of living, poverty, or inequality, rather than solely relying on income, commodity bundles, or utilities. Functionings are the doings and beings humans have reasons to value, for instance, being well-nourished, being healthy, being sheltered, or participating actively in social and political life. Their outstanding importance follows from their constitutive role, they play for human well-being. Let the vector  $\mathbf{b}_i = (b_i^1, \dots, b_i^k, \dots, b_i^K)^T$  denote the functioning achievements of individual  $i$  with  $\mathbf{b} \in \mathbb{R}^K$  (the functioning space).

Being able to do or to be something, however, frequently requires resources such as income or, more specifically, commodities. Therefore, let the vector  $\mathbf{x} = (x^1, \dots, x^j, \dots, x^J)^T$  denote a commodity bundle with  $\mathbf{x} \in \mathbb{R}^J$  (the commodity space). The vector  $\mathbf{x}_i$ , with  $\mathbf{x}_i \in \mathcal{X}_i$ , represents a commodity bundle individual  $i$  is *entitled* to. Let  $\mathcal{X}_i$ , with  $\mathcal{X}_i \subset \mathbb{R}^J$ , denote the *entitlement set* (for short: *entitlements*).  $\mathcal{X}_i$  is the set of all commodity bundles  $i$  can choose from.<sup>17</sup> Each commodity bundle provides *characteristics*  $\mathbf{c} = (c^1, \dots, c^l, \dots, c^L)$ :

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<sup>16</sup> For a more general treatment of the CA see Sen (1985a, 1992, 1999). Introductions and overviews worth reading include Alkire (2002), Robeyns (2005, 2006), and Schokkaert (2007b).

<sup>17</sup> In principle, one could link the capability approach with the so-called entitlement approach more comprehensively. This exercise, however, is beyond the scope of present paper. For the entitlement approach see in particular Sen (1981, 1982). Moreover, Sen (1981) notes that income is useful to capture entitlements adequately in some cases. In general, however, the two notions are not identical. Nevertheless, for the



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$\mathbb{R}^J \mapsto \mathbb{R}^L$ , e.g., a given caloric content, a certain amount of nutrients, but also the material equipment for a social dinner. As a given amount of caloric content can be obtained from various bundles,  $c(\cdot)$  fails to be an injective function. Originally, Lancaster (1966a, 1971) suggested a linear additive consumption technology as a useful starting point.

Finally, the *conversion or utilization function*  $f = (f^1, \dots, f^k, \dots, f^K) : \mathbb{R}^L \mapsto \mathbb{R}^K$  maps the  $L$  characteristics into  $K$  functioning achievements. In general, the conversion function  $f(\cdot)$  fails to be injective either, allowing different consumption patterns to bring about the same functioning achievements. For instance, you can achieve social participation using different characteristics such as access to the local sports club, access to the internet, or none of these characteristics at all.

The conversion, however, may vary with so-called conversion factors  $\mathbf{z}_\bullet$ , which can be specific to the individual  $\mathbf{z}_i$ , the respective society  $\mathbf{z}_s$ , or the relevant environment  $\mathbf{z}_e$ .<sup>18</sup> Conversion factors that the utilization functions can account for include physical conditions, chronic diseases, social and legal norms, institutional settings, climate, or living in a congested urban area, but also aspects like the distribution of resources within families; see Sen (1999, Ch. 3). To illustrate, consider a paraplegic who fails to convert the ownership of an ordinary car into the same level of the functioning *moving about freely*, an able-bodied person would achieve. In sum, (2.1) describes the commodity–functioning link:

$$\mathbf{b}_i = f(\mathbf{c}(\mathbf{x}_i), \mathbf{z}_i, \mathbf{z}_s, \mathbf{z}_e) \quad (2.1)$$

To acknowledge an individual’s freedom to choose what he or she considers to be part of a good life, Sen (1985a) introduces the concept of the capability set: the set of all feasible functioning achievements an individual actually can choose from—given her entitlements  $\mathcal{X}_i$  and given her conversion factors  $\mathbf{z}_\bullet$ . Thus the capability set represents the substantial freedom an individual enjoys. Let  $\mathcal{Q}_i$  denote the capability set; by definition,

$$\mathcal{Q}_i(\mathcal{X}_i) = \{\mathbf{b}_i \mid \mathbf{b}_i = f(\mathbf{c}(\mathbf{x}_i), \mathbf{z}_i, \mathbf{z}_s, \mathbf{z}_e), \quad \forall \mathbf{x}_i \in \mathcal{X}_i\}. \quad (2.2)$$

Before turning to the concept of capability deprivation, three remarks on the commodity–

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present exercise I will use entitlement and income interchangeably.

<sup>18</sup> Note that if we focus on the short run or consider a static setting, it is reasonable to treat the conversion factors  $\mathbf{z}_\bullet$  as parameters. In the long run, however, they are affected by behaviour, such as education or migration. Likewise, the conversion factor  $\mathbf{z}_\bullet$  may vary with time.

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functioning link,  $f \circ c$ , are in order. First, the good–functioning link is best considered as a many-to-one function, where additionally one good may reasonably improve several functionings; see also Sen (1983, 1984a). Assuming all  $f^k(\cdot)$  and  $c^l(\cdot)$  to be differentiable, on the one hand, as is seen in

$$\frac{\partial b_i^k}{\partial x_i^j} = \sum_l \frac{\partial f^k(c(x_i), z_i, z_s, z_e)}{\partial c^l} \frac{\partial c^l}{\partial x_i^j} \quad \forall k \quad (2.3)$$

a commodity  $j$ , say food, is conducive to several functionings such as being well nourished, being healthy, and participating in social life. On the other hand, as is seen in

$$db_i^k = \sum_j \sum_l \frac{\partial f^k(c(x_i), z_i, z_s, z_e)}{\partial c^l} \frac{\partial c^l}{\partial x_i^j} dx_i^j \quad (2.4)$$

to achieve some functioning  $k$ , say being healthy, several different goods are conducive; e.g., a healthy diet, proper sanitation facilities, and an adequate shelter. Second, in general, both the characteristics function  $c(\cdot)$  and the conversion function  $f(\cdot)$ , therefore, also allow for substitutability among goods and characteristics, respectively. While different commodity bundles may provide the same caloric content, different patterns of consumption may result in social participation. Third, as the derivatives in (2.3) and (2.4) illustrate, the influence of a commodity, more precisely a characteristic, on a certain functioning achievement depends on both the conversion factors and other characteristics. For instance, the same diet may result in mal- or supernutrition, depending on whether it is consumed by an adult or a child. Moreover, this diet may, thereby, render the same adverse sanitary conditions merely unpleasant for one person, but fatal for another.

Summing up, the good–functioning link is best considered as a many-to-one function and is also in general characterised by substitutability among both goods and characteristics; moreover, it varies with the conversion factors and certain goods may affect several functionings. Consequently, we fail to draw any reliable conclusion, in general, about functioning achievements from partial or incomplete consumption data—even if all relevant conversion factors were known. The intuition is that there might always be some other consumption pattern resulting in a particular being and doing, which we, however, do not observe. For instance, merely lacking a meal with meat does not necessarily imply malnutrition.

### Capability Deprivation

Sen (1992, 1999) suggests conceptualising poverty as capability deprivation.<sup>19</sup> Let  $\underline{\mathbf{b}} = (\underline{b}^1, \dots, \underline{b}^k, \dots, \underline{b}^K)^T$  denote the vector of critical levels of functioning achievements that a society requires an individual to achieve in order to be considered nondeprived. Let  $\mathbf{b}_i^* = \mathbf{f}(\mathbf{c}(\mathbf{x}_i^*), \mathbf{z}_i, \mathbf{z}_s, \mathbf{z}_e)$  denote the functioning vector achieved by individual  $i$ . Individual  $i$  is clearly *nondeprived* if we observe  $\mathbf{b}_i^* \in \mathcal{B} \equiv \{\mathbf{b} \geq \underline{\mathbf{b}}\}$ , meaning that each chosen functioning achievement is above the critical threshold. Thus, observing a choice out of  $\mathcal{B}$  indicates deprivation-free being and doing. By contrast, individual  $i$  is *deprived* if no such  $\mathbf{b}$  can be achieved, i.e.,  $\mathbf{b}_i^* \in \mathcal{S} \equiv \{\mathcal{Q}_i \cap \mathcal{B} = \emptyset\}$ . Therefore, observing a choice out of  $\mathcal{S}$  indicates a deprived being and doing. This feature allows to distinguish *conceptually* between a fasting and a starving person.

However, while conceptually convincing, the CA requires at this stage counterfactual information for asserting an individual to be deprived of some being or doing. Did she actually have the choice of an undeprived being and doing? Hence, if we observe an individual with some  $b_i^{k*} < \underline{b}^k$ , we can only consider her as *potentially deprived* with respect to functioning  $k$ . Thus either we directly assume that the underlying choice set was  $\mathcal{S}$ , or we do so conditional upon further information, thereby rendering this assumption more reasonable. The present paper pursues the latter approach; it does so, however, in the commodity space.

How does capability deprivation translate into the commodity space? Given a vector  $\underline{\mathbf{b}}$  and an individual's conversion factors  $\mathbf{z}_\bullet$ , this implies a set of commodity bundles that provide the individual a nondeprived being and doing.<sup>20</sup> This commodity set of *nondeprivation* is

$$\mathcal{ND}_i = \{\mathbf{x} \mid \mathbf{b}_i = \mathbf{f}(\mathbf{c}(\mathbf{x}_i), \mathbf{z}_i, \mathbf{z}_s, \mathbf{z}_e) \geq \underline{\mathbf{b}}\}. \quad (2.5)$$

Note that  $\mathcal{ND}_i$  varies parametrically with  $\mathbf{z}_\bullet$  and might even be an empty set for some individuals. Analogously to the functioning space, an individual not being entitled to any of the deprivation-free commodity bundles in  $\mathcal{ND}_i$  *must* be deprived of at least one

<sup>19</sup> Although the notion of capability deprivation is an essential feature of poverty, more is needed to identify the multidimensional poor, i.e. the deprivation cut-off,  $\underline{\mathbf{b}}$ , has to be complemented with a poverty cut-off, to accomplish aggregation over dimensions. The present paper, however, is concerned with the deprivation aspect only. For multidimensional poverty measurement, allowing for a dual cut-off, see in particular Alkire and Foster (2011).

<sup>20</sup> This line of reasoning is similar to the application of the entitlement approach to famines and starvation in Sen (1981, 1982).

functioning achievement. Thus the commodity set associated with deprivation is

$$\mathcal{D}_i \equiv \{\mathbb{R}^J \setminus \mathcal{N}\mathcal{D}_i\}. \quad (2.6)$$

If  $\mathcal{X}_i \subseteq \mathcal{D}_i$ , then  $i$  has to go without something, and hence  $i$  must fail to achieve some functioning. Thus (2.6) indicates a dilemma: choosing out of  $\mathcal{D}_i$  is like robbing Peter to pay Paul. As (2.6) also illustrates, the exclusive focus on income is insufficient to examine deprivation, for instance in case of extremely detrimental conversion factors. More specifically, a uniform income-based poverty line is substantially flawed, or, as Sen (1992, p. 111) puts it:

To have an inadequate income is not a matter of having an income level below an externally fixed poverty line, but to have an income below what is adequate for generating the specified levels of capabilities for the person in question.

Therefore, this capability-based perspective on poverty provides a profound insight into what an *inadequate* or *insufficient income* is: an income (or entitlement), with  $\mathcal{X}_i \subseteq \mathcal{D}_i$ . Thus, an inadequate income, on that note, is by definition associated with capability deprivation.<sup>21</sup> Capability deprivation is best understood as the result of a specific configuration of both conversion factors and entitlements. Therefore, in general, it cannot be said what an inadequate entitlement is without referring to the conversion factors  $\mathbf{z}_\bullet$ . The inadequacy of income is, hence, individual- or group-specific (see Sen, 1983).

From a CA perspective, goods, like incomes, are only of secondary interest. However, there is readily available data on both. What do the previous considerations, therefore, mean for a valid inference of capability deprivation based on consumption data? To infer functioning achievements from consumption data, in general, it is (i) necessary to know the complete commodity bundle  $\mathbf{x}_i^*$ , owing to the multiplicity of consumption patterns yielding the same achievements. In addition to the consumption information, (ii) technical aspects of the conversion function, such as the substitutability, have to be properly accounted for, which, moreover, vary with the conversion factors  $\mathbf{z}_\bullet$ . Therefore, (iii) either more information or additional assumptions on the conversion factors' influence are essential for an inferential exercise as well. Finally, a study specifically interested in capability deprivation, as opposed to low-functioning achievements, (iv) requires information

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<sup>21</sup> Note, however, that capability deprivation may also result independent from income, e.g. occupational bans, denying voting rights or other discriminatory practices.

on not-chosen options in the choice set, i.e. counterfactual information.

Against these informational requirements, the present study's approach is characterised as follows: A good is considered *pivotal* if its characteristics are essential for the society's average consumer to attain some specific functioning level. For instance, phones, mobiles, and internet connections each provide access to commonly used communication networks. To address (i) and (ii), I assume, moreover, the respective component functions  $f^k(\cdot)$  to be of a limitational type, in the sense that the average consumer requires the pivotal good for a  $b_i^{k*} \geq \underline{b}^k$ .<sup>22</sup> Accordingly, nonconsumption of the pivotal good is likely to be accompanied with a  $b_i^{k*} < \underline{b}^k$ . Regarding (iii), the present approach, though somewhat crude, assumes the good to be pivotal for all relevant  $\mathbf{z}_\bullet$ . A more refined approach, which is left for future research, may allow for specific subpopulations. Regarding the counterfactual information (iv), I additionally draw upon the self-reported reason for nonconsumption. Follow-up questions, frequently included in longitudinal surveys, ask for reasons for nonconsumption and allow the respondent to report answers like "cannot afford" or "financial reasons". This latter information corroborates the presumption that the nonconsumption of a pivotal good is due to an inadequate income and hence associated with a deprived being or doing. Thus, the present paper advances identification of the capability deprived by combining the CA's concept of an inadequate income (Sen, 1992) and indicators originally devised by the material deprivation literature (Mack and Lansley, 1985).

### 2.4. Data and Empirical Approach

The present study uses four waves of the German Socio-Economic Panel (SOEP), namely, every second year of 2001–2007.<sup>23</sup> Only for these waves can I construct the key explanatory variables. The sample includes all individuals aged 20–65, yielding 56,908 person–year observations of 22,193 respondents.

I construct the key explanatory variables based on questions that ask whether the house-

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<sup>22</sup> The idea is not to preclude other consumption patterns in general. Deviating from mainstream consumption patterns, however, is arguably a deliberate decision the consumer is aware of.

<sup>23</sup> Socio-Economic Panel (SOEP), data for years 1984–2010, version 27, SOEP, 2011. For more details see Wagner *et al.* (2007). The data used in this paper was extracted using the add-on package PanelWhiz for Stata. PanelWhiz (<http://www.PanelWhiz.eu>) was written by Dr. John P. Haisken-DeNew (john@PanelWhiz.eu). See Haisken-DeNew and Hahn (2010) for details. The PanelWhiz-generated DO file to retrieve the data used here is available from me upon request. Any data or computational errors in this paper are my own.

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hold owns certain goods or performs certain activities (certain items for short); for instance, whether the household has a phone, whether it has a car, whether it takes a vacation away from home for more than two weeks once a year, or whether it invites friends for dinner at least once a month. Moreover, the households are asked whether they eat a hot meal with meat at least every other day, and whether they put some money aside for emergencies.<sup>24</sup>

How to deal with the inference problem of the previous section? In a nutshell, first, I only consider pivotal goods, i.e., rather uncontroversial goods, that are typically used in the society under consideration to achieve a certain functioning; so far I am in line with other studies (e.g. Klasen, 2000, Alkire and Santos, 2011). Second, I argue for isolating those persons reporting nonconsumption of an item who have an inadequate or insufficient income, building upon a follow-up question for the reason.

Table 2.1 provides an overview of the pivotal items, the exact wording in the questionnaire, and the associated capabilities somebody *might* be deprived of in case he has to do without. The selection of the associated capabilities is guided by the list Nussbaum (2001a,b) suggests.<sup>25</sup> For example, somebody not eating a warm meal with meat every other day might be deprived of the functioning “being well-nourished”.

The answers to these questions, by themselves, fail as indicators of capability deprivation, since going without a meal with meat could simply result from a reasonable preference as well (e.g., for a vegetarian), as Piachaud (1981) already noted. In case the respondent reports doing without a particular item, she is additionally asked whether this is caused by *financial reasons* or *other reasons*. The key idea of the present paper is that financial reasons for nonconsumption of a pivotal item indicate that an individual has an inadequate income. This inadequacy of income forces the individual to go without *some* of the pivotal goods, i.e., to choose out of  $\mathcal{D}_i$ . Since pivotal means are missing, the individual, therefore, fails to achieve the associated functionings, and hence is deprived of fundamental capabilities. To illustrate this further, I suggest that somebody without a phone for financial reasons is severely deprived of being able to participate in social life,

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<sup>24</sup> There are two more items in the SOEP with information on the underlying reason for a potential nonconsumption: internet access and colour TV. However, I do not include them, as the former is asked only in two waves (2005, 2007), while the latter lacks a sufficient number of observations reporting financial reasons for nonconsumption (below 100).

<sup>25</sup> On this issue see also Alkire (2002, 2008), Leßmann (2012) and Sen (2004, 2010), but also sections 1.1, 1.3 and the discussion in this chapter.

Table 2.1.: Key Explanatory Variables

Variable	Question	Associated potential deprived capabilities
Meal	I eat a hot meal with meat, fish, or poultry at least every other day	<b>Bodily Health:</b> Being well-nourished
Car	The household has a car	<b>Being Mobile:</b> Being able to move freely
Building	The flat is located in a building which is in good condition	<b>Shelter</b> (physical meaning) <b>Bodily Health:</b> Not being exposed to adverse environmental conditions <b>Affiliation:</b> Having the social bases of self-respect and nonhumiliation
Hood	The building is located in a good neighbourhood	<b>Shelter</b> (physical meaning) <b>Bodily Health:</b> Not being exposed to violent environment <b>Emotions:</b> Not having one's emotional development blighted by fear and anxiety
Dinner	I invite friends over for dinner at least once a month	<b>Affiliation:</b> Engage in social life
Phone	The household has a telephone	<b>Affiliation:</b> Engage in social life
Furniture	Furniture which is worn out but can still be used is replaced by new furniture	<b>Affiliation:</b> Engage in social life; Having the social bases of self-respect and nonhumiliation
Emergency	I have put some money aside for emergencies	<b>Shelter</b> (social meaning) <b>Practical Reason:</b> Engage in planning ones' life
Vacation	I take a vacation away from home for at least one week every year	<b>Play:</b> Enjoy recreational activities

Table 2.2.: Entitlements, capability deprivation and expected responses

case	sufficient entitlement	explanation for nonconsumption	must be deprived	Intuition	Response	expected effect on LS
(A)	no	not entitled to deprivation-free bundle	yes	'You have to rob Peter to pay Paul'	financial reasons	–
(B)	no	not entitled to deprivation-free bundle	yes	'I could afford that, given I abandon anything else'	other reasons	–
(C)	no	not entitled to deprivation-free bundle	yes	'I don't need any sour grapes'	other reasons	0
(D)	yes	other constraint	yes	e.g., due to a social norm	other reasons	–
(E)	yes	chose other goods to achieve functioning	no	'I don't need that'	other reasons	0
(F)	yes	functioning not aspired	no	'I devote myself to higher end'	other reasons	0

Notes: – indicates the expected effect on life satisfaction to be negative; 0 indicates that no significant effect is expected.



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as he or she faces (possibly prohibitively) high costs of socializing or staying in contact with peers, friends, or relatives. As another example, a person unable to take a vacation away from home at least once a year is also deprived of a valuable capability, namely of being able to enjoy a specific, but common type of recreational activity.

Table 2.2 displays the links between (in)sufficiency of entitlements (or income), capability deprivation, expected response behaviour and expected influence on life satisfaction. The prime objective is to detect those persons with insufficient entitlements (who therefore must be deprived), by reporting financial reasons for going without a pivotal good (case A).

Who might report *other reasons* for going without? Table 2.2 distinguishes the deprivation–response link for some further cases. In particular, persons deliberately choosing a diet without meat, or participating in social life by some other activity than inviting friends for dinner, are not deprived and, moreover, are expected to report other reasons (case E). Instead, case F allows for an “austere life-style decision”, which, naturally, will impinge upon the chosen commodity vector.<sup>26</sup> Note that a reasonable interpretation of the question (‘I could afford that, given I abandon anything else’) might possibly cause some respondents to report other reasons, although being truly deprived (see table 2.2 case B). Finally, a version of adaptive preferences may cause individuals to edit out certain desires (‘I don’t need any sour grapes’), case C in table 2.2; see also Halleröd (2006) on this.<sup>27</sup> Although plausible, the empirical relevance of the different groups remains a subject of speculation and is left for future research.

Vital for the present approach, however, is that the reporting of financial reasons is not contaminated by respondents whose decision for nonconsumption originates from some other motivation (cases D–F). But why should, e.g., vegetarians report other reasons for going without meat? The underlying intuition is that doing without a pivotal item is arguably a *deliberate* decision, e.g., to abstain from using a mobile phone or to deny oneself a vacation away from home. As this consumption pattern is an obvious deviation from

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<sup>26</sup> Sen (1985b, 1993a) deals with this issue more generally by differentiating between achieving well-being and achieving so-called agency goals. By making this distinction people are not required to achieve or even maximise well-being; instead, conflicts such as those manifested by persons on hunger strike are explicitly allowed for.

<sup>27</sup> There is some evidence (McKay, 2004, Hick, 2013) that elderly tend to report more often other reasons, despite a lower income. However, it is not entirely clear, whether this results from adaptive preferences or deviant consumption patterns; see, e.g., Legard *et al.* (2008). On adaptive preferences in general, see in particular Elster (1982), Nussbaum (2001b).

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the average consumer's, the respondent can be expected to be clear about her motivation and, thus, to report "other reasons". Section 2.6 discusses some more issues of this kind.

To construct the key explanatory variables I use  $j = 1, \dots, 9$  items; the econometric model is

$$LS_{it} = \sum_j (\gamma_j FR_{jit} + \delta_j OR_{jit}) + \mathbf{X}'\boldsymbol{\beta} + \epsilon_{it}. \quad (2.7)$$

General life satisfaction,  $LS_{it}$ —i.e., the answers to the question "How satisfied are you with your life, all things considered?"—serves as the dependent variable. The response is recorded on 0–10 scale with 0 meaning "completely dissatisfied" and 10 "completely satisfied". The key explanatory variables are the  $FR_{jit}$ , which equal 1 if item  $j$  is missing for individual  $i$  in period  $t$  due to financial reasons, and 0 otherwise. Likewise, the  $OR_{jit}$  equal 1 if item  $j$  is missing for  $i$  in  $t$  for other reasons, and 0 otherwise. Those having the item serve as the reference group.

Expecting capability deprivations to hurt means expecting  $\hat{\gamma}_j < 0$ . Things are less clear-cut for the expectation of  $\hat{\delta}_j$ , owing to the heterogeneity of motives for reporting other reasons. While a lower life satisfaction is reasonable for cases (B) and (D), as both are deprived, one might expect no effect on life satisfaction for (E) and (F) (why should vegetarians, *ceteris paribus*, be more or less satisfied?). As adaptive preferences are expected to operate subconsciously, it is reasonable to expect no effect on life satisfaction (case C). Thus I expect  $\hat{\gamma}_j \leq \hat{\delta}_j \leq 0$ , depending on the relative importance of the respective groups. However, the expectation on  $\hat{\delta}_j$  is of lower priority for the present paper.

Table 2.3.: Mean Life Satisfaction and frequencies by item and reason

	building	phone	car	hood	emergency	vacation	dinner	meal	furniture
having item	7.09	7.03	7.08	7.07	7.29	7.33	7.35	7.04	7.29
	(50529)	(55580)	(51596)	(51486)	(41368)	(36912)	(27500)	(51925)	(30468)
other reasons	6.61	6.58	6.78	6.53	6.69	6.87	6.91	6.85	7.11
	(3760)	(564)	(2147)	(3732)	(1776)	(7145)	(23494)	(4159)	(14662)
financial reasons	6.00	5.61	5.96	6.05	6.19	6.17	5.78	5.44	6.15
	(2619)	(764)	(3165)	(1690)	(13764)	(12851)	(5914)	(824)	(11778)

Notes: Data from SOEP waves 2001, 2003, 2005, 2007. Cells contain mean life satisfaction and frequencies in parentheses.

Table 2.3 provides some descriptive statistics; in detail, the mean life satisfaction and the number of observations per item; specifically for *having the item*, for failing to have the item due to *other reasons*, and for failing to have it owing to *financial reasons*. First, there

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are some items with cell sizes slightly below 1000 ( $FR_{meal}$ ,  $FR_{phone}$ , and  $OR_{phone}$ ). In contrast, for other variables ( $FR_{emergency}$ ,  $FR_{vacation}$ ,  $OR_{dinner}$ ,  $OR_{furniture}$ ) there are more the 10,000 observations each. However, the number of observations Table 2.3 shows is not the cell size effectively used in estimation. The employed within-estimator requires changes from or to financial reasons, whereas the table also contains person-year observation of individuals solely reporting financial reasons for an item. Broadly speaking, the share of person-year observations by individuals changing their response varies between 50% and 80% (data not shown).

Moreover, Table 2.3 indicates that, in general, having an item is associated with the highest life satisfaction on average. The nonconsumption of an item owing to other reasons is typically associated with a slightly lower life satisfaction on average, suggesting the B and D types (misreported reason and other constraints) to be relevant. However, nonconsumption due to financial reasons is associated with a 1–1.5-point-lower life satisfaction on average. In sum, the descriptive evidence suggests that capability deprivation may, indeed, hurt. However, background variables such as employment or income might account for this.

The matrix  $X$  contains the usual control variables included in life satisfaction regressions, namely, marital, employment, and health status, the latter being captured by a dummy for degree of disability above 30, the logarithm of years of education, dummies for age groups (five-year brackets), and year and region dummies. To control for income, I include the logarithm of real net household equivalence income, using the modified OECD equivalence scale.

### **Adaptation Model**

To examine the potential process of adaptation explicitly, I adopt the approach pioneered by Clark *et al.* (2008a). The idea is to split up the treatment group of deprived persons—say, deprived of a dinner with friends—according to their *exposure time*. This approach explicitly uses the SOEP's panel structure, as both the current state of deprivation and a person's point of entry into it, have to be observed. Therefore, I introduce the following

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variables:

$$\begin{aligned}
 FRO_{ikt} &= \mathbb{1}(FR_{ikt} = 1 \wedge FR_{ikt-1} = 0) \\
 FR1_{ikt} &= \mathbb{1}(FR_{ikt} = 1 \wedge FR_{ikt-1} = 1 \wedge FR_{ikt-2} = 0)
 \end{aligned}$$

In words: the variable  $FRO_{ikt}$  equals 1 if individual  $i$  is deprived of item  $k$  in period  $t$  but was not in  $t - 1$ . Thus,  $FRO_{ikt} = 1$  indicates that the individual entered this capability deprivation only lately. Accordingly,  $FR1_{ikt}$  equals 1 if a person  $i$  is deprived of item  $k$  in  $t$  and  $t - 1$ , but was not in  $t - 2$ . Likewise, I construct  $FR2_{ikt}$ . However, the sample consists of four waves only, which is why I code  $FR1_{ikt} = 1$  if a person was not deprived in  $t - 2$  or  $t - 3$ .<sup>28</sup> Additionally, as the key explanatory variables are available biennially only, I have to assume that between two periods, each indicating a deprivation, this deprivation is present as well. Due to data limitations, I have to confine this exercise to the items  $k = \text{vacation, dinner, furniture, emergency}$ . Therefore, the second econometric model is, for each  $k$ ,

$$\begin{aligned}
 LS_{it} &= \eta_{k0}FRO_{ikt} + \eta_{k1}FR1_{ikt} + \delta_k OR_{ikt} \\
 &\quad + \sum_{j \neq k} (\gamma_j FR_{jit} + \delta_j OR_{jit}) + \mathbf{X}'\boldsymbol{\beta} + \epsilon_{it}.
 \end{aligned} \tag{2.8}$$

If capability deprivation hurts initially only (i.e., individuals adapt later on), this leads to the expectation for  $\hat{\eta}_{k0}$  to be significantly negative and for  $\hat{\eta}_{k1}$  to be insignificant.

To obtain the main results I estimate (2.7) and (2.8) using a linear fixed effects estimator. There are two merits to this approach. First, the coefficients are straightforward and easy to interpret as marginal effects; second, we are able to control for unobserved heterogeneity (such as personality traits or the interpretation of the response scale).<sup>29</sup> Ferreri-Carbonell and Frijters (2004) point out the relevance of controlling for fixed effects in life satisfaction regressions in general. For the present exercise, unobserved heterogeneity (e.g., being an extrovert) might matter, as this can be expected to be correlated with social activities (e.g., inviting friends for dinner). Consequently, estimations ignoring fixed

<sup>28</sup> Alternatively, a slightly different approach requires for  $FRO_{ikt} = 1$  not only  $FR_{ikt-1} = 0$ , but also  $OR_{ikt-1} = 0$ . Dropping the last condition has the merit of larger treatment and control groups, but entails the cost of a downward bias towards zero. Therefore, the adaptation results represent a lower bound of distress.

<sup>29</sup> Lykken and Tellegen (1996) demonstrate personality traits to be relevant for life satisfaction.

effects run the risk of being severely biased.

An objection to the linear estimation is that the ordinal nature of the dependent variable is ignored. Therefore, I estimate (2.7) also using the conditional logit fixed effects estimator, suggested by Chamberlain (1980). Beforehand, I have collapsed the dependent variable from an ordered 0–10 into a binary one, using the individual means over time as thresholds.<sup>30</sup> Drawbacks of this approach are (i) a considerably smaller sample (observations without variation in the collapsed dependent variable are dropped), and (ii) that the marginal effects can no longer be computed (the fixed effects they depend on have just been eliminated). Nonetheless, the conditional logit results provide a useful robustness check for the signs and significance of the coefficients.

## 2.5. Results

Columns (1), (2) of Table 2.4 provide the linear fixed effects results, (3) and (4) the conditional logit results, respectively. Columns (1) and (3) serve as benchmark estimations and are not explicitly discussed. First, for eight out of nine items the  $\hat{\gamma}_j$  show up significantly negative, indicating that nonconsumption of an item for financial reasons is associated with a lower life satisfaction on average. These items are pivotal means for achieving a certain functioning. More specifically, somebody abstaining from, say, inviting friends for dinner for financial reasons is argued to be less satisfied, because of being deprived of social participation. Hence, the results indicate that capability deprivation does in fact hurt. Second, the similar magnitude of the  $\hat{\gamma}_j$ , of about 0.2 each, suggests that whatever the inadequate income's manifestation, the associated dissatisfaction is roughly the same.

Third, four of these items, dinner, furniture, vacation and emergency, additionally exert a significant negative influence if missing for other reasons ( $\hat{\delta}_j < 0$ ) as well. Strictly speaking, it must remain unclear what factors drive this result. It is, however, suggestive to expect either other constraints (e.g., having no friends to invite), or persons with insufficient incomes, but reporting other reasons, to cause, in sum, significantly lower life satisfaction. Put differently, a  $\hat{\delta}_j < 0$  suggests the B and D types of Table 2.2 to be quantitatively relevant. Additionally, the  $H_0 : \hat{\gamma}_j = \hat{\delta}_j$  for  $j = \text{dinner, meal, building, furniture}$  are

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<sup>30</sup> The dependent variable is  $LS_{it}^{\text{bin}} = 1$  if  $LS_{it} \geq \overline{LS}_i$ , where  $\overline{LS}_i = \frac{1}{T} \sum_{t=1}^T LS_{it}$ , and 0 otherwise. This approach can be shown to be an approximation of the estimator Ferrer-i-Carbonell and Frijters (2004) suggested. On this see also Kassenböhmer and Haisken-DeNew (2009).

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Table 2.4.: Linear fixed effects and conditional logit fixed effects results

	linear fixed effects				conditional logit fixed effects			
	(1)		(2)		(3)		(4)	
Separated	-0.245**	(-3.27)	-0.154*	(-2.08)	-0.270**	(-2.91)	-0.164	(-1.73)
Single	-0.244***	(-4.47)	-0.205***	(-3.75)	-0.339***	(-4.01)	-0.298***	(-3.50)
Divorced	-0.0134	(-0.20)	0.0636	(0.94)	-0.00835	(-0.09)	0.0793	(0.85)
Widowed	-0.572**	(-3.19)	-0.568**	(-3.20)	-0.561**	(-2.80)	-0.574**	(-2.84)
lnehhNetIncR	0.419***	(13.23)	0.286***	(8.98)	0.496***	(10.82)	0.344***	(7.31)
OLF	-0.125***	(-4.45)	-0.114***	(-4.09)	-0.130**	(-3.14)	-0.123**	(-2.95)
UE	-0.568***	(-13.28)	-0.525***	(-12.47)	-0.662***	(-12.04)	-0.629***	(-11.31)
Phone			-0.0946	(-1.15)			-0.119	(-1.00)
PhoneFR			-0.249*	(-2.55)			-0.191	(-1.58)
Car			0.0105	(0.18)			0.0147	(0.17)
CarFR			-0.139*	(-2.44)			-0.196**	(-2.62)
Hood			-0.122***	(-3.54)			-0.0748	(-1.42)
HoodFR			-0.0172	(-0.30)			-0.0333	(-0.44)
Emergency			-0.197***	(-4.39)			-0.290***	(-4.23)
EmergencyFR			-0.203***	(-7.93)			-0.268***	(-6.80)
Vacation			-0.0528	(-1.95)			-0.0850*	(-2.02)
VacationFR			-0.128***	(-4.63)			-0.161***	(-3.83)
Dinner			-0.0838***	(-4.74)			-0.121***	(-4.12)
DinnerFR			-0.255***	(-7.36)			-0.271***	(-5.45)
Meal			-0.0653*	(-2.09)			-0.130**	(-2.64)
MealFR			-0.274***	(-3.62)			-0.166	(-1.71)
Furniture			-0.0533**	(-3.02)			-0.0590*	(-1.96)
FurnitureFR			-0.210***	(-8.32)			-0.233***	(-6.18)
Building			-0.0153	(-0.47)			-0.0231	(-0.45)
BuildungFR			-0.169***	(-3.53)			-0.214***	(-3.31)
Constant	4.444***	(6.73)	5.693***	(8.58)				
$\bar{R}^2$	0.0377		0.0549					
Obs.	56908		56908		42088		42088	
Ind.	22193		22193		12778		12778	
LL					-15484.4		-15327.0	

Notes: Sample based on SOEP waves 2001, 2003, 2005, 2007; t-statistics in parentheses. Models (1),(2): dependent variable is reported general life satisfaction on a 0–10 scale, linear fixed effects estimations. Models (3),(4): dependent variable is general life satisfaction collapsed from 0–10 to a binary variable using individual means over time as threshold, conditional logit fixed effects estimations. All models include further dummies for age groups, disability, year and region, and logarithm of educational years. Indicated levels of significance are \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

rejected at the 1% level of significance, and for  $j = \text{car}$ , vacation, at the 5% level of significance, implying  $\hat{\gamma}_j < \hat{\delta}_j < 0$ . This finding in turn suggests that individuals using different means to achieve the respective functioning also report other reasons for doing without inviting friends for dinner (cases E,F of Table 2.2). Likewise, for  $\hat{\delta}_{\text{emergency}} < 0$  other constraints or the reporting problem might be important. However,  $H_0 : \hat{\gamma}_{\text{emergency}} = \hat{\delta}_{\text{emergency}}$  cannot be rejected at the conventional levels of significance, suggesting that nobody really likes to go without putting some money aside for emergencies—i.e. C, E, and F types (adaptive or reasonable preferences) seem to be irrelevant in this case.

Finally, results appear to be somewhat different regarding living in a good neighbour-

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hood. While living in a bad neighbourhood for other reasons hurts ( $\widehat{\delta}_{hood} < 0$ ), it does not hurt for financial reasons ( $\widehat{\gamma}_{hood}$  is insignificant). However, there being too few variation may well account for its insignificance.<sup>31</sup> The significant negative effect of  $OR_{Hood}$ , however, might again indicate that either other causes of capability deprivation are at work (e.g., strong and restrictive family relations or work-related obligations). Alternatively, respondents with an insufficient income may, nonetheless, report other reasons.

To account for the ordinal nature of life satisfaction accurately, columns (3), (4) of table 2.4 show the conditional logit results. First, the table displays a substantial loss of about 14,800 person–year observations and of about 9,400 individuals. With that said, it is in line with expectation that some coefficients lose their significance, in particular those with rather small cell sizes ( $\widehat{\gamma}_{phone}, \widehat{\gamma}_{car}$ ). Nonetheless, the pattern appears to be essentially the same as for the linear results. Having to go without other items (as, for instance, dinner, emergency, furniture, or vacation) for financial reasons causes a significant drop in life satisfaction. Moreover, the  $\widehat{\gamma}_j$  are all of similar size. In comparison with other coefficients (e.g., widowhood or unemployed), the  $\widehat{\gamma}_j$  indicate a quantitatively similar relative influence to that in the linear framework. All in all, the conditional logit results basically confirm the linear results.

Summarizing: First, the results suggest that it is crucial to distinguish between financial and other reasons when analysing nonconsumption. For eight out of nine items the results indicate a significantly lower life satisfaction if nonconsumption is owing to financial reasons. Moreover, for seven out of those eight items, either  $\widehat{\gamma}_j < \widehat{\delta}_j$  or even  $\widehat{\delta}_j$  is insignificant; hence the underlying reason makes a difference. Second, the results suggests that facing the need to go without a pivotal good, given the inadequateness of one’s income, is inevitably painful. Finally, the  $\widehat{\gamma}_j$  display significant negative effects of similar size in the linear and in the conditional logit fixed effects framework.

Turning to the results on adaptation to deprivation, figure 2.1 illustrates the main finding. Table A.1 of the appendix contains the underlying results. A negative point estimate in one of the subplots at period 1 indicates the average drop in life satisfaction when the individual is observed deprived for the first time, i.e. he or she just entered the deprivation. Accordingly, a negative point estimate in period 2 indicates the average drop in life

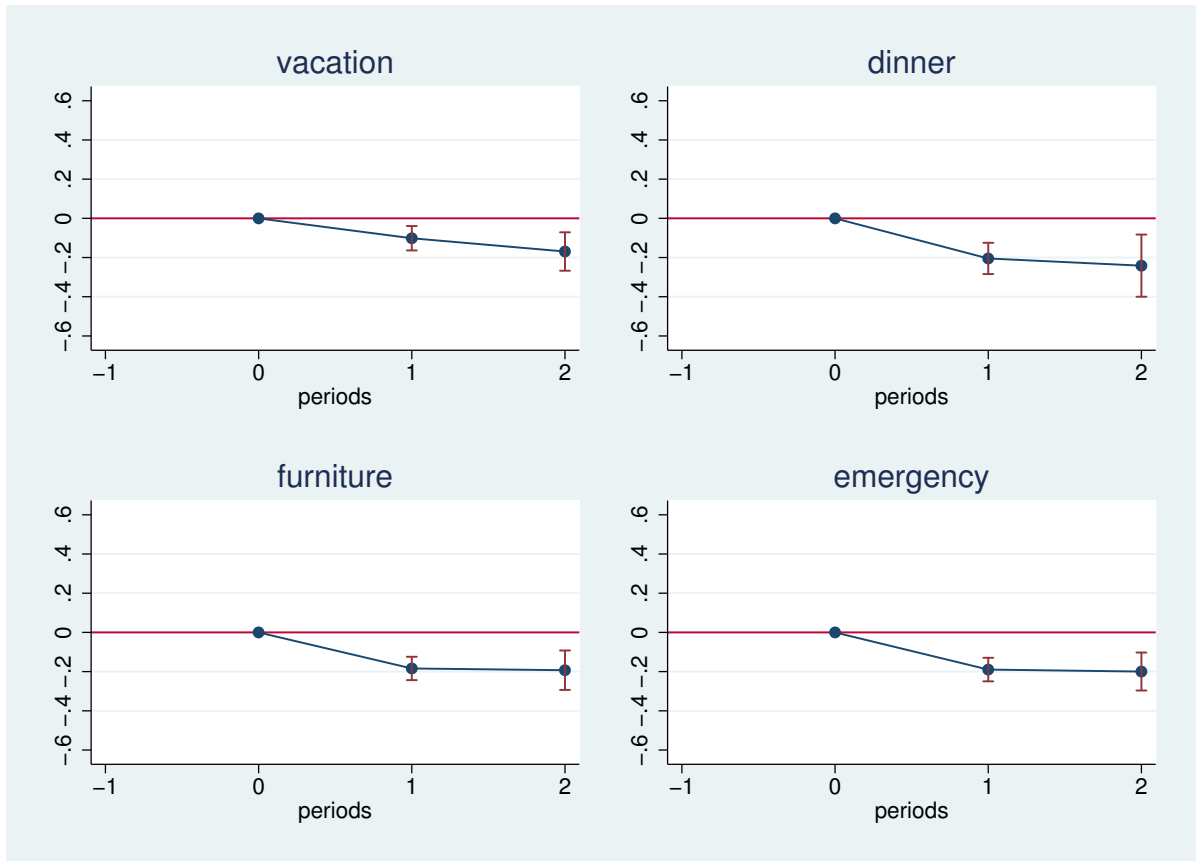
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<sup>31</sup> Out of 1690 person–year observations reporting financial reasons for living in a bad neighbourhood, only 1280 can be employed in the estimation. The reason is that some individuals fail to exhibit within variation. In contrast, out of 3732 person–year observations reporting other reasons for living in a bad neighbourhood, 2730 are effectively used.

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satisfaction for an enduring spell of deprivation (compared to the life satisfaction before entering the deprivation). The general picture contradicts adaptation to the capability de-

Figure 2.1.: Adaptation and Capability Deprivation



Notes: Data from SOEP waves 2001, 2003, 2005, 2007. Each graph based on single regression. See Table A.1 for detailed results. Equation (2.8) is the underlying model, which is estimated using linear fixed effects. Dependent variable is life satisfaction on a 0–10 scale. Confidence intervals are calculated for 95% level. For details see section 2.4.

privations under consideration. The impact of being deprived of an associated functioning appears to be the same, irrespective whether one experiences it for a short period only, or for four or more years. Not only is  $H_0 : \hat{\eta}_{k0} = 0$  rejected at the 5% level of significance for all items, but also  $H_0 : \hat{\eta}_{k1} = 0$ . As the items are constructed for every second year, a lower life satisfaction in period 2 indicates that having to go without the item it still hurts after four to six years. Broadly speaking, this evidence suggests that individuals do not adapt to being deprived of functionings (e.g., social participation) owing to an inadequate income.



### Robustness Issues

A reasonable objection is that the results might only be an artefact of an improper functional form specification of income, especially for the lower tail of the income distribution. The main specification, however, already allows for a decreasing effect of income by using a semilog specification. Nonetheless, I additionally estimate a model including a dummy,  $pov60 = 1$ , if the household has an income below 60% of the region-specific median net household equivalence income, and 0 otherwise. Therefore, if ultimately a merely low income ( $pov60 = 1$ ) drives the main results, I expect  $H_0 : \hat{\beta}_{pov60} < 0$ , while rendering (at least some of) the  $\hat{\gamma}_j$  insignificant. Moreover, this specification provides evidence whether there is more to poverty than an income below an external poverty line, from a life satisfaction perspective. If there is more to poverty, at least some of the  $FR_j$  should remain significant after the inclusion of  $pov60$ .

Finally, to elaborate the functional form specification, I estimate a spline function of income, which is more flexible in that it allows for a varying effect of income. As knots I use incomes of 1000, 1500, and 2000, roughly corresponding to the 25th, 50th, and 75th percentiles of the (unweighted) income distribution. Table 2.5 contains the results; columns (1) and (3) show the benchmark model augmented with  $pov60$  and the spline function, respectively. In (1)  $\hat{\beta}_{pov60}$  is seen to be significantly negative ( $-0.1$ ), indicating that an income below 60% of the median income threshold is associated with an additional drop in life satisfaction—on top of the nonlinear effect of income. However, including the key explanatory variables of the present study renders  $\hat{\beta}_{pov60}$  insignificant. In contrast, the  $\hat{\gamma}_j$  remain basically unchanged, indicating that neither does a *low income* ( $pov60 = 1$ ) drive the results, nor does such a low income capture all aspects of poverty from a life satisfaction perspective (i.e., the pain from going without). In other words, the lowness of income fails to capture its inadequacy. Columns (3) and (4) show the results for the spline function specification, indicating roughly the same marginal effect of income as the semilog specification of the main results<sup>32</sup> and, moreover, that the main results are robust to such a more flexible specification of income. In summary, to examine poverty

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<sup>32</sup> The implied marginal effect for an income below 1000, the first knot, is a higher life satisfaction by 0.06 points for another €100. For an income between €1000 and €1500, the implied marginal effect is  $0.063 - 0.045 = 0.017$  points for another €100. As the semilog specification implies continuously decreasing marginal effects, these lie in between: for an income of €800 (€1100) the marginal effect for another €100 is roughly 0.04 (0.03).

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Table 2.5.: Robustness checks for functional form of income

	(1)	(2)	(3)	(4)
lnehNetIncR	0.385***	(11.61)	0.266***	(8.00)
pov60	-0.105*	(-2.07)	-0.0635	(-1.26)
ehhNetIncR			0.000945***	(7.51)
knot1			-0.000623***	(-3.75)
knot2			-0.000152	(-1.32)
knot3			-0.000112	(-1.64)
Phone		-0.0927	(-1.12)	-0.0911
PhoneFR		-0.244*	(-2.49)	-0.243*
Car		0.0124	(0.21)	0.0108
CarFR		-0.136*	(-2.38)	-0.131*
Hood		-0.122***	(-3.55)	-0.122***
HoodFR		-0.0182	(-0.32)	-0.0187
Emergency		-0.197***	(-4.40)	-0.198***
EmergencyFR		-0.203***	(-7.91)	-0.203***
Vacation		-0.0535*	(-1.97)	-0.0557*
VacationFR		-0.128***	(-4.64)	-0.128***
Dinner		-0.0837***	(-4.74)	-0.0840***
DinnerFR		-0.254***	(-7.32)	-0.253***
Meal		-0.0651*	(-2.09)	-0.0652*
MealFR		-0.272***	(-3.60)	-0.272***
Furniture		-0.0535**	(-3.03)	-0.0537**
FurnitureFR		-0.210***	(-8.33)	-0.211***
Building		-0.0149	(-0.45)	-0.0145
BuildungFR		-0.170***	(-3.54)	-0.170***
Constant	4.717***	(7.07)	5.852***	(8.73)
	6.472***	(10.15)	7.073***	(11.06)
$\bar{R}^2$	0.0379	0.0550	0.0379	0.0548
Obs.	56908	56908	56908	56908
Ind.	22193	22193	22193	22193

Notes: Sample based on SOEP waves 2001, 2003, 2005, 2007; t-statistics in parentheses. Dependent variable is reported life satisfaction in general on a 0–10 scale. All models estimated using linear fixed effects. Models (3),(4) contain a spline function for income. The three knots implemented are €1000, 1500, 2000. All models contain the same control variables as in Table 2.4, including year and region dummies. Indicated levels of significance are \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

on conventional income basis runs the risk of ignoring substantial costs of poverty related to (individual-specific) inadequateness of income.

## 2.6. Discussion

### Economic significance

Are the results economically significant as well? As a person typically suffers from several deprivations simultaneously (multiple deprivation), the psychic costs add up in a linear framework. For instance, about 90% of the (person–year) observations, who suffer from at least one deprivation due to an inadequate income, involve up to four deprivations simultaneously. More than 50% of these observations involve two–four deprivations. Tak-

ing three out of the four most frequent indicators of capability deprivation, amounts to a total drop in life satisfaction of about 0.5–0.7 points on the 0–10 scale. Thus, the results imply psychic costs similar to those associated with widowhood (relative to being married) or unemployment (relative to being employed). Moreover, the psychic costs of these capability deprivations accrue on top of those of possible unemployment, disability, or low income. Thus, this is the first paper demonstrating poverty as capability deprivation to be a major determinant of general life satisfaction.

### **Adaptation**

The provided evidence suggests that individuals fail to adapt to the painful dilemma of going without an item that they require for achieving functionings. This holds for the subsequent four to six years. The present study, therefore, provides novel evidence for a failure of adaptation, thereby adding poverty as capability deprivation to the conditions, which individuals fail to adapt to—besides unemployment Clark *et al.* (2008a) and serious forms of disability Powdthavee (2009).

Thus this first evidence mitigates the fundamental concern about adaptation to deprivation, raised by the Sen (1984b). More specifically, it demonstrates that—at least under certain conditions—capability deprivations *can* be detected using individual assessments. Three qualifying points on the results' scope: First, as the implemented strategy exploits within-variation, the data is required to contain information on the situation both before and after entering deprivation. Therefore, some circumstances are difficult if not impossible to examine. Analysing deprivations, entered long ago (e.g., in childhood) is in principle a question of data availability. In contrast, deprivations suffered over the whole lifetime, escape from such a within-variation-based analysis. Second, as Teschl and Comim (2005) point out, adaptation may well vary by domain, because comparing functioning achievements is easier for some than for others (e.g., health is easier to compare than the degree of autonomy in agency). Third, another form of adaptation, more precisely adaptive preferences, may cause individuals to report other reasons for going without. This issue, however, is left for future research. Therefore, generalisations regarding both the domain of and the reason for deprivation should be treated with caution.

### **Covariates and capability deprivation**

How do the other covariates relate to functioning achievements and capability deprivations? Some covariates, like years of education, are suited to capture certain functioning achievements or at least preconditions—even if only partially. If properly implemented, other covariates may also capture capability deprivations, which would, however, similar to the present exercise require either more the information or appropriate assumptions about the options not chosen. For instance, unemployment and serious health problems, as disabilities, are essentially capability deprivations; see Sen (1999, Ch. 4) and Sen (1997) on this.

Moreover, examining capability deprivations appears not to be mainly an exercise in including more explanatory variables; rather it is one of detecting where constraints systematically prevent some individuals from certain functioning achievements—constraints that others are not subject to. Consequently, a more comprehensive assessment of the situation of deprived individuals requires these effects to be considered as well. Nonetheless, the prime challenge is to discriminate between a low-functioning achievement (e.g., due to a deliberate decision) and a truly deprived capability set. The results suggest further that, for examining poverty-related issues, a focus on income and employment status is too narrow, as the psychic costs the poor bear are ignored.

### **Marginal effect of income**

What is the marginal effect of income, when simultaneously including information on financial reasons for nonconsumption? Clearly, to state the marginal effect of income is tricky, as the  $\gamma_j$  capture the effect of an inadequately low income, whereas  $\beta_{inc}$  captures the “ordinary” effect of income. The results, however, suggest to think less in terms of a functional specification of the income variable (e.g., logs or polynomials), and more in terms of other variables that the marginal effect may depend on (some interaction-effect-like specification). Potential candidates for such an exercise are variables capturing conversion factors.

A related point applies to an external fixed, uniform poverty line. The evidence fails to show a significant effect of an income below that poverty line (beyond the ordinary decreasing effect of income). This result suggests that such a poverty-line-based approach is incapable of accounting for the complexity of deprivation. It is precisely one of the major

concerns of the CA not only to understand poverty as capability deprivation, but also to “to acknowledge that deprivations of very different kinds have to be accommodated within a general overarching framework” (Sen, 2000, p. 18). The presented evidence, therefore, lends support to the CA on this.

### **Pivotal goods**

What makes a good or an activity pivotal for relevant functioning achievements? First, being a pivotal good is contingent upon what functionings are deemed relevant. Following the CA, it is not the theorist who, on his own, selects the relevant functionings and capabilities, for an assessment of poverty or the standard of living. Instead, among other things, public reason is vital to their selection; see Sen (1992, 2004, 2010). Although a list of “central human capabilities”, as proposed by Martha Nussbaum (2001b,a) can be disputed, it may well serve as a guide for exercises such as the present one.<sup>33</sup>

Second, for a good to be pivotal, critically depends on the structure and organisation of the society in question; see Sen (1983) on this. For instance, nowadays, a mobile phone is a pivotal means to participate in social life, due to its characteristic of providing access to *customary* communication networks—contrary to, say, 40 years ago.<sup>34</sup> In line with this, the assumption  $f^k(\cdot)$  being of a limitational type for the average consumer has to be warranted. Only then does lacking the specific good imply a deprivation regarding functioning  $k$ .

### **Do *financial reasons* provide a meaningful response?**

First, as outlined in section 2.3, the CA provides a profound concept of what inadequate or insufficient income means. As a follow-up question for nonconsumption of pivotal goods, the present paper argues, financial reasons are suited to indicate such an inadequate income. Second, is it reasonable to expect individuals to respond adequately? Since no consequence is attached to the follow-up questions, and the questions are no more intimate than other financial questions asked in the SOEP, strategic or deliberately

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<sup>33</sup> Naturally, the present paper does not claim to study all relevant capability deprivation exhaustively, as the selection is obviously driven by data availability. For a further discussion see of selecting relevant functionings, see, e.g., Alkire (2008), Robeyns (2003).

<sup>34</sup> Actually, Townsend (1979) also aims at this point, however, naturally, without the understanding of goods as means for the end of functioning achievements; see section 1.1.

## 2. Capability Deprivation and Life Satisfaction

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biased response behaviour seems unlikely. A natural requirement to obtain a meaningful response is, however, to ask for ordinary, familiar items, as only then the response can be based on a reasonable evaluation. This condition, however, is apparently fulfilled anyway by focussing on pivotal goods, which by definition are commonly consumed, i.e. they are used by the average consumer to achieve a certain functioning.<sup>35</sup>

Do we merely capture merely a feeling of being poor or self-perceived deprivation; is subjectivity introduced in a measure designed to capture objective deprivation, as claimed by McKay (2004)? Taking the notion of poverty as capability as basis, implies the inadequate income to be individual-specific. Therefore, *if* the item is truly pivotal and *if* nonconsumption is due to financial reasons, instead of introduced feelings, I argue, that otherwise private information (about the inadequacy of the income) is revealed.

Table 2.6.: Mean income by item and reason

	building	phone	car	hood	emergency	vacation	dinner	meal	furniture
having item	1788	1751	1803	1772	1910	1979	1908	1744	1918
other reasons	1448	1323	1338	1503	1558	1548	1704	1776	1777
financial reasons	1143	926	904	1140	1236	1142	1064	994	1213

Notes: Data from SOEP waves 2001, 2003, 2005, 2007. Cells contain mean real equivalence net household income.

Is there evidence beyond these intuitions? Table 2.6 provides some descriptive data: mean income by item and reason for nonconsumption. In accordance with intuition, the general pattern is  $\overline{inc}_{FR_j} < \overline{inc}_{OR_j} < \overline{inc}_{chosen_j}$ . While consuming the respective item is associated with a considerably larger income than nonconsumption for financial reasons, the average income associated with nonconsumption for other reasons lies in between. This evidence suggests not only that persons, earning an insufficient income, are more likely to report financial reasons, but also that some of them report other reasons, thereby indicating the relevance of a plausible “misinterpretation” of the question (cf. section 2.4, Table 2.2, case B).

Finally, the main results precisely suggest a significant difference between the underlying reasons for nonconsumption. Moreover, the magnitude of the psychic distress caused by going without a pivotal good is quite similar for qualitatively rather distinct goods;

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<sup>35</sup> To illustrate, both requirements (being pivotal and being familiar) were violated by asking whether financial or other reasons account for not having a yacht.

thus further corroborating the systematic influence of an inadequate income. Apparently, it does not really matter, whether you rob Peter or Paul. In sum, reporting financial reasons for nonconsumption of a pivotal item, therefore, seem to indicate a meaningful response.<sup>36</sup>

### **Do other reasons provide a meaningful response?**

This question is of lower priority for the present analysis, but important for both a better understanding of poverty and refinements of the measures. Although a thorough analysis is left for future research, one can speculate on the underlying mechanisms for reporting other reasons, if not consuming a pivotal good.

In general, the results lend support to the suspicion that truly deprived people report other reasons, since nonconsumption for other reasons in most cases hurts as well. On the one hand this could be due to other constraints (case D), which is also supported by a higher average income of this group ( $\overline{inc}_{OR_j} > \overline{inc}_{FR_j}$ ).<sup>37</sup> On the other hand, the potential “misinterpretation” of the question may also account for this (case B), which in turn is supported by a lower average income compared to those who possess the good ( $\overline{inc}_{chosen_j} > \overline{inc}_{OR_j}$ ). Moreover, that a reasonable preference for not consuming a pivotal good matters (cases E,F) is indicated by  $\widehat{\delta}_j > \widehat{\gamma}_j$  for most  $j$ . Alternatively, this could also be for editing out one’s desire, i.e. believing the grapes to be sour anyway (case C). Since this mechanism is expected to work behind one’s back, it is, however, at odds with distress found for nonconsumption due to other reasons, in particular for the item of emergency.

All in all, the current discrimination between two further options thus appears to be not only conceptually crude, but also empirically insufficient. Consequently, the results suggest for devising better deprivation indices, that relying exclusively on nonconsumption for financial reasons will tend to underestimate, whereas nonconsumption irrespective of the reason, may overestimate the scope deprivation.<sup>38</sup> Future research on these indicators may, however, scrutinise the driving factors for reporting other reasons and devise more accurately partitioned follow up questions. The conceptually profound CA, especially the

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<sup>36</sup> Moreover, regarding reliability and validity, measures that discriminate reasons for nonconsumption are commonly found outperform those relying on nonconsumption only, see, e.g., Halleröd *et al.* (2006), Hick (2013).

<sup>37</sup> Alternatively, the higher income could be caused by reasonable preferences (E and F types), whose relevance, however, is questioned at least for the item emergency.

<sup>38</sup> This suspicion is already entertained, confer e.g., Halleröd (1995).

notion of poverty as capability deprivation, may fruitfully complement these efforts in order to illuminate and disentangle the complexities of poverty.

### **Follow-up questions and capability deprivation**

The present studies' results suggest that using follow-up questions on the reasons for particular functioning achievements, or their failure, will be fruitful for discriminating between a serious deprivation and the mere result of a reasonable preference, or low functioning achievement in general. For instance, a discrimination between the various other reasons allows one to investigate whether adaptation varies with the reason (instilled social norms might be more subtle than financial quandaries). A critical limit for such an approach is, however, a possibly *deliberately* biased response behaviour under certain conditions—for instance, in case of forced marriages with both spouses living in the household, or a child, though suffering from domestic violence, still living in that household. The present exercise, however, demonstrates that subjectively evaluated indicators can—if properly implemented—be used to analyse capability deprivation—despite prevailing distrust.

## **2.7. Concluding Remarks**

This chapter analyses whether capability deprivation actually hurts and whether individuals ultimately adapt to it. Methodologically, the present paper advances identification of the capability deprived by combining the CA's concept of an inadequate income (Sen, 1992) and indicators originally devised by the material deprivation literature Mack and Lansley (1985), which however lack a conceptual underpinning. Specifically, to identify capability deprivation, I require the nonconsumption of goods pivotal for functioning achievement in a given society, and augment this with information on the reported reasons (financial or other). I argue that this information, nonconsumption of pivotal goods for financial reasons, indicates a respondent faced with a dilemma; because of an inadequate income, a deprivation-free commodity vector is beyond her reach. Therefore, she has to go without at least one pivotal good and thus is deprived of at least one functioning achievement. The results suggest that such a situation is, literally, a painful dilemma.

More precisely, the results imply statistically and economically significant psychic costs



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of being deprived of certain functioning achievements, originating from an inadequate entitlement (income). These psychic costs are similar to those of unemployment or widowhood and be incurred in addition to these. Thus, this is the first paper adding poverty as capability deprivation (resulting from an inadequate income) to the major determinants of life satisfaction. The results prove robust to accounting for the ordinal nature of the dependent variable and other functional form specifications for income.

More importantly, the robustness checks also indicate that the mere lowness of income fails to capture its inadequacy. Thereby, the results reject the view that a unique, externally fixed threshold of income covers, by and large, all relevant aspects of poverty. The analysis of adaptation rejects the hypothesis that individuals come to terms with the adverse conditions they are confronted with, within the subsequent 4–6 years. This finding suggests that the individuals' scale of satisfaction is not distorted and that individuals neither accept nor quietly adapt. The present study, thus, provides novel evidence for a failure of adaptation, thereby adding poverty as capability deprivation to the conditions, which individuals fail to adapt to—besides unemployment Clark *et al.* (2008a) and serious forms of disability Powdthavee (2009).

To put the results in perspective: The present study demonstrates life satisfaction to be sensitive to specific forms deprivations, i.e. valuation is revealed of the underlying functionings, the affected persons are deprived of. Therefore, a cogent integration of life satisfaction and the CA appears to be feasible, and thus also a more comprehensive and compelling approach to human well-being.

Moreover, the methodological innovation demonstrates how to distinguish between a vegetarian and somebody who is incapable of regularly eating a warm meal with meat. Hence, the general concern of the CA's impracticability, due to its informational requirements, is substantially weakened. Additionally, this empirical strategy proves subjective indicators to be, indeed, capable of detecting capability deprivation—despite a generic distrust. Naturally, that is not to say that “realistic desires” or “taking pleasure in small mercies” do not matter at all.

However, future research in this vein may identify conditions under which the unemployed fails to break and the destitute is full of hope; both well aware of their deprived situation, rather than having learned to desire little. Finally, future studies may likewise reveal the beings and doings, persons not only have reason to value, but also, in fact, do value—thereby contributing to a better understanding of human well-being in general.

### **3. Job Characteristics and Subjective Well-Being. A Capability Approach Perspective<sup>1</sup>**

#### ***Abstract***

*This chapter scrutinises the influence of job characteristics on subjective well-being. The capability approach perspective provides a profound conceptual underpinning that supports the interpretation of the results and guides the operationalisation of job characteristics. The empirical analysis employs both a confirmatory factor analysis and the common life and job satisfaction frameworks. Job characteristics are found to increase both job and life satisfaction significantly. Moreover, they also account for what has been called procedural utility and occupational differences in job satisfaction alike. The results suggest that exercises in this vein may help in setting the stage for a more comprehensive and compelling approach to human well-being.*

#### **3.1. Introduction**

Job characteristics receive scholarly attention at least since the famous Hawthorne studies conducted in the 1930s, which documented the importance of non-pecuniary aspects of labour for workers' performance (Roethlisberger and Dickson, 1939, Mayo, 1945). Since then job characteristics pose a major field of research in human resource management (e.g., Wilkison *et al.*, 2013). Drawing on these results also experimental psychologists and sociologists proved work to be a source of satisfaction for its social and psychological benefits (for surveys see e.g. Warr, 1999, 2007). Initially, economists made use of job characteristics to explain wage differentials (Rosen, 1974, 1986). Recognising the results

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<sup>1</sup> This paper was presented at the annual conference of the Human Development and Capabilities Association in Jakarta, Indonesia in 2012.

### 3. Job Characteristics and Subjective Well-Being

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of the neighbouring fields, job characteristics along with job satisfaction data received more attention within economics as well (e.g., Hamermesh, 1977, Freeman, 1978).

Within job satisfaction research a human-resource perspective is still prevailing. Most studies are motivated by pointing out that job satisfaction is relevant *for* increasing workers' economic performance (e.g., Böckerman *et al.*, 2011, Fahr, 2011). A notable exception are Benz and Frey (2008a,b) who explicitly point out the potential role of work as a source of well-being. More specifically, the authors argue the higher job satisfaction of self-employed to indicate procedural utility, i.e. being one's own boss matters as well.

So far, only few studies explicitly addressed the work–well-being link in a comprehensive way, although the importance of labour for well-being is widely accepted (Fitoussi *et al.*, 2011).<sup>2</sup> Currently, however, in tandem with the increasing interest in life satisfaction, the focus implicitly shifts to overall subjective well-being (SWB). Work-related aspects examined with respect to life satisfaction include unemployment (e.g., Winkelmann and Winkelmann, 1998), self-employment (Binder and Coad, 2013), part-time employment (e.g., Booth and van Ours, 2008, 2009), and economic insecurity (Lüchinger *et al.*, 2010, Knabe and Rätzl, 2010). Moreover, pioneering studies considering both job *and* life satisfaction are, for instance, Booth and van Ours (2008, 2009), who examine part-time employment and family happiness. Moreover, Helliwell and Huang (2010) also analyse specific job characteristics and both job and life satisfaction, however, having a focus on calculating compensating differentials.

The contribution of this paper is threefold: This is the first paper demonstrating several specific job characteristics, such as autonomy or variety, to be a significant determinant of job and life satisfaction within a linear fixed effects framework. While both Helliwell and Huang (2010) and Benz and Frey (2008b) use cross-sectional data, Benz and Frey (2008a) fail to control for unobserved heterogeneity when including satisfaction with work-related aspects; only Helliwell and Huang (2010) analyse *life* satisfaction as well. Second, Ferreri-Carbonell and Frijters (2004) claim controlling for unobserved heterogeneity in life satisfaction regressions to be relevant referring to often used socio-economic variables. The present paper extends this claim to job characteristics by demonstrating that controlling for unobserved heterogeneity matters for both job and life satisfaction. A third contribution is conceptually; I demonstrate how to make use of the CA to support both the

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<sup>2</sup> Studies dealing directly with the measurement of the quality of work (e.g., Sehnbruch, 2008, Lugo, 2007) try to capture various aspects; the work-well-being itself, however, is not explicitly scrutinised.

### 3. Job Characteristics and Subjective Well-Being

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interpretation of the life satisfaction results and the operationalization of job characteristics. The latter translates into a refined measurement of job characteristics. So far I am not aware of similar papers, except maybe chapter 2, which, however, focuses on poverty.

The present study complements this literature by explicitly shifting the attention to human well-being (HWB). To this end I draw on the capability approach (CA), essentially developed by Sen (1985a, 1992), which provides a well-founded conceptual framework for analysing HWB. Adopting a CA perspective, has two major implications for the present analysis: First, the CA entails a comprehensive, holistic understanding of well-being; specifically, this means that the influence of work-related aspects is not limited to the domain of “work life”. This in turn implies for subjective well-being analysis that *life* rather than *job* satisfaction, is of prime interest.<sup>3</sup> Notwithstanding, job satisfaction may still enrich the analysis. Second, the empirically scrutinised hypotheses receive a conceptual underpinning by conceiving (i) characteristics as means for functioning achievements and (ii) work as a characteristic-providing activity (see section 1.2). Thereby, the activity of work is made accessible to a thorough analysis with respect to HWB.<sup>4</sup> Thus, the hypothesis the present paper examines empirically—whether job characteristics are associated with higher SWB—is motivated by their instrumental relevance for achieving functionings.

The significance of this study originates from its contribution to a better understanding of the work-well-being link, more specifically to illuminate the role of work as a device for achieving, or failing to achieve, well-being. Additionally, as outlined in chapter 1.3, I suggest to adopt a CA-view and apply life satisfaction techniques in order to establish the links between both frameworks. Consequently, a higher life satisfaction can be understood as implicit valuation of functionings they help to achieve (type-I-exercise). This in turn not only suggests that valuation *can* be inferred, but, by the same token that adaptation renders not all subjective indicators useless. Additionally, evidence on life satisfaction-relevant characteristics supports choosing dimensions in more comprehensive assessments of well-being.

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<sup>3</sup> Life satisfaction is likely to be more comprehensive as important aspects, like occupational risks and diseases, or the far-reaching influence of hours worked, might otherwise be easily neglected, see section 1.2.

<sup>4</sup> However, as Leßmann (2012) recently noted, it is not entirely clear how to conceive work from CA-perspective. I outlined in section 1.2 that there is a natural way to integrate work properly into the CA with the characteristics approach providing the interface.

### 3. Job Characteristics and Subjective Well-Being

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A second gap is related to the vagueness of what *should* be captured by the respective measures, in particular regarding subjective measures—a common conceptual framework is lacking. This vagueness may explain a significant portion of the plurality of measures adopted in previous work, whereas data limitations may account for another. For instance, Böckerman *et al.* (2011) use objectively constructed measures (a churning rate), often, however, results are inferred from employment status (Benz and Frey (2008b), Booth and van Ours (2009), Binder and Coad (2013) or from the sector of employment (Lüchinger *et al.*, 2010). Other studies examine perceived risk (Knabe and Rätzl, 2010), whereas Wells (2010), Cornelißen (2009) employ self-assessed job features. Finally, Skalli *et al.* (2008), Benz and Frey (2008a) use satisfaction with work-related aspects. While information on the employment status is usually readily available, obtaining detailed insights on the well-being relevant factors is intricate. The application of subjective assessments may provide a more detailed account. Frequently, this approach is not only data-driven, but also appears to be rather ad hoc. The CA, particularly its discrimination between goods, their characteristics and functionings, appears promising to sort out this matter. First, the CA may help to explain the results more precisely, and thus support their interpretation in general. For instance, in the case of self-employment, it is not this status per se, but rather the characteristics it provides (access to autonomous decisions), that promote the functioning of agency, whose achievement ultimately gives satisfaction.<sup>5</sup> Second, imposing the Lancaster-good requirements helps to reject certain subjective measures, such as “attitudes” or “satisfactions”, without discarding subjective assessments in general. Thus, the operationalization of job characteristics is guided as well.

For the empirical analysis I use Australian panel data, since it provides both regularly collected information on several job features, and a panel structure, which allows to control for unobserved heterogeneity. The analysis is confined to four job characteristics inherently difficult to measure, such as autonomy. To operationalize and eventually measure these job characteristics, I consider them as latent variables and make use of a confirmatory factor analysis relying on self-assessed aspects of the job. The main results are obtained using the common empirical set up of life satisfaction research, augmented with job characteristics. To better understand the nature of the work-well-being link I also

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<sup>5</sup> “A person’s agency achievement refers to the realization of goals and values she has reason to pursue, whether or not they are connected with her own well-being” (Sen, 1992, p.56). See also Sen (1985b, 1993a) on this.

examine job satisfaction, albeit this fails to be a good representation of well-being. To assess the cogency of the suggested approach, I probe whether the procedural utility found for self-employed in terms of job satisfaction, in fact, originates from job characteristics. Finally, I address the question whether unobserved heterogeneity matters in SWB analyses relying on self-assessed job characteristics, since latter are both commonly used and particularly prone to an observed heterogeneity bias.

The results suggest that the four latent job characteristics are valid constructs, i.e. are reasonable measures for latent job characteristics. Moreover, this study extends previous research (in particular Benz and Frey, 2008a, Helliwell and Huang, 2010) by demonstrating favourable job characteristics, within a refined framework, to increase not only job but also life satisfaction significantly, indicating that they are indeed valued. Moreover, job characteristics amount up to 50% of the unemployed's dissatisfaction, and to some extent account for procedural utility of self-employed found in job satisfaction regressions. Altogether the results point at a promising avenue for future research to adopt a CA perspective for life satisfaction analysis. Finally, controlling for unobserved heterogeneity is shown to be crucial in exercises of this kind.

The remainder is structured as follows: section 3.2 briefly introduces the conceptual underpinnings provided for by the CA. Section 3.3 deals with operationalizing job characteristics and contains the empirical strategy. The results are presented in section 3.4 and discussed in section 3.5. Finally, section 3.6 offers some concluding remarks.

## 3.2. Conceptual Background

Adopting a CA perspective, functionings, the doings and being individuals have reason to value, are constitutive for human well-being.<sup>6</sup> The functioning vector  $\mathbf{b}_i$  describes the achievements in doings and beings an individual has reason to value. Resources allow the individual to choose a commodity vector  $\mathbf{x}_i$ , which provides a certain mix of characteristics  $\mathbf{c}(\cdot)$ . Characteristics in turn are converted into achievements, given the conversion function  $f(\cdot)$ , which depends on individual, social, and environmental conversion factors

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<sup>6</sup> See Sen (1992) and section 1.1 on this. Moreover, Sen (1992, 1993a) emphasizes that analysing well-being achievements is only one of several distinct exercises the capability approach allows for. The conceptual framework, however, remains the same.

$\mathbf{z}_\bullet$ . The following equation summarizes these aspects:

$$\mathbf{b}_i = f(\mathbf{c}(\mathbf{x}_i), \mathbf{z}_i, \mathbf{z}_s, \mathbf{z}_e) \quad (3.1)$$

The achieved functionings finally not only give pleasure, as described by the happiness function  $\mathbf{h}(\cdot)$ , but are also valued elements of an individual's being, described by  $\mathbf{v}(\cdot)$ . While both functions have been suggested to link the capability approach and life satisfaction research more closely, this chapter adopts the view that a closer link is contingent upon future research (see section 1.3).

Recently Leßmann (2012) noted that it is not entirely clear how to conceive work from a CA-perspective.<sup>7</sup> Concerning this, the present approach views labour as an activity which provides Lancaster-type characteristics, i.e., characteristics are conceived as objectively attached to the goods or activities in question.<sup>8</sup> The underlying idea is that an individual's endowment of time can be spent on various activities, each providing a certain mix of characteristics, which in turn are inputs for the production of functionings. Other important aspects associated with labour, such as hours worked, are not considered as characteristics in Lancaster's sense.

The key motivation for such an approach is that the activity of labour may affect several distinct functioning achievements, such as being healthy or appearing in public without shame. Thus, this framework has the merit of not reducing the influence of work to some employment dimension a priori, and thereby allowing for the holistic nature of the CA. This point clearly shows why job satisfaction is a too narrow concept for SWB from a CA point of view.<sup>9</sup>

For the present exercise characteristics, like goods as well, are thus of derived interest only, as they are used as means for achieving functionings; see Sen (1984a). The hypothesis the present study examines empirically—whether favourable job characteristics are associated with a higher life satisfaction—is, therefore, *not* motivated by an intrinsic valuation of the characteristic itself. Instead, job characteristics are valued *for* helping functionings to achieve, i.e., they are of instrumental interest only. Clearly, we expect

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<sup>7</sup> Several work-related aspects are discussed in Leßmann and Bonvin (2011), Leßmann (2012).

<sup>8</sup> See section 1.2 for an illustration of this notion and chapter 4 for a formal treatment.

<sup>9</sup> Further advantages of conceiving labour as a characteristic-providing activity include that achievements of functionings may well depend of specific conversion factors. For instance, the enforcement of employment protection requires also a working judicial system. Finally, other forms of labour, such as informal work, can be easily added to the analysis.

the job characteristics to be correlated with life satisfaction only as long as the relevant functioning achievements themselves are not controlled for.

Analysing characteristics' influence on (subjective) well-being, rather than the functionings' impact is useful for two reasons—apart from the fact that functionings are frequently difficult to measure. First of all, some characteristics play a vital role for well-being as they affect several functionings simultaneously. Indeed, the previous chapter's pivotal characteristics are a case in point. Moreover, a study's objective may direct the focus towards characteristics—as in the present case—namely if the goal is to illuminate the influence of *work* on subjective well-being. Specific labour activities, however, can be fruitfully characterised by the job characteristics they provides, as illustrated in section 1.2.<sup>10</sup>

### 3.3. Data and Empirical Approach

For the empirical analysis, I use the waves 2005–2010 of the HILDA, where useful indicators of job characteristics are collected yearly.<sup>11</sup> The sample is confined to individuals within the workforce aged 25–55. After excluding potential outliers and observations with missing values (for details see below) the sample contains roughly 14,000 person-year observations from 3,900 each males and females.

In order to operationalize job characteristics, the present analysis draws essentially on the notion of characteristics suggested by Lancaster (1966a, 1971). More specifically, this means that characteristics are objective properties of the good or activity in question, albeit possibly difficult to observe and measure. In particular, this implies that the characteristics of a specific good are the same for *all* consumers, whereas consumers may well vary in preferences for characteristics. Note that this aspect clearly rejects “attitudes” and “satisfactions” as reasonable measures for characteristics.<sup>12</sup> Other important aspects of

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<sup>10</sup> Clearly, if the objective is to comprehensively assess overall well-being, functioning achievements rather than characteristics have to be focussed.

<sup>11</sup> This paper uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views reported in this paper, however, are those of the author and should not be attributed to either FaHCSIA or the Melbourne Institute. Wooden and Watson (2007), Summerfield *et al.* (2011) provide more details. The data was extracted using PanelWhiz, see Haisken-DeNew and Hahn (2010) and <http://www.PanelWhiz.eu>.

<sup>12</sup> In addition to this, satisfactions are (i) prone to suffer from an adaptive preferences bias, (ii) the inference about the underlying working conditions is dubious (see Leßmann and Bonvin, 2011, p.88), and (iii) their



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work, such as hours worked and income are not conceived as characteristics in this sense, as argued in section 1.2. Table 3.1 shows indicators for job characteristics available in the

Table 3.1.: Indicator Variables for Job Characteristics

Variable	Question	latent JC
<b>since 2001</b>		
JC_stress	My job is more stressful than I had ever imagined	—
JC_makesill	I fear that the amount of stress in my job will make me physically ill	—
JC_fairpay	I get paid fairly for the things I do in my job	—
JC_secure	I have a secure future in my job	security
JC_stillbusy	The company I work for will still be in business 5 years from now	security
JC_worryjob	I worry about the future of my job	security
JC_complex	My job is complex and difficult	—
JC_newskills	My job often requires me to learn new skills	varied
JC_useskills	I use many of my skills and abilities in my current job	—
JC_freedomhow	I have a lot of freedom to decide how I do my own work	autonomy
JC_lotsay	I have a lot of say about what happens on my job	—
JC_freedomwhen	I have a lot of freedom to decide when I do my work	autonomy
<b>since 2005</b>		
JC_choicewhat	I have a lot of choice in deciding what I do at work	autonomy
JC_flex	My working times can be flexible	—
JC_decidebreak	I can decide when to take a break	—
JC_repetitive	My job requires me to do the same things over and over again	varied
JC_variety	My job provides me with a variety of interesting things to do	varied
JC_initiative	My job requires me to take initiative	—
JC_fast	I have to work fast in my job	workload
JC_intensity	I have to work very intensely in my job	workload
JC_notime	I don't have enough time to do everything in my job	workload

data set along with the wording of the corresponding questions. However, not all items listed in table 3.1 suite the present analysis. For instance, the responses to “My job is more stressful than I had ever imagined” or “I get paid fairly for the things I do in my job” fail to comply with aforementioned requirements.

Additionally, the selection of job characteristics is (i) based on what psychological research identified as relevant (see e.g. Warr, 2007), and (ii) constrained by data availability. Finally, I confine the analysis to job characteristics which are rather intangible and inherently difficult to measure. Therefore, I conceive job characteristics as latent variables and employ a confirmatory factor analysis (CFA) for their measurement. Advantages of this approach include that a CFA allows for (i) several subdimensions per latent variable, (ii) (correlated) errors in item measurement, and (iii) theoretically reasonable adjustments. The setup of the CFA is congeneric, with the latent constructs, the indicators are expected

measurement error is likely to be correlated with the dependent variables of job or life satisfaction.

### 3. Job Characteristics and Subjective Well-Being

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to load on shown in table 3.1. Factors are allowed to be correlated, whereas errors are not. Factor variances are normalised to 1. To ease interpretation of the results later on, I collapse the factor scores into a binary variable, using individual thresholds.<sup>13</sup>

The econometric model for analysing the job characteristics' influence on life satisfaction is given by

$$LS_{it} = \beta_1 PT_{it} + \beta_2 SE_{it} + \sum_{j=1}^4 \theta_j \tilde{\gamma}_{jit} + \mathbf{X}'\boldsymbol{\beta} + \epsilon_{it}. \quad (3.2)$$

The dependent variable is the response to the general life satisfaction question, recorded on a 0–10 scale. I partition the workforce into part-time workers (*PT*), self-employed (*SE*) and full-time workers, the latter serving as reference group when estimating model (3.2).

The control set includes age, age squared and dummies for marital status, long-term health conditions, and years, log equivalent real household income to capture consumption, years of education, hours worked and hours worked squared. Income is deflated using the consumer price index provided by the Australian Bureau of Statistics and equivalised using the OECD-modified scale.<sup>14</sup> I trim the bottom and top 1% of the household income distribution, to exclude potential outliers. Moreover, I drop observations with a negative individual market income and those individuals working more than 120 hours (together less than 1%),

Although the key objective is to analyse the effect on *overall* SWB, I also examine the effect on domain-specific job satisfaction to obtain a more comprehensive picture. The econometric model for analysing job satisfaction is basically the same as (3.2), but further job-related control variables, common in that literature, are added; specifically tenure, tenure squared, occupation and industry dummies, and the firm's number of workers. The answers to the question on job satisfaction are recorded on a 0–10 scale. The expectation for a *good* job characteristic on job and life satisfaction, such as access to autonomous decisions, is  $\hat{\theta}_j > 0$ . For a *bad* job characteristic, such as a high workload, the expectation is  $\hat{\theta}_j < 0$ . The underlying motivation is that job characteristics are vital for some functioning achievement, which individuals have reason to value. Therefore, a favourable job charac-

<sup>13</sup> More specifically,  $\tilde{\gamma}_{jit} = \mathbb{1}(\hat{\gamma}_{jit} > \bar{\gamma}_{ji})$  with  $\bar{\gamma}_{ji} = \frac{1}{T_i} \sum \hat{\gamma}_{ijt}$  for  $j = 1, \dots, 4$ , where  $\hat{\gamma}_{jit}$  is the factor score for characteristic  $j$  of individual  $i$  in year  $t$ . Moreover, I also used common thresholds for all, which, however, failed to affect the findings substantially.

<sup>14</sup> The first adult of a household receives a weight of 1.0, the second and each subsequent person aged 14 and over receive 0.5, and to each child below 14 a weight of 0.3 is assigned.

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teristic is expected to increase life satisfaction, conditional on the respective functioning not being controlled for.

Even though the influence of the simple employment status on job and life satisfaction is not the chief concern of the present work, in particular the impact of self-employment is relevant in order to probe the job characteristics' ability in accounting for procedural utility.<sup>15</sup> Therefore, table 3.2 contains a breakdown of descriptive statistics by employment status.<sup>16</sup> Job and life satisfaction appear to be roughly the same for full-time and self-employed males on average, while both satisfactions seem to be slightly lower for part-time employed. Females, instead, appear to prefer self-employment to part-time to full-time employment, according to both job and life satisfaction. Moreover, table 3.2 shows that self-employed are on average older, earn less individual market income than their full-time employed counter-parts, while working more hours on average. Self-employed women, however, work fewer hours compared to full-time.<sup>17</sup> For estimation I use the lin-

Table 3.2.: Descriptive Statistics by Employment Status

	males				females			
	FT	PT	SE	Total	FT	PT	SE	Total
age	39.67	39.37	42.70	40.21	39.77	41.08	42.01	40.51
hhdispinc	86.90	59.99	84.51	84.95	88.53	79.00	87.79	84.73
imarketincr	43.45	20.05	38.96	41.31	33.76	17.15	26.92	26.60
hours worked	45.50	22.57	48.48	44.76	42.33	21.20	32.31	33.09
job satisfaction	7.51	7.22	7.56	7.50	7.61	7.77	7.94	7.70
life satisfaction	7.75	7.65	7.73	7.74	7.77	7.84	7.95	7.82

Notes: Sample based on HILDA waves 2005–2010. Cells contains means.

ear fixed effects estimator, since Ferrer-i-Carbonell and Frijters (2004) demonstrate that controlling for unobserved heterogeneity in life satisfaction regressions is crucial. Many studies examining the link between job characteristics and subjective well-being, however, use cross-sectional data (e.g. Benz and Frey, 2008b, Helliwell and Huang, 2010). Since the use of subjective assessment of job characteristics is both widespread and particularly prone to an observed heterogeneity bias, the question of their empirical relevance arises immediately. To examine the role of unobserved heterogeneity in the present

<sup>15</sup> Self-employed, like part-time employed, are known to be rather a heterogeneous groups (e.g. Blanchflower, 2000). Thus, recent studies having a focus on the job or life satisfaction partition this group in more detail (see in particular Binder and Coad, 2013, Block and Koellinger, 2009).

<sup>16</sup> Summary statistics of the sample can be found in Table B.1 of the appendix.

<sup>17</sup> For a survey of the empirical findings of self-employment, see Blanchflower (2000).

context explicitly, I first estimate the respective random effect models, followed by a bootstrap-adapted Hausman test.<sup>18</sup> As the effects might be gender-specific, all estimations are carried out separately for men and women.

### 3.4. Results

Table 3.3 shows the results of the CFA. Specifically, table 3.3a contains the indicators' factor loadings. All but three indicators exhibit a factor loading greater than 0.5, therefore being a first indication of convergence validity. Table 3.3a suggests, moreover, that allowing the factors to be correlated is justified and that the model's overall fit is acceptable-good (3.3a); see, e.g., Brown (2006).

To assess convergent and discriminant validity in more detail, table 3.3b provides information about the average variance extracted (AVE), the construct reliability (CR), and the squared interconstruct correlations. Since the factors *workload* and *autonomy* exhibit a  $AVE(\psi_j) > 0.5$  and all factors have  $CR(\psi_j) > 0.6$ , this adds further evidence for convergently valid constructs. Moreover, the Fornell-Larcker criterion,  $AVE(\psi_j) > \phi_{kj}^2 \forall k \neq j$ , aiming to assess discriminant validity, is fulfilled for all factors (see table 3.3b). Finally, additional evidence for the validity of self-assessed job characteristics is provided by chapter 4, which demonstrates them to be, in fact, choice relevant.<sup>19</sup>

Table 3.4 contains the results for job satisfaction estimations. The results for the benchmark regression table 3.4 (1), show a significant positive coefficient for self-employed men. Part-time employment fails to affect job satisfaction significantly for both men and women. Controlling for hours worked (column (2) of table 3.4a), further increases the estimate for self-employed men, supporting the relevance of procedural utility. There is no such evidence for women though. These results further imply job satisfaction-maximising hours worked of ca. 44h for men and 24h for women. Adding job characteristics, the inspection of table 3.4 (3),(4) reveals that all of them affect job satisfaction in the expected direction. This results holds for both men and women and irrespective of controlling for hours worked or not. As the coefficient for self-employed men is no longer significant,

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<sup>18</sup> The standard Hausman test fails to be applicable in the present context, since it requires the random effects estimator to be efficient, which is an invalid assumption in a setting where standard errors are required to be robust or to account for clustering.

<sup>19</sup> Moreover, Cornelißen (2009) shows job characteristics to be associated with quitting and changing jobs, using German data.

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Table 3.3.: Results of Confirmatory Factor Analysis

#### (a) Factor Loadings and Factor Correlations

	autonomy	workload	security	varied
<b>Gamma</b>				
JC_choicewhat	0.877	0	0	0
JC_freedomhow	0.738	0	0	0
JC_freedomwhen	0.771	0	0	0
JC_fast	0	0.657	0	0
JC_notime	0	0.506	0	0
JC_intensity	0	0.947	0	0
JC_stillbusy	0	0	0.495	0
JC_worryjob	0	0	0.538	0
JC_secure	0	0	0.909	0
JC_variety	0	0	0	0.895
JC_repetitive	0	0	0	0.402
JC_newskills	0	0	0	0.478
<b>Phi</b>				
autonomy	1			
workload	0.0445	1		
security	0.169	0.0794	1	
varied	0.437	0.320	0.296	1
<b>goodness of fit</b>				
std root mean resid	0.0598			
root mean sq error	0.0777			
CFI	0.915			
TLI	0.883			
CD	1.000			

#### (b) Statistics on Discriminant Validity

	autonomy	workload	security	varied
AVE	0.636	0.528	0.453	0.397
CR	0.839	0.759	0.697	0.635
<b>PhiSQ</b>				
autonomy	1			
workload	0.00198	1		
security	0.0284	0.00630	1	
varied	0.191	0.102	0.0878	1

Notes: Sample based on HILDA waves 2005–2010; panel (a): all coefficients are standardized and significantly different from 0 at the 1% level. Estimation method: maximum likelihood. Panel (b) contains average variance extracted (AVE), construct reliability (CR), and interconstruct correlations (PhiSQ).

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Table 3.4.: Job Satisfaction—Linear Fixed Effects Results

**(a) Men**

	(1)		(2)		(3)		(4)	
Professionals	-0.0372	(-0.57)	-0.0462	(-0.71)	-0.00797	(-0.13)	-0.0171	(-0.27)
TechTradeWorkers	-0.00863	(-0.12)	-0.0165	(-0.23)	0.0326	(0.46)	0.0243	(0.35)
ComPersServWork	-0.0211	(-0.13)	-0.0183	(-0.11)	0.0465	(0.29)	0.0466	(0.29)
AdmWork	-0.149	(-1.75)	-0.154	(-1.81)	-0.0804	(-0.98)	-0.0864	(-1.06)
SalesWork	-0.238*	(-2.17)	-0.237*	(-2.17)	-0.188	(-1.81)	-0.188	(-1.81)
MachOpDriv	-0.415***	(-3.78)	-0.425***	(-3.89)	-0.278**	(-2.68)	-0.288**	(-2.79)
Labourers	-0.291**	(-2.70)	-0.295**	(-2.74)	-0.190	(-1.88)	-0.197	(-1.94)
hhIndispinc	-0.00278	(-0.05)	-0.00437	(-0.08)	-0.0105	(-0.21)	-0.0107	(-0.21)
PT	-0.112	(-1.06)	0.0273	(0.23)	-0.0638	(-0.65)	0.0432	(0.38)
SE	0.212*	(2.08)	0.273**	(2.66)	0.126	(1.29)	0.181	(1.83)
hours_worked			0.0363***	(3.49)			0.0312**	(3.04)
hours_workedSQ			-0.000416***	(-4.22)			-0.000369***	(-3.78)
highAUTON					0.209***	(8.80)	0.209***	(8.81)
highWORKLOAD					-0.123***	(-5.29)	-0.118***	(-5.14)
highSECUR					0.297***	(12.61)	0.296***	(12.62)
highVARIED					0.307***	(12.58)	0.305***	(12.48)
Cons	7.377***	(6.90)	6.580***	(6.05)	7.355***	(7.28)	6.675***	(6.48)
Adj. R-squaerd	0.0173		0.0214		0.0781		0.0816	
Obs.	14296		14296		14296		14296	
Ind.	3932		3932		3932		3932	
age	25-55		25-55		25-55		25-55	
opthw			43.66				42.25	

**(b) Women**

	(1)		(2)		(3)		(4)	
Professionals	0.0546	(0.68)	0.0426	(0.53)	0.0507	(0.67)	0.0359	(0.48)
TechTradeWorkers	0.0704	(0.48)	0.0539	(0.36)	0.0861	(0.61)	0.0612	(0.43)
ComPersServWork	-0.124	(-1.19)	-0.142	(-1.35)	-0.0714	(-0.72)	-0.0949	(-0.96)
AdmWork	-0.0351	(-0.41)	-0.0547	(-0.63)	0.0474	(0.58)	0.0223	(0.27)
SalesWork	-0.0546	(-0.46)	-0.0755	(-0.63)	0.0534	(0.48)	0.0267	(0.24)
MachOpDriv	-0.285	(-1.16)	-0.307	(-1.25)	-0.0663	(-0.29)	-0.0983	(-0.43)
Labourers	-0.343*	(-2.31)	-0.366*	(-2.47)	-0.185	(-1.34)	-0.219	(-1.59)
hhIndispinc	-0.0415	(-0.71)	-0.0418	(-0.72)	-0.0608	(-1.10)	-0.0570	(-1.03)
PT	0.0252	(0.47)	-0.0280	(-0.41)	0.0598	(1.18)	-0.0336	(-0.52)
SE	0.0913	(0.75)	0.0949	(0.77)	0.0340	(0.30)	0.0159	(0.14)
hours_worked			0.00952	(1.41)			0.00561	(0.88)
hours_workedSQ			-0.000202*	(-2.40)			-0.000182*	(-2.32)
highAUTON					0.282***	(11.58)	0.283***	(11.62)
highWORKLOAD					-0.0861***	(-3.52)	-0.0788**	(-3.21)
highSECUR					0.355***	(14.09)	0.357***	(14.19)
highVARIED					0.314***	(12.51)	0.315***	(12.56)
Cons	6.196***	(5.47)	6.201***	(5.39)	6.017***	(5.63)	6.110***	(5.63)
Adj. R-squaerd	0.0139		0.0154		0.0888		0.0909	
Obs.	13550		13550		13550		13550	
Ind.	3895		3895		3895		3895	
age	25-55		25-55		25-55		25-55	
opthw			23.57				15.38	

Notes: Sample based on HILDA waves 2005–2010; *t*-statistics in parenthesis. Dependent variable is reported job satisfaction on a 0–10 scale. All models are estimated using linear fixed effects and contain a constant. Control variables are age, age<sup>2</sup>, tenure, tenure<sup>2</sup> and dummies for long-term health conditions, educational attainments and marital status, for groups of numbers of employees, and for industries and years. Indicated levels of significance are \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

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this suggests job characteristics, indeed, to account for some portion of the procedural utility derived from self-employment. This corroborates the findings of Benz and Frey (2008a). Additionally, including job characteristics not only reduces certain coefficients of occupational dummies (e.g. of machinery operators and drivers), but also renders other insignificant (e.g. of sales workers and labourers), suggesting job characteristics indeed to capture further objective differences between occupations. There is, however, no such evidence for industrial differentials (data not shown). Furthermore, the results of (4) imply slightly lower optimal amounts of hours worked for men (42h), and women (15h). Finally, part-time employed seem to be neither more nor less satisfied with their job than their full-time employed fellows, being in line with the findings of Booth and van Ours (2009, table 2).<sup>20</sup>

The result for life satisfaction estimations are provided by table 3.5. For men (3.5a) the results suggest, that neither self-employment nor part-time work significantly affect satisfaction with life in general. Apparently procedural utility, derived from self-employment, does not translate into higher life satisfaction. This result is in line with previous findings: Booth and van Ours (2009) found no effect of part-time employment for males, while neither Andersson (2008) nor Binder and Coad (2013) found a significant effect for self-employed in comparable set-ups.<sup>21</sup> For women the results provide some evidence for a higher life satisfaction when part-time employed, confer table 3.5b (1),(4), which is also in line with the findings of Booth and van Ours (2009, table 2b). This effect vanishes, however, once hours worked are controlled for, suggesting this effect to originate from a time allocation better meeting individual preferences. Adding the measures for job characteristics, shows that all of them except workload increase life satisfaction significantly, suggesting that they are indeed valued. The influence of the job's mere workload on general life satisfaction, independent of hours worked, seems to be negligible. Moreover, hours worked, strictly speaking, fail to exhibit a significant impact on males satisfaction with life at all. The implied optimum is reduced from 37h to 34h if job characteristics are introduced. Women's optimal amount of hours worked falls from roughly 22h to 19h, once job characteristics are account for. Finally, the results for job characteristics with respect to both job and life satisfaction prove robust to a modification of the sample's age

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<sup>20</sup> One may expect the income coefficient to be insignificant because of accounting for household rather than personal income. However, personal income likewise fails to increase job satisfaction significantly.

<sup>21</sup> However, Binder and Coad (2013), having a focus on the self-employed's life satisfaction demonstrate that a higher life satisfaction for self-employed in a more sophisticated framework.

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Table 3.5.: Life Satisfaction—Linear Fixed Effects Results

**(a) Men**

	(1)		(2)		(3)		(4)	
hhIndispinc	0.102**	(2.71)	0.104**	(2.75)	0.0998**	(2.67)	0.102**	(2.72)
PT	-0.0659	(-1.00)	-0.0514	(-0.64)	-0.0499	(-0.76)	-0.0470	(-0.59)
SE	0.0472	(0.89)	0.0628	(1.21)	0.0356	(0.67)	0.0491	(0.95)
hours_worked			0.00839	(1.27)			0.00677	(1.03)
hours_workedSQ			-0.000113	(-1.76)			-0.0000993	(-1.57)
highAUTON					0.0518**	(3.26)	0.0516**	(3.25)
highWORKLOAD					-0.0123	(-0.78)	-0.00937	(-0.59)
highSECUR					0.116***	(7.43)	0.116***	(7.42)
highVARIED					0.0500**	(3.02)	0.0498**	(3.01)
Cons	7.148***	(10.31)	6.956***	(9.81)	7.151***	(10.38)	6.995***	(9.93)
Year dummies	Yes		Yes		Yes		Yes	
soc-dem controls	Yes		Yes		Yes		Yes	
Adj. R-squaerd	0.0143		0.0152		0.0239		0.0248	
Obs.	14420		14420		14420		14420	
Ind.	3944		3944		3944		3944	
age	25-55		25-55		25-55		25-55	
opthw			37.21				34.08	

**(b) Women**

	(1)		(2)		(3)		(4)	
hhIndispinc	0.0217	(0.57)	0.0222	(0.58)	0.0175	(0.46)	0.0189	(0.50)
PT	0.0570	(1.77)	0.0277	(0.68)	0.0653*	(2.03)	0.0275	(0.68)
SE	-0.0000185	(-0.00)	-0.000733	(-0.01)	-0.0103	(-0.14)	-0.0156	(-0.21)
hours_worked			0.00426	(1.05)			0.00348	(0.85)
hours_workedSQ			-0.0000954	(-1.83)			-0.0000920	(-1.77)
highAUTON					0.0572***	(3.42)	0.0578***	(3.45)
highWORKLOAD					-0.0102	(-0.63)	-0.00683	(-0.42)
highSECUR					0.0795***	(4.91)	0.0801***	(4.95)
highVARIED					0.0446**	(2.62)	0.0454**	(2.66)
Cons	8.286***	(11.52)	8.283***	(11.51)	8.284***	(11.59)	8.297***	(11.60)
Year dummies	Yes		Yes		Yes		Yes	
soc-dem controls	Yes		Yes		Yes		Yes	
Adj. R-squaerd	0.00877		0.00953		0.0149		0.0158	
Obs.	13686		13686		13686		13686	
Ind.	3910		3910		3910		3910	
age	25-55		25-55		25-55		25-55	
opthw			22.33				18.88	

Notes: Sample based on HILDA waves 2005–2010; *t*-statistics in parenthesis. Dependent variable is reported general life satisfaction on a 0–10 scale. All models are estimated using linear fixed effects and contain a constant and year dummies. Socio-demographic control variables are age, age<sup>2</sup> and dummies for long-term health conditions, educational attainments and marital status. Indicated levels of significance are \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .



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bracket, unlike the results for simple employment status, which are typically sensitive to this due to their heterogeneous composition; see table B.3 of the appendix.

Table 3.6.: Bootstrap-adapted Hausman test

#### (a) Life Satisfaction

	males		females	
highAUTONOMY	-0.0222*	(0.0101)	-0.0184	(0.0116)
highWORKLOAD	0.0195*	(0.00918)	0.0140	(0.0107)
highSECURITY	-0.0920***	(0.00899)	-0.117***	(0.0109)
highVARIED	-0.0855***	(0.0104)	-0.0672***	(0.0118)
Obs.	14420		13686	
Ind.	3944		3910	
Reps.	200		200	
pjoint	0.0000		0.0000	
age	25-55		25-55	

#### (b) Job Satisfaction

	males		females	
highAUTONOMY	-0.0673***	(0.0168)	-0.0630***	(0.0186)
highWORKLOAD	0.0666***	(0.0168)	0.0834***	(0.0185)
highSECURITY	-0.170***	(0.0161)	-0.144***	(0.0176)
highVARIED	-0.148***	(0.0179)	-0.0969***	(0.0174)
Obs.	14296		13550	
Ind.	3932		3895	
Reps.	200		200	
pjoint	0.0000		0.0000	
age	25-55		25-55	

Notes: Sample based on HILDA waves 2005–2010; standard errors in parenthesis. Coefficients indicate  $\tilde{\theta}_j - \hat{\theta}_j$ , where  $\tilde{\theta}_j$  denote estimates from linear fixed effects, and  $\hat{\theta}_j$  from random effects model. The underlying predicted factor scores are collapsed using a common threshold, for both models. pjoint shows  $p$ -value for the hypothesis that coefficients jointly equal zero. Indicated levels of significance are \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

Are the previous findings sensitive to unobserved heterogeneity, such as personality traits? Table B.2 shows the results for the life and job satisfaction regressions using a random effects approach. Since this approach exploits between variation only, the results are biased if fixed effects matter, i.e. are correlated with the covariates. The main findings, a significant influence of job characteristics on job and life satisfaction, are supported. However, the results also suggest that fixed effects, such as an individual-specific anchoring point are in fact correlated with both job characteristics and employment status. The coefficients of job characteristics in the random effects framework roughly double, compared against the linear fixed effects results.

More precisely, table 3.6 contains the differences between the point estimates provided by the fixed and the random effects model, along with their bootstrapped standard errors.

The results suggest that the differences for all coefficients in both life and job satisfactions are statistically significant, with workload and autonomy in life satisfaction for women being the only exception. Finally, the hypothesis that the differences for all job characteristics are jointly zero can be rejected for both men and women. Therefore, results on the effects of self-assessed job characteristics on life or job satisfaction should be treated with caution, if unobserved heterogeneity is not controlled for.

## 3.5. Discussion

This is the first paper, analysing the influence of several job characteristics on life satisfaction simultaneous in a linear fixed effects framework. Thus, to put the results in perspective, note that the composite effect of autonomy, variety and security for life satisfaction amounts up to 0.2, irrespective of the sex. For men this is roughly 50% of the psychic costs associated with unemployment (see table B.4) and, for comparison only, suffering from bad health conditions amounts to 0.15 on average (data not shown). For women the satisfaction gap between employed and unemployed even vanishes (due to lower costs of unemployment).<sup>22</sup>

The presented evidence demonstrates job characteristics to be a significant determinant for job satisfaction. Indeed they account for occupational differences and, to some extent, for what has been called procedural utility. The CA perspective, however, allows a more detailed account, as it attributes this finding to specific job characteristics, which are conceived means for distinct functioning achievements. Following this perspective, it is the achievement of functionings that ultimately gives satisfaction. Thus the CA offers a natural way to accommodate this finding, rather than introducing non-outcome (i.e. procedural) aspects by the backdoor to an utilitarian perspective. Specifically, having access to autonomous decision helps to achieve agency, i.e., the realization of goals one has reason to pursue. Procedural aspects can also be accommodated more generally, as *choosing* what one has reason to value is a functioning itself and thus its achievement gives rea-

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<sup>22</sup> Moreover, this perspective offers a further explanation for the distress associated with unemployment, namely that those affected have, e.g., reduced access to autonomous decisions, which then may cut certain functioning achievements such as agency or self-respect, implying a lower satisfaction with life in general. This interpretation, however, is not covered by the presented results, as the relevant characteristics by way of data collection are available for employed only. Yet, recording comparable characteristics for distinct activities is feasible in principal.

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son to satisfaction, see also Sen (1985a, 1992). This consideration exemplifies the first part of the conceptual contribution; how to interpret life satisfaction results from a CA perspective.

In support of this view is, moreover, that once job characteristics are operationalized properly, they not only significantly increase job *and* life satisfaction, but also in a quantitatively similar way for both men and women. Finally, the results also lend support to a holistic and comprehensive approach to well-being, as job characteristics are demonstrated to go beyond their purported domain of work and also increase life satisfaction in an economic significant way (in line with Helliwell and Huang, 2010).

Although not the prime focus of this work, the results on the optimal hours worked reveal interesting insights. First, as hours worked and job characteristics seem to be correlated, controlling for the latter reduces the implied optimal number of hours worked—irrespective of both sex and dependent variable. Hence, job characteristics demand attention in the analysis of time allocations. A more refined approach, however, is left for future research.<sup>23</sup> More importantly, the joint analysis of job and life satisfaction reveals remarkably diverging optimal hours worked (irrespective of controlling for job characteristics). Specifically, the implied optimum is always higher for job compared to life satisfaction. Job satisfaction, therefore, appears to be a deficient indicator of worker’s well-being, as it ignores costs arising in other life domains (e.g., induced by a work-life-imbalance or by reduced recreational activities), which more than offset the increased job satisfaction.

Finally, Hamermesh (2004), criticises in particular the atheoretical use of subjective concepts to explain subjective outcomes not only for economically uninteresting, but also for being plagued by correlated measurement errors. Concerning this, note the latent constructs of job characteristics itself are conceived as objective and inherent to the job, not the individual—although being subjectively assessed. Moreover, drawing on the approach of Lancaster (1966a) to rationalise job characteristics in economic choice models, not only predicts differences in economic behaviour (labour supply), but also discards certain subjective measures, such as “attitudes” and “satisfactions” as useful explanatory variables.<sup>24</sup>

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<sup>23</sup> A thorough analysis requires the consideration hours constraints, i.e. the mismatch between actual and desired hours of work. This aspect is not only emphasised by a CA perspective, where individual or group-specific constraints play a key role, but also the first empirical studies analysing the influence of hours constraints on subjective well-being underline their importance (e.g., Wooden *et al.*, 2009).

<sup>24</sup> Rationalising job characteristics in conventional choice analysis and their implications for observed behaviour are treated more rigorously in the next chapter.

Discriminating further among potential indicators for job characteristics is, in fact, the second part of the present paper's conceptual contribution, namely a CA-guided and refined approach for measuring job characteristics. Finally, in particular *life* satisfaction is a vital input for both constructing better measures of HWB and a better understanding thereof, which additionally justifies its analysis. Regarding the correlated measurement errors, note first that assessments of, rather than satisfactions with job characteristics are used. The latter can indeed be expected to be heavily correlated with job satisfaction. Moreover, the linear fixed effects estimator eliminates time invariant unobserved heterogeneity (e.g. optimism) by exploiting within variation only. Finally, the presented evidence precisely suggests that controlling for unobserved heterogeneity matters for analysing self-assessed job characteristics in satisfaction frameworks. Thus, the present paper contributes to the previous literature by extending the claim of Ferrer-i-Carbonell and Frijters (2004) to self-assessed job characteristics.

### 3.6. Concluding Remarks

The present study scrutinises the influence of job characteristics on subjective well-being. Methodologically, this study contributes a novel approach for measuring job characteristics, with the operationalization guided by the CA. Specifically, drawing on the characteristics approach, developed by Lancaster (1966a) and employed by Sen (1985a) provides a refined measurement of job characteristics, such as autonomy. In particular, "satisfactions" and "attitudes" are rejected as useful explanatory variables.

The presented evidence suggests that (i) the measurement of job characteristics accomplishes both convergent and discriminant validity, (ii) that job characteristics not only increase both job and life satisfaction significantly for both men and women, but also (iii) account to some extent for what has been called procedural utility. The results therefore suggest both that a comprehensive approach to well-being is reasonable and to view work as a source for subjective well-being—beyond income and hours worked. Thus, the present paper adds job characteristics to the major determinants of life satisfaction, by demonstrating their economic significance for the first time within a linear fixed effects framework. Previous research either used cross-sectional data (Helliwell and Huang, 2010) or analysed *job* rather than *life* satisfaction (Benz and Frey, 2008a) or both (Benz and Frey, 2008b). Finally, the results suggest that unobserved heterogeneity does matter

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in exercises like the present. Thus, future studies on self-assessed job characteristics and subjective well-being have to take note of unobserved heterogeneity. Thereby, the present paper contributes evidence for the general claim of Ferrer-i-Carbonell and Frijters (2004), specifically, for subjectively assessed job characteristics.

Part of the conceptual contribution is to demonstrate how to make explicit use of the CA to support the interpretation of life satisfaction results. Specifically, I argue that (i) characteristics increase subjective well-being because of their instrumental role in achieving functionings and that (ii) job characteristics are best understood in a Lancaster-sense, from which several implications for measurement follow. Specifically, a CA point of view accommodates empirical findings in a conceptually natural way, rather than introducing non-outcome aspects by the backdoor into an utilitarian perspective, as in the case of procedural utility. In this instance, achieving agency or, alternatively, choosing what one has reason to value is a functioning itself and thus its achievement gives reason to satisfaction. A job providing access to autonomous decisions is, therefore, a means to this end. The suggested approach thus supports both operationalization of the job characteristics and interpretation of the results.

More generally, this study explores new avenues by applying CA perspective to life and job satisfaction regressions. By way of this, the results of life satisfaction research receive a solid and elaborate conceptual underpinning, which also provides meaningful intuitions and helps to explain empirical findings. A significant advantage of this view is to clearly distinguish between different types of information, while giving them their due at the same time. Because of this, various types of information can be processed in a proper way. Hence, exercises like the present may provide a promising route to bridge the gap between two so far at best loosely related approaches to well-being. Thereby, similar exercises may help to set the stage for a more comprehensive and compelling approach to human well-being. To this end future studies may (i) refine the measurement models, (ii) add more characteristics to the analysis, (iii) account for other forms of labour, (iv) take note of conversion factors and (v) address the influence on specific functioning achievements explicitly.

## 4. Job Characteristics and Labour Supply. Evidence from Down Under<sup>1</sup>

### *Abstract*

*Job characteristics have been studied from various perspectives. Their influence on labour supply, however, has mostly been neglected. The aim of this paper is thus twofold: First, we propose a consistent conceptual framework, based on Lancaster's approach to consumer theory, for rationalizing such characteristics in conventional theoretical labour supply models. Within this framework, we investigate two main hypotheses: Favorable job characteristics imply (i) lower wage elasticities of labour supply but (ii) larger (less negative) income elasticities. Second, we provide new empirical evidence on the job characteristics-labour supply nexus by estimating a standard discrete choice model using Australian data. The empirical findings lend support to our hypotheses and thus buttress the importance of job characteristics in labour supply decisions.*

### 4.1. Introduction

Experimental sociologists and psychologists have provided ample evidence from controlled laboratory studies that individuals value work not only as a means of earning income to satisfy their consumption needs but also as a direct source of satisfaction for its social, psychological and non-pecuniary benefits, e.g., Jahoda (1982) or Loewenstein and Issacharoff (1994)<sup>2</sup>.

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<sup>1</sup> This chapter is coauthored with Lars Kunze and was presented at Finanzwissenschaftliches Kolloquium (Seminar on Public Economics) in Münster, Germany in 2013, at the annual conference of the Scottish Economic Society in Perth, Scotland in 2013, and at the annual congress of the European Economic Association in Gothenburg, Sweden in 2013.

<sup>2</sup> See Warr (2007) for a survey of the literature.

Subsequent empirical work on the role of job characteristics in employment relationships focused largely on their impact on job satisfaction (e.g., Benz and Frey, 2008b) or, more generally, on life satisfaction (Lüchinger *et al.*, 2010). The findings of these studies suggest that favourable job characteristics are associated with significant higher job and life satisfaction. Another strand of literature, inspired by the seminal work of Rosen (1974), demonstrates that job characteristics may account for wage differentials (Villanueva, 2007, Wells, 2010).<sup>3</sup>

By contrast, few studies so far have focused on the impact of job characteristics on labour supply.<sup>4</sup> An important exception is the seminal paper by Atrostic (1982) who shows that, when estimating a system of demands including one for job characteristics, wage and income elasticities of labour supply differ from those usually found in the literature. Also, Altonji and Paxson (1986) provide evidence that work hours of individuals are heavily influenced by the characteristics of specific jobs. The results of these studies indicate that the quality of a job is an important determinant of labour supply. However, to the best of our knowledge, recent empirical evidence on the role of job characteristics in labour supply decisions is lacking.<sup>5</sup> Thus, this is the first paper analysing the systematic influence of job characteristics on labour supply elasticities using discrete choice models.<sup>6</sup>

Moreover, the conceptualization of job characteristics in labour supply models is far from being clear: Whereas Atrostic (1982) models job characteristics in terms of goods, Altonji and Paxson (1986) completely refrain from an explicit modelling. Alternative approaches, in turn, ascribe observed effects for employment status to specific job characteristics, as for example a high degree of autonomy for self-employed (Benz and Frey, 2008a,b). While data limitations may reasonably account for this methodological hetero-

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<sup>3</sup> The theory of hedonic wages and the particular impact of job characteristics for this theory have also been extensively studied in the context of labour market search models, see, e.g., Hwang *et al.* (1998). Similarly, the value of a statistical life literature, in the tradition of Viscusi (1978), emphasises the importance of earnings premiums for job hazards.

<sup>4</sup> Excellent surveys reporting evidence on elasticities for different countries, different periods and different methods are, e.g., Blundell and Macurdy (1999), Meghir and Phillips (2010) and Keane (2011).

<sup>5</sup> A potential explanation of why the importance of job characteristics in labour supply decisions has mostly been neglected in recent years is that the literature on labour supply has primarily been concerned with a huge array of econometric issues, in particular since the 1980s. Still, there is not only little consensus about these issues so far, but rather an intense controversy, see, e.g., Keane (2011).

<sup>6</sup> An exception is Jara Tamayo (2013). However, his paper differs from ours in several important aspects. First, his analysis is confined to both one job characteristic only (security) and to the labour supply of female singles. Moreover, this characteristic is modelled as a choice variable, whereas our approach assumes job characteristics to be fixed at the observed values and inherent to the actual job.

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geneity in empirical work, they do not, however, for theoretical analysis.

The aim of this paper is to fill both the conceptual and the empirical gap. To do so, in the theoretical part of the paper, we suggest a consistent conceptual framework of modelling job characteristics based on Lancaster's 'characteristics approach' (Lancaster, 1966a,b), originally designed as a fine grain theory to consumer demand. While there is clearly no role for job characteristics in the standard neoclassical theory of labour supply,<sup>7</sup> the main idea of Lancaster's approach is to define preferences over characteristics of commodities rather than over commodity bundles themselves. At the heart of this framework is a (linear) consumption-technology transforming commodity bundles into bundles of characteristics that provide utility to the individual consumer.<sup>8</sup> As these characteristics are readily implemented into conventional choice analysis, our approach can be viewed as a modification of the standard neoclassical model in order to rationalize the existence of job characteristics.<sup>9</sup> This also means that other forms of labour, as e.g. informal or voluntary work, could easily and consistently be accommodated.

Within such a model one would expect differing behavioural responses to increasing monetary incentives depending on the characteristics provided by a specific job. Indeed, using a simple special case of Lancaster's model we illustrate theoretically, that such a conjecture is valid. In particular, we show that a job which provides more favourable characteristics (as e.g. one with a higher degree of autonomy) implies a smaller wage elasticity and a less negative income elasticity of hours worked as compared to a job with less favourable characteristics. Also, we demonstrate that a more favourable job inhibits a smaller substitution elasticity.

In the empirical part of the paper, we employ a standard discrete choice model of family labour supply (van Soest, 1995, Hoynes, 1996) to examine the effect of job characteristics on labour supply elasticities and thus to provide novel evidence on the role of

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<sup>7</sup> In its simplest form, this theory posits that each individual disposes of a limited amount of time, which he or she chooses to allocate between paid and homogeneous work and leisure. This basic trade-off between consumption and leisure ultimately determines the properties of the supply of labour, see e.g. Cahuc and Zylberberg (2004) for an overview of the neoclassical model of labour supply and several extensions of the basic framework.

<sup>8</sup> After all, Rosen (1974)'s seminal work on hedonic wages can be viewed as an augmentation of Lancaster's approach with an equilibrium analysis. Likewise, Sen (1985a, 1992) integrates Lancaster's characteristics into his capability approach. This in turn, provides an additional motivation of why agents may, in fact, demand characteristics, since these are conceived as means for functioning achievements—the doings and beings individuals ultimately have reason to value.

<sup>9</sup> In fact, the neoclassical model represents a special case of Lancaster's approach.



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such characteristics in labour supply decisions. Job characteristics are assumed to be objective, measurable and, in particular, individually fixed as we are interested in labour supply responses—given the observed job characteristics rather than studying occupational choice. They are incorporated into the empirical framework by assuming that more favourable characteristics increase the opportunity costs of leisure. Technically, job characteristics are modelled as preference shifters for the number of hours worked.

We test our hypothesis using data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The survey contains 12 measures of self assessed job characteristics (Summerfield *et al.*, 2011). Using a confirmatory factor analysis, we model four factors, namely autonomy related to decision making in a particular job, workload, variety and job security<sup>10</sup>. These factors are then dichotomised into ‘good’ and ‘bad’ and we assess whether the resulting wage and income elasticities differ significantly among individuals having either a ‘good’ or a ‘bad’ job.

In our study, we show that labour supply decisions critically depend on the characteristics provided by a specific job. This result holds both for men and women. While previous studies have documented differing elasticities depending on whether job characteristics have been taken into account at all (e.g. Atrostic (1982)), the present study shows that this result also holds for the distinction between good and bad job characteristics. More specifically, differences of average wage and income elasticities by job characteristics are significantly different from zero based on bootstrap standard errors. Our main hypothesis, lower wage elasticities and less negative income elasticities for better job characteristics, is confirmed for all four factors. Also, our results indicate that omitting job characteristics from labour supply models imply both larger wage and income elasticities.

Our findings complement the literature in important ways. First, we extend the standard neoclassical model of family labour supply allowing for job characteristics to shed light on the nature of the relationship between such characteristics and labour supply elasticities. Second, we incorporate job characteristics into an empirical discrete choice model of labour supply to test whether differences in choices of individual hours worked are brought about by differences in non-pecuniary qualities of a specific job. We thus provide for both a theoretical and empirical link between job characteristics and the number of hours worked. Finally, we show that these differences in hours worked translate into significantly different labour supply elasticities. Our findings are fundamental, since they

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<sup>10</sup> See e.g. Wells (2010) for a similar analysis.

indicate that labour supply is strongly driven by job-related determinants other than the wage rate and non-labour income.

Furthermore, given that the quality of jobs differs not only across individuals and their personal characteristics, but also across countries, our findings may contribute to explain cross country variations in labour supply elasticities that have been recently documented by Bargain *et al.* (2012). Additionally, our results are highly relevant for the design of the tax system, especially for low income families, see e.g. Blundell and Shephard (2012) for a recent analysis, and also for optimal income taxation in general, see Meghir and Phillips (2010) and Keane (2011).

The remainder of the paper is organised as follows. The next section provides an overview of Lancaster's characteristics approach to consumer theory and derives and illustrates our main hypothesis within this framework. Section 3 first gives an overview over the Australian tax and transfer system and subsequently sets up the empirical model and describes our data. Section 4 presents the results and Section 5 ends with some concluding remarks.

## **4.2. Theoretical Background**

In this section we first summarise the main insights of Lancaster's consumer theory (Lancaster, 1966a) relevant for our analysis and will then develop a special case of his model in order to derive and illustrate our main hypotheses.

### **4.2.1. Lancaster's characteristics approach**

The main idea of Lancaster's approach is that goods, per se, do not provide utility to the consumer but instead the characteristics these goods possess. The same good may possess more than one characteristic, and the same characteristics may well be obtained by more than one good. Moreover, characteristics are considered to be objective and measurable. For instance, a meal provides (i) a certain caloric content, (ii) a nutritional composition, (iii) aesthetic characteristics, but also (iv) the material device for a social dinner.

The technical relationship that transforms goods into characteristics is called the (linear) consumption technology.<sup>11</sup> Utility or preference orderings are assumed to rank col-

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<sup>11</sup> Inspired by the criticism of Hendlar (1975), who argues, based on a large psychological evidence, that

lections of characteristics whereas collections of goods are only ranked indirectly through the characteristics they possess. Formally, Lancaster's consumer-choice program can be stated as follows:

$$\max_z U(z) \quad (4.1)$$

$$\text{subject to } px \leq k \quad (4.2)$$

$$\text{with } z = \Phi x \quad (4.3)$$

$$z, x \geq 0. \quad (4.4)$$

where  $U(z)$  is a standard neoclassical utility function operating on characteristics and defined on the characteristics-space (C-space). The budget constraint  $px \leq k$  is defined on the goods-space (G-space). The equation system  $z = \Phi x$  represents the transformation between G-space and C-space where the matrix  $\Phi$  describes the consumption technology of the economy. Consumer choices can either be studied in the goods-space (as in the traditional analysis) or in the characteristics-space.<sup>12</sup>

As the focus of the present paper is on job characteristics and labour supply, we will now develop a special case of the above model in order to derive testable implications about the relationship between the characteristics provided by a specific job and the individual's choice of hours worked. To do so, consider  $N+1$  goods, i.e.  $x = (L_1, L_2, \dots, L_n, \dots, L_N, C)'$ , where  $C$  denotes a consumption good and each of the other  $N$  goods,  $L_n$ , represents a specific amount of time spend on consuming that respective good. Therefore, each  $L_n$  is called an activity in the following and the total amount of time spent on these activities is normalised to unity, which implies  $\sum_{n=1}^N L_n = 1$ .<sup>13</sup> Moreover, we assume that each activity provides  $K$  characteristics while there is only one characteristic specific to the consumption good. The respective consumption technology  $\Phi$  is a  $(K+1) \times (N+1)$  matrix. Since we focus on labour supply, it is further assumed that consumption fails to provide any of the  $K$  characteristics related to activities and none of the activities provides the consumption

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there is no strong reason for the technology to be linear, Rustichini and Siconolfi (2008) have recently extended the analysis to allow for a nonlinear consumption-technology.

<sup>12</sup> One important example of an analysis in the C-space is the so called efficiency substitution effect which implies that consumers may change goods collections as a result of compensated relative price changes, simply in order to obtain the same characteristics collection in the most efficient manner.

<sup>13</sup> Note that a more elaborated version of this framework also allows consumption being a time consuming good (Lancaster, 1966a).

characteristic. Consequently, each entry of the matrix  $\Phi$ , denoted by  $\phi_{kn} \geq 0$ , determines the amount of characteristic  $k$  provided by spending one unit of time on activity  $n$ . There are thus several activities that provide various combinations of characteristics. In general, however, characteristics cannot reasonably be assumed to be unique to one specific activity. For instance, a certain level of autonomy may well be provided by both job-related and recreational activities.

Applying this approach directly to an empirical setup, however, faces two key problems: First, it not only requires information about all the coefficients  $\phi_{kn}$  in order to construct  $\Phi$  but also about the individuals' chosen amounts of each activity  $L_n$ . Second, assumptions on the individual choice sets have to be made, since not everybody can reasonably choose every  $L_n$ .

The present approach, therefore, focusses on two activities: A *labour activity* providing a remuneration and certain amounts of selected characteristics and a *residual activity*, possibly containing both recreational and volunteering activities, which provides certain amounts of the same selected characteristics. Moreover, we abstract from occupational choice in our cross-sectional setting and only consider quantitative differences regarding hours worked, given specific job characteristics. More precisely, we fix the job characteristics at their empirically observed value and assume that an individual engages exclusively in this specific labour activity.

As the focus of the empirical analysis will be on couples' labour supply, we interpret  $C$  as consumption of the family in the following and denote each spouses' time spent on the labour and residual activity as  $L_1, L_2$  and  $1 - L_1, 1 - L_2$ , respectively. The vector  $x$  can thus be written as

$$x = (L_1, 1 - L_1, L_2, 1 - L_2, C)'. \quad (4.5)$$

Furthermore, confining the theoretical analysis to one (job-) characteristic per spouse only and normalizing some of the coefficients to unity, the consumption technology  $\Phi$  reduces to the following simple form:

$$\Phi = \begin{pmatrix} \phi_1 & 1 & 0 & 0 & 0 \\ 0 & 0 & \phi_2 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix} \quad (4.6)$$

The third characteristic is exclusively obtained by the consumption good, whereas the

other two characteristics are obtained as a linear combination of the labour and the residual activity by each spouse, respectively. For example, a given amount of autonomy is realised with a specific number of working hours in combination with a certain amount of leisure time.

The parameter  $\phi_i$  ( $i = 1, 2$ ) measures the productivity of the labour activity relative to the residual activity in generating one unit of the respective characteristic. As the residual activity,  $1 - L_i$ , is a combination of several distinct activities, including recreational ones and volunteering, we assume  $\phi_i < 1$  ( $i = 1, 2$ ) in our subsequent analysis. This indicates that there is at least one activity which is more productive in obtaining that characteristic.

The focus of our analysis, however, will be on the impact of an increase in  $\phi_i$  on labour supply decisions. More specifically, such an increase is interpreted as an improvement in the characteristics provided by the working activity (e.g. a varied job), as the amount of  $z_i$  ( $i = 1, 2$ ) increases for a given number of hours worked.<sup>14</sup> Using (4.6), equation (4.3) can finally be written as

$$z = \Phi x = \begin{pmatrix} \phi_1 L_1 + (1 - L_1) \\ \phi_2 L_2 + (1 - L_2) \\ C \end{pmatrix}. \quad (4.7)$$

### 4.2.2. Hypotheses

In order to keep the analysis tractable and to derive analytical solutions, we restrict the utility function, defined on the characteristics space, to be of the Cobb-Douglas type. We can thus write the household maximization problem as follows:

$$U(z) = \alpha_1 \ln(z_1) + \alpha_2 \ln(z_2) + (1 - \alpha_1 - \alpha_2) \ln(z_3) \quad (4.8)$$

$$\text{s.t. } C = w_1 L_1 + w_2 L_2 + R_1 + R_2 \quad (4.9)$$

$$z = \Phi x \quad (4.10)$$

where  $x$  and  $\Phi$  are given by equations (4.5) and (4.6), respectively.  $R_i$  ( $i = 1, 2$ ) is individual  $i$ 's exogenous amount of non-labour income. The above preference representation

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<sup>14</sup> In the empirical part of the paper we further assume that  $\phi_i$  is a discrete variable which takes only two values,  $\phi_i^b$  and  $\phi_i^g$ , representing a bad or good job, respectively. In the following, however,  $\phi_i$  is assumed to be continuous.

#### 4. Job Characteristics and Labour Supply

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implies concavity of the utility function in  $z_i$  ( $i = 1, 2, 3$ ). Moreover, by transforming the utility function into the goods space, it is straight forward to see that  $U$  is concave in  $L_i$  and  $C$ , i.e.  $U_{L_i} < 0, U_{L_i L_i} < 0$  and  $U_C > 0, U_{CC} < 0$ .<sup>15</sup> Furthermore, the utility function is increasing in  $\phi_i$  ( $i = 1, 2$ ), i.e.  $U_{\phi_i} > 0$ , so that an improvement in the quality implies a higher level of individual utility. Finally, favourable job characteristics increase the opportunity costs of leisure, i.e.  $U_{L_i \phi_i} > 0$ .

Given these specific functional forms, we get:

$$L_i^* = \frac{1 - \alpha_i}{1 - \phi_i} - \frac{\alpha_i}{w_i} \left( \frac{w_j}{1 - \phi_j} + R \right) \quad (4.11)$$

with  $i = 1, 2$ ;  $j = 1, 2$  and  $j \neq i$ . Clearly, optimal labour supply  $L_i^*$  is decreasing in the level of non-labour income  $R$  and the spouses' wage level  $w_j$ , whereas it is increasing in the own wage rate  $w_i$  and the quality of the job  $\phi_i$ . Using (4.11) allows us to derive explicit solutions for wage and income elasticities of labour supply:

$$\epsilon_{L_i^*}^{w_i} = \frac{1}{\frac{(1-\alpha_i)(1-\phi_j)}{\alpha_i(1-\phi_i)} \frac{w_i}{w_j+(1-\phi_j)R} - 1} \quad (4.12)$$

and

$$\epsilon_{L_i^*}^R = - \frac{R}{\frac{(1-\alpha_i)w_i}{\alpha_i(1-\phi_i)} - \left( R + \frac{w_j}{1-\phi_j} \right)} \quad (4.13)$$

with  $i = 1, 2$ ;  $j = 1, 2$  and  $j \neq i$ . Note that  $\epsilon_{L_i^*}^R < 0$  as long as  $L_i^* > 0$ . In empirical applications, however, the income elasticity with respect to non-labour income is typically very small and not well defined for a large share of the population for which non-labour income is zero. In order to account for this shortcoming, we also consider elasticities with respect to potential income, being defined as the sum on non-labour income and wage income if the total time endowment is devoted to working, see e.g. Cahuc and Zylberberg (2004) and also the discussion in Atrostic (1982) about different income concepts. To derive the potential income elasticity, note that the residual activity is given by  $F_i = 1 - L_i$  ( $i = 1, 2$ ) where individual's time endowment is normalised to one. Equation (4.11) can

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<sup>15</sup> Note that the characteristics approach in general also allows positive utility, rather than disutility associated with labour. In our case  $\phi_i < 1$  accounts for *disutility* of labour.

#### 4. Job Characteristics and Labour Supply

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now be rewritten as follows:

$$L_i^* = \frac{1 - \alpha_i \phi_i}{1 - \phi_i} - \frac{\alpha_i}{w_i} \left( \frac{\phi_j}{1 - \phi_j} w_j + R_0 \right) \quad (4.14)$$

where  $R_0 = R_1 + R_2 + w_1 + w_2$ . Then, we obtain

$$\epsilon_{L_i^*}^{R_0} = - \frac{R_0}{\frac{(1 - \alpha_i \phi_i) w_i}{\alpha_i (1 - \phi_i)} - \left( R_0 + \frac{\phi_j}{1 - \phi_j} w_j \right)} \quad (4.15)$$

with  $i = 1, 2$ ,  $j = 1, 2$  and  $j \neq i$ . Differentiating (4.12), (4.13) and (4.15) with respect to  $\phi_i$  yields our main hypothesis:

$$\partial \epsilon_{L_i^*}^R / \partial \phi_i > 0, \quad \partial \epsilon_{L_i^*}^{w_i} / \partial \phi_i < 0 \quad \text{and} \quad \partial \epsilon_{L_i^*}^{R_0} / \partial \phi_i > 0. \quad (4.16)$$

As a result, our simple model predicts a lower wage income elasticity and a higher (less negative) non-labour as well as potential income elasticity for better jobs (captured by an increase of  $\phi_i$ ). Note that those results also imply a smaller Hicksian substitution elasticity  $\bar{\epsilon}_{L_i^*}^{w_i} \Big|_{U=\bar{U}}$  for more favorable job characteristics given the Slutsky equation, i.e.:

$$\bar{\epsilon}_{L_i^*}^{w_i} \Big|_{U=\bar{U}} = \frac{\alpha_i (1 - \alpha_i) \left[ \frac{1}{1 - \phi_i} + \frac{w_j}{w_i (1 - \phi_j)} + \frac{R}{w_i} \right]}{\frac{1 - \alpha_i}{1 - \phi_i} - \frac{\alpha_i}{w_i} \left[ \frac{w_j}{1 - \phi_j} + R \right]} \quad (4.17)$$

with  $\partial \bar{\epsilon}_{L_i^*}^{w_i} \Big|_{U=\bar{U}} / \partial \phi_i < 0$ . Consequently, the smaller substitution elasticity dominates the less negative income elasticity as the wage elasticity unambiguously decreases with  $\phi_i$ . Intuitively, labour becomes relatively more attractive: Substitution towards the residual activity (e.g. leisure) decreases for higher wages whereas the reduction of labour supply for an increase in non-working income is smaller. To test these predictions empirically is the aim of the next section.

### 4.3. Empirical Analysis of Labour Supply

Before discussing our empirical model and estimation strategy, we briefly provide some key features of the Australian tax and benefit system.

#### 4.3.1. The Australian Tax and Benefit System

The key components of the Australian family income tax system are the Personal Income Tax (PIT), the Low Income Tax Offset (LITO), the Dependent Spouse Tax Offset (SPOUTO), the Mature Age Tax Offset (MATO), Medicare Levy (ML) and net of cash transfers under Family Tax Benefits Part A (FTB- A), Family Tax Benefits Part B (FTB-B), New Start Allowance (NSA) and Rent Assistance (RA). These instruments will be used in our empirical analysis to calculate net household incomes for a given gross income.<sup>16</sup>

The tax base for the PIT, LITO and MATO is individual income, whereas the tax base of the ML and the SPOUTO is partly joint income, due to the withdrawal of exemption limits on family income or the taxable income of the taxpayer's spouse, respectively. Cash transfers under FTB-A are also withdrawn on family income.

The marginal rate scale of the 2009-10 PIT is strictly progressive, beginning with a zero rated threshold of \$6,000, followed by rates of 15%, 30% and 38% up to an income of \$180,000, and thereafter a top rate of 45%. However, when the LITO is added, strict progressivity is lost. In 2009-10 the LITO provided a tax credit of \$1350, phased out at 4 cents in the dollar on individual incomes above \$30,000. While the LITO is applicable for low income households, MATO applies to employed persons aged 55 years and over and is equal to 5% of wage and salary income net of deductions up to a maximum of \$500. It is reduced for wage and salary income net of deductions in excess of a threshold (\$53,000) at a rate of 5%. SPOUTO is accrued in addition to any other offsets to which the taxpayer is eligible. The maximum offset is \$2,159, phased out at 25 cents in the dollar on the taxable income of the taxpayer's spouse above \$9,254. SPOUTO is not available if the taxable income of the taxpayer is above \$150,000 or if the taxpayer is eligible to FTB-B. In addition to the preceding tax offsets, we also account for any other offsets by assuming

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<sup>16</sup> The aim of this section is to give a detailed description of those parts of the tax transfer system that are taken into account in our empirical analysis. We however do not assess their impact on the overall tax system (e.g. regarding progressivity of the PIT or issues of joint taxation). See Apps *et al.* (2012) for more information.



that an average national tax reduction of 2% of taxable income applies as a flat rate to all taxpayers (Wilkins, 2009).

The ML raises marginal tax rates by 1.5 percentage points for taxpayers with incomes above specified thresholds for exemption categories or reductions. For a family with more than one child, the exemption threshold income is based on family income and varies with the number of children. In 2009-10 the family income limit for a full reduction for a two-parent family was \$31,196, plus \$2,865 for each dependent child or student. The exemption is withdrawn at a rate of 10 cents in the dollar above this limit.

FTB-A provides a cash transfer for each dependent child, with the size of the transfer varying with the age of the child. The 'Maximum Rate' of FTB-A in 2009-10 for a child under 13 years was \$4,080.44. This maximum payment is withdrawn at 20 cents in the dollar on a family income over \$44,165 up to the 'Base Rate' of \$1,750.84 pa. The Base Rate is withdrawn at 30 cents in the dollar at a higher family income threshold that depends on the number of dependent children, e.g., for a family with two dependent children, the income threshold for the Base Rate is \$98,112.

FTB-B provides a payment of \$3,899.41 pa for a family with a child under 5 years. The payment is withdrawn at a rate of 20 cents in the dollar on a second income above \$4,745.

RA is a government cash benefit paid to renters residing in private accommodation. Income support recipients and families receiving more than the base rate of FTB A are eligible for the benefit which is paid at the family level. A family comprises a single person or couple together with any dependent children. The amount of RA generally depends on the annual rent payable, as well as on partner status and the number of dependent children. Similarly, the basic rates of NSA which is an unemployment benefit for individuals aged between 21 and 65 who are willing to undertake a suitable paid employment, vary with partner status and the number of dependent children and are subject to an income test.<sup>17</sup>

### 4.3.2. Data and Model Specification

In this section we specify a discrete choice labour supply model along the lines of van Soest (1995) and Hoynes (1996), to obtain estimates of labour supply elasticities with respect

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<sup>17</sup> See <http://www.centrelink.gov.au/internet/internet.nsf> for an overview of the current Australian social security system and <http://www.ato.gov.au> for more information about the Australian tax system.

#### 4. Job Characteristics and Labour Supply

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to income and wages. The main advantage of the unitary model is that it can be used to study non-linear budget constraints, fixed costs and participation problems in a family labour supply setting.<sup>18</sup> The focus of this paper is on household labour supply functions where both spouses jointly maximise utility. The household's labour supply decision is modelled by a utility function, which is assumed to depend on household's net income ( $y$ ) and the hours worked of the male ( $hm$ ) and the female ( $hf$ ) spouse. Following Keane and Moffitt (1998), this utility function is defined as a second order polynomial with interaction between the wife and the husband terms plus a random disturbance that is assumed to follow a type I extreme value distribution:

$$\begin{aligned}
 U_{ij}(y_{ij}, hm_{ij}, hf_{ij}) = & \alpha_1 y_{ij}^2 + \alpha_2 hm_{ij}^2 + \alpha_3 hf_{ij}^2 + \alpha_4 y_{ij} hm_{ij} + \alpha_5 y_{ij} hf_{ij} \\
 & + \alpha_6 hm_{ij} hf_{ij} + \beta_1 y_{ij} + \beta_2 hm_{ij} + \beta_3 hf_{ij} \\
 & + \gamma_m FSm_{ij} + \gamma_f FSf_{ij} + \epsilon_{ij}.
 \end{aligned} \tag{4.18}$$

In order to allow for individual and job characteristics affecting the utility, the coefficients of the linear terms are defined as follows:

$$\beta_l = \sum_{n=1}^{N_l} \beta_{nl} x_{nl} \quad l \in 1, 2, 3 \tag{4.19}$$

where  $x_{nl}$  represent individual characteristics as well as job characteristics. Moreover, as in Euwals and van Soest (1999), we include fixed savings from not working for both spouses in order to improve the model's fit. These savings, denoted  $FSm_{ij}, FSf_{ij}$ , are non-zero (equal to one) for positive hour choices and are further allowed to vary with observed individual characteristics  $z_{nk}$ , i.e.

$$\gamma_k = \sum_{n=1}^{N_k} \gamma_{nk} z_{nk} \quad k \in m, f. \tag{4.20}$$

Our estimation strategy is based on the conditional logit model.<sup>19</sup> In a companion paper

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<sup>18</sup> Still, it is controversial and researchers have recently tried to figure out whether the unitary model or the alternative approach, namely the collective model of labour supply, better fits the data. While Fortin and Lacroix (1997) finds that the unitary model only fits couples with pre-school-age children, Blundell *et al.* (2007) shows that the unitary model cannot be rejected.

<sup>19</sup> As is well known, the most prominent drawback of conditional logit models is the property called in-

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(Kunze and Suppa, 2013), however, we demonstrate that wage and income elasticities of labour supply derived from the standard and from (non-)parametric random coefficient models do not differ significantly.<sup>20</sup> We therefore conjecture that our key results carry over to more sophisticated models.

To estimate the model, data from the tenth wave of the Household, Income and Labour Dynamics in Australia (HILDA) survey are used. The survey provides data on a wide range of socioeconomic variables for a representative sample (17,000 respondents) of the Australian population, who have been followed annually since the year 2001. Particularly relevant to this study are the data on job characteristics. The year of analysis is 2010. We focus on households with a partnered or married couple where both spouses have a flexible labour supply. We thus exclude couples in which either spouse is a civil servant, self-employed or student. Several other sample restrictions are imposed: We drop families in which one member of the couple was over 65 years old or younger than 25. Also, we drop observations due to missing or implausible high or low values.<sup>21</sup> Our estimation sample then consists of 1881 households of couples with and without children.

Table C.1 of the appendix provides some summary statistics of the sample. We observe between 0 and 80 working hours per week, measured in one-hour units. In line with the empirical literature, the discrete labour supply points are chosen to represent the actual observed distribution of hours worked in the sample. Specifically, we define 15 alternatives of working hours a household can choose from: Men can choose between non-employment (0-1 hours), regular time (2-45 hours) and overtime (>45 hours), whereas there are two part-time categories (2-25 hours and 26-35 hours), one regular time (36-45 hours) and one overtime category (>45 hours) for women. Figure 4.1 shows the actual distribution of hours worked for both spouses. The discrete hours points are set to the average number of hours worked observed in each of these intervals, and the average number of hours worked is used to determine the corresponding labour income at that

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dependence of irrelevant alternatives (IIA). However, while more general discrete choice models may well circumvent these drawbacks, each of these more flexible specifications faces certain limitations: Whereas the parametric random coefficient model may incur enormously high computational costs, implying that bootstrap standard errors for labour supply elasticities are typically not available, convergence and robustness of the estimation is often problematic for the nonparametric random coefficient model (Cameron and Trivedi, 2005, Ch.18.5). As a result, most applied work is based on the standard conditional logit model.

<sup>20</sup> These results are in line with recent findings by Haan (2006) and Pacifico (2012).

<sup>21</sup> Specifically, we trim the bottom and top 1% of the distributions of hourly wages, hours worked, and non-working income to exclude outliers.

labour supply point.

To estimate the probability that household  $i$  chooses one of the 15 alternatives  $j$ , we need to know the budget constraint in order to determine the household net income associated with each choice  $j$ . For workers, we use both their observed annual gross wage and salary income and weekly hours usually worked in all jobs to calculate their hourly wages. For non-workers, gross hourly wages rates are estimated by applying a two-step Heckman selection model in order to control for selection into employment.<sup>22</sup> Results of the selection model are presented in table C.2 of the appendix. We then calculate the expected gross labour income at different choices of hours worked. The sum of resulting expected gross labour income and other non-labour income for both spouses is used to compute taxes paid and family payments received by both partners based on the relevant tax and transfer system as outlined in the previous section. The annual non-labour income of the couple is computed as the sum of each partner's business income, investment income and private domestic pension. According to table C.1, around 46% of wives have non-zero (taxable) non-working income, while 54% of the husbands in the sample have non-zero non-working income.

These income data are used to derive the set of 15 family incomes, net of the taxes and benefits, associated with the discrete time use choices. Hence, the net-household income of household  $i$  when choosing alternative  $j$  can be written as follows:

$$y_{ij} = w_{im}hm_j + w_{if}hf_j + nly_i + TB(w_{im}; w_{if}; hm_j; hf_j; nly_i; x_i) \quad (4.21)$$

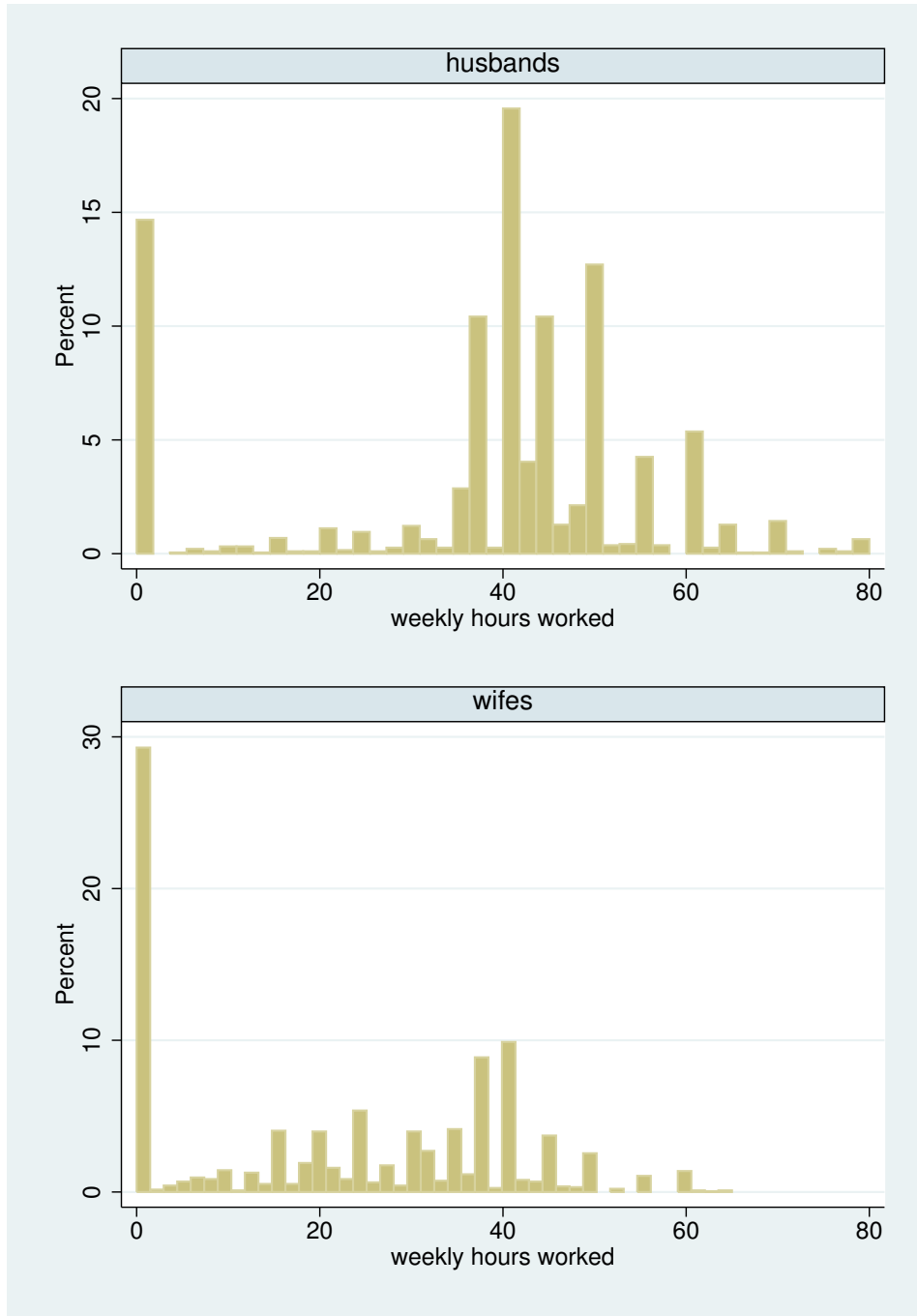
where  $w_{if}$  and  $w_{im}$  are the hourly gross wages from employment for women and men respectively;  $nly_i$  is the household non-labour income and the function  $TB(\cdot)$  represents the tax-benefit system, which depends on the gross wage rates, hours of work, household non-labour income and household characteristics  $x_i$ .

Job characteristics are measured using self-assessed items provided by HILDA. We conduct a confirmative factor analysis with a congeneric setup based on 12 selected indicators

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<sup>22</sup> The participation decision for employment is estimated as a function of age, age squared, education, gender, state, the time spent in the workforce as well as the time being unemployed and family circumstances including marital status, number of children and non labour income. The wage equation additionally includes tenure, occupation and industry whereas the variables describing family circumstances are used as exclusion restrictions. Note further that missing values of unemployed individuals for occupation and industry are either imputed by using past values from the 2005–2009 waves if available or are randomly drawn from the distribution of these characteristics among non-working individuals.

Figure 4.1.: Distributions of hours worked by spouse



Notes: Data from HILDA wave 10; Discretization husbands: (0-1), (2-45) and (>45); wives: (0-1), (2-25), (26-35), (36-45) and (>45)

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(see Table 4.1) and allow for four latent factors, labelled autonomy, security, variety and workload. Each characteristic is assumed to be objectively measurable and refers to a specific amount accessible through a certain job in line with Lancaster's approach. Moreover, the selection of characteristics is based on both psychological research (Warr, 2007) as well as on data availability. Table 4.2 provides the results. The factor autonomy is meant to capture opportunities for personal control and employee discretion. By contrast, workload may contain quantitative and qualitative aspects such as task or attentional demands while variety allows for both variation in job content and location. Finally, security accounts for the prospects and imponderability of the (financial) future. Factor scores are predicted and dichotomised using means as thresholds.<sup>23 24</sup>

Table 4.1.: Job characteristics: Items and Questions

Variable	Statement	latent JC
JC_secure	I have a secure future in my job	security
JC_stillbusy	The company I work for will still be in business 5 years from now	security
JC_worryjob	I worry about the future of my job	security
JC_repetitive	My job requires me to do the same things over and over again	varied
JC_variety	My job provides me with a variety of interesting things to do	varied
JC_newskills	My job often requires me to learn new skills	varied
JC_fast	I have to work fast in my job	workload
JC_notime	I don't have enough time to do everything in my job	workload
JC_intensity	I have to work very intensely in my job	workload
JC_freedomhow	I have a lot of freedom to decide how I do my own work	autonomy
JC_freedomwhen	I have a lot of freedom to decide when I do my work	autonomy
JC_choicewhat	I have a lot of choice in deciding what I do at work	autonomy

Note: The responses of the statements above have been recoded on a 7-point Likert-type scale.

<sup>23</sup> We adopt the dichotomization for convenience, although psychological research suggests that some characteristics, e.g., workload or variety may also exhibit a hump-shaped relationship with workers' well-being (e.g., Warr and Clapperton, 2010, ch.5). This issue, however, is left for future research.

<sup>24</sup> Missing values of job characteristics for non-working individuals are predicted using a probit model with sample selection and the same explanatory variables as for wage imputations. To those individuals with positive hours worked but missing job characteristics (they failed to return the self completion questionnaire) we apply simple regression based imputation techniques.

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Table 4.2.: Results of Confirmatory Factor Analysis

	autonomy	workload	security	varied
<b>Gamma</b>				
JC_choicewhat	0.871	0	0	0
JC_freedomhow	0.756	0	0	0
JC_freedomwhen	0.791	0	0	0
JC_fast	0	0.662	0	0
JC_notime	0	0.545	0	0
JC_intensity	0	0.947	0	0
JC_stillbusy	0	0	0.492	0
JC_NOworryjob	0	0	0.562	0
JC_secure	0	0	0.908	0
JC_variety	0	0	0	0.852
JC_NOrepetitive	0	0	0	0.395
JC_newskills	0	0	0	0.497
<b>Phi</b>				
autonomy	1.000			
workload	0.047	1.000		
security	0.186	0.095	1.000	
varied	0.447	0.365	0.332	1.000

Notes: Data from HILDA; all coefficients significant at 1%-percent level.

#### 4.4. Estimation Results

Table 4.3 shows the estimation results of the conditional logit model when job characteristics are either excluded (column 1) or included (column 2). Due to the complex structure of the model interpretation of individual coefficients is not straight forward. Still, all coefficients of the interaction terms containing job characteristics have the expected sign and all of them (except job variety for females) are significantly different from zero. A significant positive coefficient, for example, implies that both utility and marginal utility of labour are increasing with the respective job characteristic. These implications are in line with the predictions of our theoretical model outlined in section 4.2.2.

Average elasticities of husband's and wife's expected hours worked with respect to before tax wage rates, taxable family non-labour income and potential taxable family income are presented in Table 4.4. In deriving these elasticities, the tax and benefits system described in Section 4.3.1. is fully taken into account. Furthermore, calculation is based on the frequency approach which consists of simply averaging the probability of each discrete choice over all households before and after a change in wage rates or (potential) unearned income.<sup>25</sup> Own wage elasticities for both men and women are rather small

<sup>25</sup> As a robustness check, however, we also applied the calibration approach (see Creedy and Kalb, 2005) which consists of repeatedly drawing a set of random terms for each household from an EV-I distribution

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Table 4.3.: Results of Conditional Logit

	(1)		(2)	
hhnetinc_e	0.0441***	(3.31)	0.0425**	(3.03)
c.hhnetinc_eXc.hhnetinc_e	-0.0000443	(-1.69)	-0.00000854	(-0.03)
hw	-0.0117	(-0.32)	-0.0405	(-1.07)
c.hwXc.hw	-0.00291***	(-7.25)	-0.00289***	(-7.16)
part_hw	-0.0859**	(-3.05)	-0.131***	(-4.24)
c.part_hwXc.part_hw	-0.00122***	(-7.46)	-0.00145***	(-8.51)
c.part_hwXc.hw	0.000859***	(6.44)	0.00107***	(7.67)
c.hwXc.hhnetinc_e	-0.0000155	(-0.19)	-0.000192*	(-2.28)
c.part_hwXc.hhnetinc_e	-0.000107	(-1.65)	-0.000261***	(-3.80)
c.hwXc.age	0.00926***	(7.45)	0.00982***	(7.53)
c.hwXc.ageXc.age	-0.000102***	(-7.67)	-0.000107***	(-7.64)
c.hwXc.Nchildren	0.0116**	(3.07)	0.0118**	(3.12)
c.part_hwXc.part_age	0.00662**	(5.37)	0.00788***	(5.84)
c.part_hwXc.part_ageXc.part_age	-0.0000845***	(-5.96)	-0.0000965***	(-6.28)
c.part_hwXc.Nchildren	-0.0245***	(-6.78)	-0.0262***	(-6.97)
c.hhnetinc_eXc.Nchildren	-0.00333	(-1.41)	-0.00351	(-1.45)
c.hhnetinc_eXc.age	-0.000503*	(-2.09)	-0.000324	(-1.28)
c.hhnetinc_eXc.part_age	0.000287	(1.17)	0.0000211	(0.08)
c.FSmXc.age	0.0597***	(3.65)	0.0592***	(3.59)
c.FSmXc.Nchildren	0.316*	(2.03)	0.285	(1.80)
c.FSfXc.part_age	0.0186***	(4.48)	0.0188***	(4.54)
c.FSfXc.Nchildren	-0.216**	(-2.91)	-0.220**	(-2.95)
1.autonomyCXc.hw			0.0190***	(5.55)
1.workloadCXc.hw			0.0134***	(4.17)
1.securityCXc.hw			0.0157***	(4.82)
1.variedCXc.hw			0.00820*	(2.35)
1.part_autonomyCXc.part_hw			0.0177***	(5.14)
1.part_workloadCXc.part_hw			0.0233***	(6.84)
1.part_securityCXc.part_hw			0.0384***	(11.22)
1.part_variedCXc.part_hw			0.00163	(0.45)
N	28215		28215	
Couples	1881		1881	

Notes: Data from HILDA wave 10; suffix "\_part" indicates variables for wives; t-statistics in parentheses. Indicated levels of significance are \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

Table 4.4.: Elasticities

	CL		JCCL	
wageelas	0.121***	(7.01)	0.0627***	(3.80)
pottfincelas	-0.178**	(-2.97)	-0.238***	(-3.77)
nwtfincelas	-0.00900	(-1.76)	-0.0142**	(-2.69)
part_wageelas_part	0.148***	(5.81)	0.0612**	(2.69)
pottfincelas_part	-0.396***	(-4.95)	-0.456***	(-5.37)
nwtfincelas_part	-0.0186***	(-3.86)	-0.0229***	(-4.41)
N	28215			
N_clust	1881			
Rep	200			

Notes: Data from HILDA wave 10; suffix "\_part" indicates variables for wives; t-statistics in parentheses. Indicated levels of significance are \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .



#### 4. Job Characteristics and Labour Supply

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but significantly positive at conventional levels of significance. Also, they are larger for women than for men in line with most of the existing literature. Income elasticities are significantly negative and much larger for the potential income as compared to the family non-labour income as expected. Moreover, both income elasticities are approximately two times larger for women. However, the inclusion of job characteristics clearly reduces both wage and income elasticities indicating that the omission of these non-pecuniary aspects in labour supply models leads to remarkably larger average elasticities.

Figure 4.2 shows wage and income elasticities by spouse and job characteristic along with their bootstrap-based 95%-confidence intervals. For all four characteristics, we find smaller wage elasticities and less negative income elasticities to be associated with better job characteristics, which provides first evidence for our hypothesis. For example, average wage elasticities for individuals with ‘bad’ jobs (both for men and women) are in the range of 0.075–0.1 whereas those for ‘good’ jobs are below .05. In order to test our hypothesis explicitly, we bootstrap the difference of the respective elasticities to obtain adequate standard errors. Table 4.5 demonstrates our key result, namely that wage and income elasticities differ significantly across job characteristics. More specifically, each entry of table 4.5 shows, for a given elasticity, its difference for the values of the respective characteristic, along with their standard errors. Clearly, wage elasticities of both spouses are significantly lower for those individuals having a better job. Moreover, potential and non-labour income elasticities are significantly larger. Therefore our findings generally confirm our hypothesis that job characteristics indeed systematically affect labour supply decisions. Less negative income elasticities indicate a less pronounced reduction in labour supply and, together with smaller wage elasticities, imply a smaller substitution elasticity based on the Slutsky equation. Intuitively, labour becomes a relatively more attractive activity as monetary incentives forfeit relevance.

These results are robust against several variations of the basic framework: First, we have looked at alternative discretizations of the number of hours worked, e.g. an equidistant division as in van Soest (1995).<sup>26</sup> Second, we have used an exploratory factor analysis as in Wells (2010) instead of a confirmatory one. Third, we have altered the threshold for

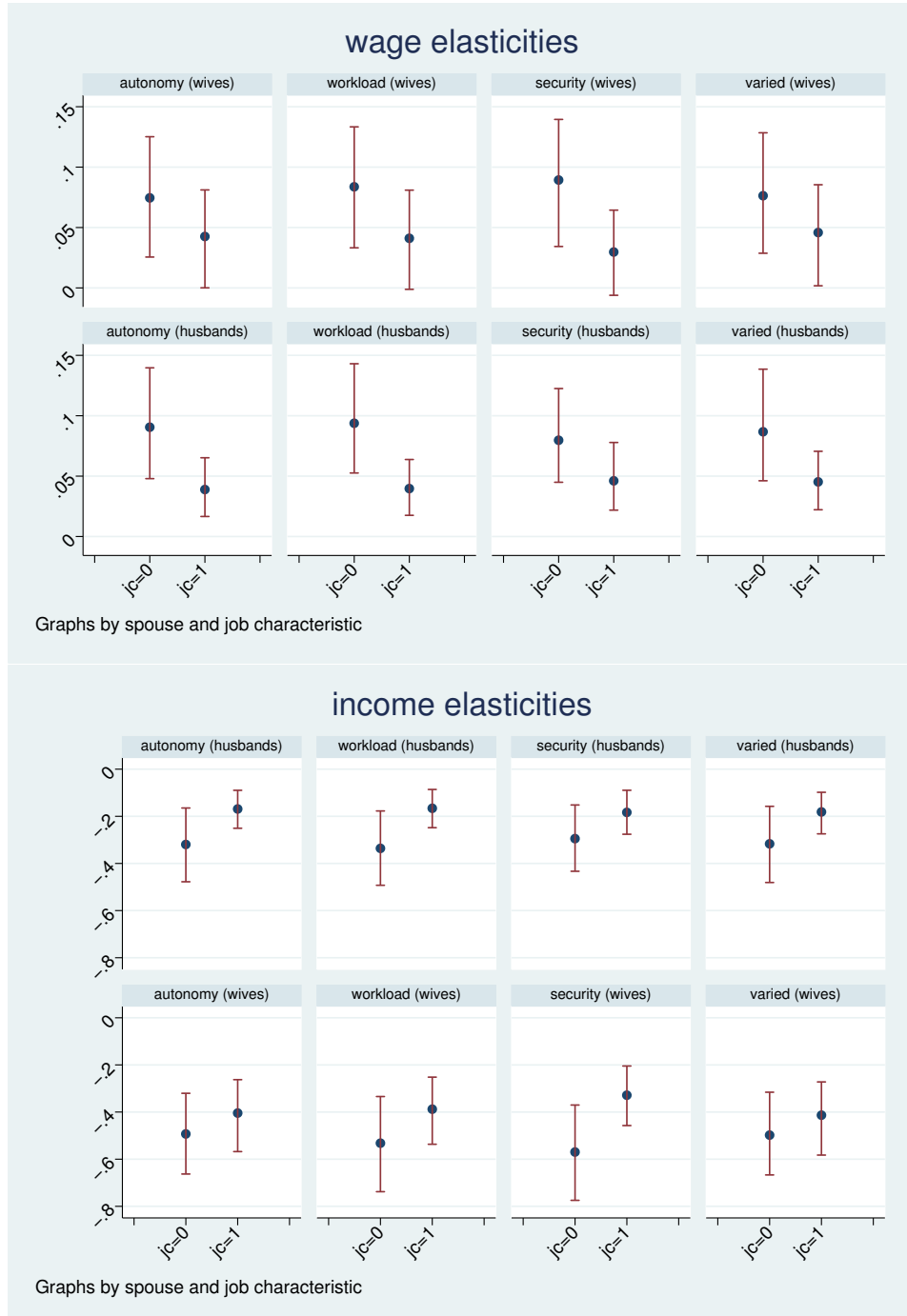
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This in turn generates a perfect match between predicted and observed choices. Keeping the same draws when predicting labour supply responses to an increase in wages or non-labour income and averaging individual responses over a large number of draws provides robust transition matrices.

<sup>26</sup> More precisely, we have used two equidistant discretizations with either interval length of eight and 10 hours, respectively.

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Figure 4.2.: Labour Supply Elasticities by Gender and Job Characteristics



Notes: Data from HILDA wave 10; 95% confidence intervals based on bootstrap standard errors (200 rep.)

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Table 4.5.: Differences in Labour Supply Elasticities

	men				women			
	wageelas		pincelas		wageelas		pincelas	
autonomy	-0.0516**	(-3.24)	0.151**	(3.28)	-0.0320*	(-2.57)	0.0887**	(3.13)
workload	-0.0541***	(-3.31)	0.170***	(3.59)	-0.0426***	(-3.55)	0.144***	(4.08)
security	-0.0336**	(-3.26)	0.111**	(3.13)	-0.0596***	(-4.47)	0.241***	(5.26)
varied	-0.0415**	(-2.80)	0.135**	(3.24)	-0.0305*	(-2.44)	0.0847**	(2.69)
N	28215							
N_clust	1881							
Rep	200							

Notes: Data from HILDA wave 10; t-statistics, based on  $\widehat{se}_{Boot}(\hat{\epsilon}_{JC=1} - \hat{\epsilon}_{JC=0})$ , in parentheses. Indicated levels of significance are \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

dichotomizing job characteristics, using gender specific means instead of the same mean for both men and women. Fourth, we have varied the number of preference shifters to include e.g. a dummy for higher education and the presence of children aged below four or to exclude all income preference shifters. Results for an augmented model are provided by table C.3–C.5 in the appendix. Finally, for predictions of labour supply effects, we have also used the calibration method whereas the baseline estimates rely on the frequency approach. While each of these changes clearly has an effect on the estimation results and thus on the level of the respective elasticities, the significant differences of these elasticities among job characteristics persist.<sup>27</sup> In sum, our robustness checks therefore buttress our main findings.

#### 4.5. Concluding Remarks

This paper shows that job characteristics are an important determinant of labour supply decisions. In the theoretical part of the paper we draw upon Lancaster’s characteristics approach (Lancaster, 1966a) in order to develop a theoretical framework that allows us to derive testable implications about the relationship between job characteristics and the number of hours worked. More precisely, we extend the unitary model of family labour supply to include job characteristics and demonstrate that wage elasticities are smaller while income elasticities are less negative for individuals whose job provides more favourable characteristics. This in turn implies a smaller substitution elasticity.

In the empirical part of our paper we first show that the omission of job characteristics

<sup>27</sup> These robustness results are available from the authors upon request.

in labour supply models generally imply larger average elasticities. Testing the theoretical predictions using a discrete choice model we find both higher utility and marginal utility of labour given favourable characteristics and that a good job is indeed associated with significantly lower wage elasticities and larger (less negative) income elasticities. These results hold for both men and women. Intuitively, labour becomes relatively more attractive or, put differently, better job characteristics increase the opportunity costs of leisure. Thus, this is the first paper documenting and rationalizing the systematic influence of job characteristics on labour supply elasticities using a discrete choice model. Our findings therefore complement earlier empirical evidence by Atrostic (1982). While her findings demonstrate that labour supply elasticities differ depending on whether job characteristics are taken into account or not, our evidence quantifies systematic differences in labour supply elasticities across individuals for a set of specific characteristics modelled by factor analysis. We document systematic and significant differences in labour supply responses across individuals with good or bad characteristics, as, e.g., a high or low degree of autonomy.

In conjunction with the findings of the previous chapter, the results suggest that job characteristics not only increase subjective well-being (job and life satisfaction), but are, moreover systematically choice-relevant. View work as a characteristic-providing activity may thus link the assessment of well-being and traditional choice analysis more closely.

Finally, our findings are highly relevant from a policy perspective. In particular, as the success of the design of low-income support critically depends on individual labour supply responses and therefore on the quality of jobs these individuals possess. Similarly, our results may have important implications for the optimal design of earnings taxation.

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## A. Additional Statistics for chapter 2

Table A.1.: Results for Adaptation Specification

	(1) vacation		(2) emergency		(3) dinner		(4) furniture	
FR0	-0.101**	(-3.20)	-0.190***	(-6.19)	-0.205***	(-5.03)	-0.184***	(-6.05)
FR1	-0.169***	(-3.38)	-0.200***	(-4.04)	-0.241**	(-2.98)	-0.193***	(-3.76)
Phone	-0.0952	(-1.15)	-0.0885	(-1.07)	-0.0882	(-1.06)	-0.0968	(-1.17)
PhoneFR	-0.251*	(-2.57)	-0.248*	(-2.53)	-0.256**	(-2.61)	-0.253**	(-2.58)
Car	0.0107	(0.18)	0.00952	(0.16)	0.0160	(0.27)	0.0128	(0.21)
CarFR	-0.139*	(-2.44)	-0.146*	(-2.58)	-0.146*	(-2.56)	-0.146*	(-2.56)
Hood	-0.121***	(-3.51)	-0.121***	(-3.53)	-0.123***	(-3.56)	-0.123***	(-3.59)
HoodFR	-0.0174	(-0.30)	-0.0200	(-0.35)	-0.0193	(-0.34)	-0.0197	(-0.34)
Building	-0.0163	(-0.50)	-0.0164	(-0.50)	-0.0180	(-0.55)	-0.0172	(-0.52)
BuildingFR	-0.173***	(-3.61)	-0.173***	(-3.61)	-0.174***	(-3.63)	-0.180***	(-3.73)
Meal	-0.0666*	(-2.13)	-0.0655*	(-2.10)	-0.0642*	(-2.06)	-0.0678*	(-2.17)
MealFR	-0.274***	(-3.63)	-0.278***	(-3.68)	-0.302***	(-4.02)	-0.279***	(-3.68)
Emergency	-0.199***	(-4.43)	-0.170***	(-3.83)	-0.196***	(-4.38)	-0.197***	(-4.40)
EmergencyFR	-0.210***	(-8.22)			-0.210***	(-8.16)	-0.214***	(-8.38)
Dinner	-0.0862***	(-4.88)	-0.0859***	(-4.86)	-0.0617***	(-3.54)	-0.0876***	(-4.96)
DinnerFR	-0.266***	(-7.71)	-0.263***	(-7.59)			-0.271***	(-7.86)
Furniture	-0.0533**	(-3.02)	-0.0545**	(-3.08)	-0.0541**	(-3.06)	-0.0313	(-1.80)
FurnitureFR	-0.214***	(-8.50)	-0.219***	(-8.70)	-0.219***	(-8.67)		
Vacation	-0.0357	(-1.35)	-0.0525	(-1.94)	-0.0546*	(-2.02)	-0.0533*	(-1.97)
VacationFR			-0.141***	(-5.12)	-0.145***	(-5.26)	-0.137***	(-4.96)
$\bar{R}^2$	0.0548		0.0543		0.0540		0.0540	
Obs.	56908		56908		56908		56908	
Ind.	22193		22193		22193		22193	

Notes: Sample based on SOEP waves 2001, 2003, 2005, 2007; t-statistics in parentheses. Dependent variable is the answer to life satisfaction in general on a 0–10 scale. All models estimated using linear fixed effects. The underlying model is (2.8). All models contain the same control variables as in Table 2.4, including year and region dummies. Indicated levels of significance are \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

## B. Additional Statistics for chapter 3

Table B.1.: Summary Statistics

	male				female			
	count	mean	min	max	count	mean	min	max
age	14420	40	25	55	13686	41	25	55
FT	14420	.76	0	1	13686	.51	0	1
PT	14420	.056	0	1	13686	.39	0	1
SE	14420	.18	0	1	13686	.098	0	1
year 11	14420	.17	0	1	13686	.2	0	1
year 12	14420	.12	0	1	13686	.14	0	1
cert	14420	.33	0	1	13686	.18	0	1
uni or adv dipl	14420	.38	0	1	13686	.48	0	1
hc	14420	.16	0	1	13686	.16	0	1
married	14420	.78	0	1	13686	.74	0	1
separated	14420	.07	0	1	13686	.12	0	1
single	14420	.15	0	1	13686	.13	0	1
hhdispinc	14420	85	2.5	225	13686	85	3.2	225
imarketincr	14420	41	0	232	13686	27	0	191
hours worked	14420	45	2	110	13686	33	0	99

Notes: Sample based on HILDA waves 2005–2010. Real disposable equivalence household income and real individual market income in 1000 AUD.

B. Additional Statistics for chapter 3

Table B.2.: Random Effects Results

(a) Life Satisfaction

	males				females			
	(1)		(2)		(3)		(4)	
hhIndispinc	0.142***	(4.67)	0.126***	(4.26)	0.0835**	(2.76)	0.0678*	(2.27)
hours_worked	0.00425	(0.77)	0.00110	(0.20)	0.00111	(0.32)	-0.000438	(-0.13)
hours_workedSQ	-0.0000808	(-1.52)	-0.0000573	(-1.09)	-0.0000600	(-1.32)	-0.0000530	(-1.19)
PT	-0.0539	(-0.77)	-0.0493	(-0.72)	0.0209	(0.59)	0.0274	(0.79)
SE	0.0182	(0.52)	-0.0175	(-0.51)	0.0742	(1.45)	0.0443	(0.88)
highAUTONOMY			0.0859***	(4.07)			0.103***	(4.73)
highWORKLOAD			-0.0291	(-1.47)			-0.0146	(-0.68)
highSECURITY			0.229***	(11.59)			0.215***	(10.66)
highVARIED			0.170***	(7.78)			0.136***	(6.06)
Cons	7.672***	(16.69)	7.789***	(17.38)	8.011***	(17.83)	8.009***	(18.14)
Year dummies	Yes		Yes		Yes		Yes	
soc-dem controls	Yes		Yes		Yes		Yes	
Adj. R-squaerd								
Obs.	14420		14420		13686		13686	
Ind.	3944		3944		3910		3910	
age								
opthw			9.599				-4.132	

(b) Job Satisfaction

	males				females			
	(1)		(2)		(3)		(4)	
hhIndispinc	0.0545	(1.35)	0.0171	(0.45)	-0.0248	(-0.58)	-0.0700	(-1.74)
hours_worked	0.0209**	(2.58)	0.0139	(1.76)	0.00142	(0.27)	-0.00170	(-0.36)
hours_workedSQ	-0.000268***	(-3.42)	-0.000212**	(-2.79)	-0.000132	(-1.91)	-0.000126*	(-1.99)
PT	-0.117	(-1.16)	-0.125	(-1.30)	-0.0724	(-1.32)	-0.0536	(-1.06)
SE	0.108	(1.75)	-0.0239	(-0.43)	0.137	(1.76)	-0.00000754	(-0.00)
highAUTONOMY			0.351***	(11.82)			0.385***	(12.60)
highWORKLOAD			-0.202***	(-7.04)			-0.168***	(-5.33)
highSECURITY			0.524***	(18.91)			0.550***	(18.83)
highVARIED			0.549***	(17.31)			0.621***	(19.34)
Cons	7.407***	(11.83)	7.463***	(12.97)	7.396***	(11.31)	7.277***	(12.09)
Year dummies	Yes		Yes		Yes		Yes	
ind. & occ.	Yes		Yes		Yes		Yes	
soc-dem	Yes		Yes		Yes		Yes	
job controls	Yes		Yes		Yes		Yes	
Adj. R-squaerd								
Obs.	14296		14296		13550		13550	
Ind.	3932		3932		3895		3895	
age								
opthw			32.68				-6.763	

Notes: Sample based on HILDA waves 2005–2010; *t*-statistics in parenthesis. Dependent variable is general life satisfaction in panel (a) and job satisfaction in panel (b). Both are recorded on a 0–10 scale. All models are estimated using random effects and contain a constant. Socio-demographic control variables are age, age<sup>2</sup> and dummies for long-term health conditions, educational attainments and marital status. Indicated levels of significance are \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .



B. Additional Statistics for chapter 3

Table B.3.: Linear fixed effects results—extended age bracket

(a) Life Satisfaction

	males				females			
	(1)	(2)	(3)	(4)	(3)	(4)	(3)	(4)
hhIndispinc	0.0795*	(2.48)	0.0792*	(2.49)	0.0231	(0.71)	0.0177	(0.55)
hours_worked	0.00500	(0.89)	0.00336	(0.60)	0.00393	(1.09)	0.00284	(0.79)
hours_workedSQ	-0.0000840	(-1.57)	-0.0000707	(-1.32)	-0.0000990*	(-2.09)	-0.0000918	(-1.94)
PT	-0.0161	(-0.26)	-0.00934	(-0.15)	0.0250	(0.69)	0.0245	(0.68)
SE	0.00287	(0.06)	-0.00856	(-0.18)	0.0132	(0.20)	-0.00223	(-0.03)
highAUTON			0.0394**	(2.80)			0.0500***	(3.37)
highWORKLOAD			-0.00752	(-0.55)			-0.00667	(-0.46)
highSECUR			0.105***	(7.61)			0.0844***	(6.00)
highVARIED			0.0581***	(3.99)			0.0425**	(2.84)
Cons	7.256***	(13.29)	7.283***	(13.44)	8.332***	(16.14)	8.392***	(16.35)
Year dummies	Yes		Yes		Yes		Yes	
soc-dem controls	Yes		Yes		Yes		Yes	
Adj. R-squaerd	0.0124		0.0212		0.00757		0.0136	
Obs.	18104		18104		17273		17273	
Ind.	5011		5011		4972		4972	
age	20-60		20-60		20-60		20-60	
opthw	29.77		23.78		19.82		15.46	

(b) Job Satisfaction

	males				females			
	(1)	(2)	(3)	(4)	(3)	(4)	(3)	(4)
hhIndispinc	0.0244	(0.54)	0.0258	(0.60)	-0.0274	(-0.55)	-0.0534	(-1.12)
hours_worked	0.0211**	(2.62)	0.0161*	(2.02)	0.00801	(1.37)	0.00302	(0.55)
hours_workedSQ	-0.000273***	(-3.50)	-0.000228**	(-2.93)	-0.000200**	(-2.67)	-0.000165*	(-2.33)
PT	0.00268	(0.03)	0.0302	(0.35)	-0.00901	(-0.15)	-0.0157	(-0.28)
SE	0.172	(1.90)	0.0994	(1.15)	0.108	(0.96)	0.00877	(0.08)
highAUTON			0.186***	(8.90)			0.273***	(12.64)
highWORKLOAD			-0.118***	(-5.74)			-0.0845***	(-3.90)
highSECUR			0.315***	(15.28)			0.347***	(15.54)
highVARIED			0.302***	(13.91)			0.323***	(14.41)
Cons	6.926***	(8.54)	6.917***	(8.95)	6.767***	(8.22)	6.936***	(8.93)
Year dummies	Yes		Yes		Yes		Yes	
ind. & occ.	Yes		Yes		Yes		Yes	
soc-dem	Yes		Yes		Yes		Yes	
job controls	Yes		Yes		Yes		Yes	
Adj. R-squaerd	0.0199		0.0813		0.0174		0.0911	
Obs.	17949		17949		17103		17103	
Ind.	4997		4997		4953		4953	
age	20-60		20-60		20-60		20-60	
opthw	38.59		35.28		20.04		9.152	

Notes: Sample based on HILDA waves 2005–2010; *t*-statistics in parenthesis. Dependent variable is general life satisfaction in panel (a) and job satisfaction in panel (b). Both are recorded on a 0–10 scale. All models are estimated using random effects and contain a constant. Socio-demographic control variables are age, age<sup>2</sup> and dummies for long-term health conditions, educational attainments and marital status. Indicated levels of significance are \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

B. Additional Statistics for chapter 3

Table B.4.: Life satisfaction—Linear Fixed Effects, complete sample

	males		females	
	(1)		(2)	
hhIndispinc	0.0671*	(2.16)	0.0524	(1.76)
PT	-0.0107	(-0.22)	0.0420	(1.54)
SE	-0.00826	(-0.17)	0.0156	(0.28)
OLF	-0.228***	(-3.51)	0.0395	(1.02)
UE	-0.286***	(-3.89)	-0.0993	(-1.45)
Cons	7.895***	(15.34)	8.961***	(18.98)
Year dummies	Yes		Yes	
soc-dem controls	Yes		Yes	
Adj. R-squaerd	0.0118		0.0114	
Obs.	21213		24570	
Ind.	5690		6242	
age	25-55		25-55	
opthw				

Notes: Sample based on HILDA waves 2005–2010;  $t$ -statistics in parenthesis. Dependent variable is general life satisfaction in panel (a) and job satisfaction in panel (b). Both are recorded on a 0–10 scale. All models are estimated using random effects and contain a constant. OLF and UE are dummies for out of labour force and unemployed, respectively. Socio-demographic control variables are age, age<sup>2</sup> and dummies for long-term health conditions, educational attainments and marital status. Indicated levels of significance are \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

## C. Additional Statistics for chapter 4

Table C.1.: Summary Statistics

	count	mean	sd	min	max
hoursworked	1881	37.85	18.58	0	80
part_hoursworked	1881	22.25	17.78	0	65
educD	1881	0.61	0.49	0	1
part_educD	1881	0.58	0.49	0	1
nwinc	1881	5917.33	16304.59	-24000	121000
nwinc_part	1881	2854.04	8911.64	-8000	78000
nwincNZ	1881	0.54	0.50	0	1
nwincNZ_part	1881	0.46	0.50	0	1
hhnetinc	1881	93154.86	43119.45	0	396253
Nchildren	1881	0.87	1.10	0	7

Notes: Data from HILDA wave 2010. Suffix "\_part" indicates variables for wives. educD equals 0 when respondent has university degree and 1 otherwise. nwinc contains business income, investment income and private pension. nwincNZ is a dummy for non-zero non-working-income.

C. Additional Statistics for chapter 4

Table C.2.: Results for Heckman Wage Esimtation

(a) Men

	lnhwage		partD		athrho		Insigma	
age	0.0146	(1.55)	0.0319	(1.27)				
c.ageXc.age	-0.000268**	(-2.86)	-0.00137***	(-5.37)				
2.educC	-0.183***	(-6.23)	-0.306***	(-3.87)				
3.educC	-0.186***	(-5.30)	-0.0813	(-0.74)				
4.educC	-0.321***	(-8.86)	-0.518***	(-5.86)				
sqrwork	0.106***	(3.90)	0.645***	(11.68)				
sqrtrue	-0.128***	(-7.29)	-0.255***	(-6.22)				
sqrtenure	0.0333***	(4.31)						
2.maritalC			-0.101	(-1.16)				
3.maritalC			-0.103	(-1.00)				
4.maritalC			-0.170	(-1.67)				
1.Ndepch14			0.0443	(0.42)				
2.Ndepch14			-0.0243	(-0.23)				
3.Ndepch14			-0.393**	(-3.05)				
1.nwinclass			-0.250	(-1.34)				
2.nwinclass			-0.0691	(-0.36)				
3.nwinclass			-0.438*	(-1.98)				
4.nwinclass			-1.216***	(-6.40)				
1.healthcond			-0.618***	(-9.11)				
_cons	2.636***	(14.29)	0.347	(0.65)	-0.0338	(-0.50)	-0.715***	(-50.90)
N	3223							
N_cens	681							

(b) Women

	lnhwage		partD		athrho		Insigma	
age	0.00922	(1.13)	0.136***	(6.99)				
c.ageXc.age	-0.000146	(-1.60)	-0.00236***	(-10.90)				
2.educC	-0.145***	(-4.79)	-0.144*	(-2.09)				
3.educC	-0.0892*	(-2.53)	-0.312***	(-3.98)				
4.educC	-0.200***	(-6.15)	-0.405***	(-6.21)				
sqrwork	0.0499**	(2.69)	0.553***	(18.96)				
sqrtrue	-0.0579***	(-3.42)	-0.130***	(-3.59)				
sqrtenure	0.0629***	(7.30)						
2.maritalC			0.134	(1.77)				
3.maritalC			0.160*	(2.18)				
4.maritalC			-0.0233	(-0.26)				
1.Ndepch14			-0.565***	(-7.27)				
2.Ndepch14			-0.840***	(-10.50)				
3.Ndepch14			-1.110***	(-10.69)				
1.nwinclass			-0.267	(-1.68)				
2.nwinclass			-0.0991	(-0.62)				
3.nwinclass			-0.334	(-1.84)				
4.nwinclass			-0.821***	(-4.85)				
1.healthcond			-0.599***	(-10.17)				
_cons	2.423***	(12.00)	-2.011***	(-4.57)	-0.0494	(-0.64)	-0.745***	(-51.24)
N	3652							
N_cens	1263							

Notes: Data from HILDA wave 10; sample includes couples and singles, t-statistics in parentheses. Wage equation contains state, industry, and occupational dummies; selection equation state dummies only. Indicated levels of significance are \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

C. Additional Statistics for chapter 4

Table C.3.: Results of Conditional Logit—Augmented Model

	(1)		(2)	
hhnetinc_e	0.0441**	(2.86)	0.0458**	(2.86)
c.hhnetinc_eXc.hhnetinc_e	-0.0000225	(-0.84)	0.0000148	(0.55)
hw	0.258**	(7.26)	0.232**	(6.63)
c.hwXc.hw	-0.00373**	(-8.35)	-0.00370**	(-8.25)
part_hw	0.117**	(6.04)	0.0893**	(4.51)
c.part_hwXc.part_hw	-0.00150**	(-8.57)	-0.00173**	(-9.52)
c.part_hwXc.hw	0.00102**	(7.50)	0.00118**	(8.42)
c.hwXc.hhnetinc_e	-0.0000716	(-0.88)	-0.000230**	(-2.71)
c.part_hwXc.hhnetinc_e	-0.000198**	(-2.96)	-0.000313**	(-4.48)
c.hwXc.age	0.000342	(0.85)	0.000463	(1.13)
1.educDXc.hw	-0.00701	(-1.46)	-0.00259	(-0.52)
c.hwXc.Nchildren	0.0155**	(3.84)	0.0166**	(4.06)
1.child4Xc.hw	-0.0122	(-1.39)	-0.0158	(-1.74)
c.part_hwXc.part_age	-0.000971**	(-3.26)	-0.000819**	(-2.66)
1.part_educDXc.part_hw	-0.0259**	(-5.93)	-0.0195**	(-4.20)
c.part_hwXc.Nchildren	-0.0162**	(-4.48)	-0.0166**	(-4.48)
1.child4Xc.part_hw	-0.0550**	(-7.26)	-0.0588**	(-7.40)
c.hhnetinc_eXc.Nchildren	-0.00315	(-1.24)	-0.00325	(-1.25)
c.hhnetinc_eXc.age	-0.000551*	(-2.19)	-0.000418	(-1.58)
c.hhnetinc_eXc.part_age	0.000224	(0.94)	-0.0000397	(-0.16)
1.educDXc.hhnetinc_e	0.00187	(0.66)	0.00137	(0.45)
1.part_educDXc.hhnetinc_e	0.000246	(0.10)	0.00140	(0.52)
1.child4Xc.hhnetinc_e	0.00437	(0.70)	0.00413	(0.63)
c.FSmXc.age	0.0977**	(5.55)	0.0958**	(5.42)
c.FSmXc.Nchildren	0.387*	(2.39)	0.370*	(2.24)
c.FSfXc.part_age	0.0239**	(5.69)	0.0240**	(5.71)
c.FSfXc.Nchildren	-0.247**	(-3.25)	-0.250**	(-3.27)
1.autonomyCXc.hw			0.0209**	(6.38)
1.workloadCXc.hw			0.0140**	(4.50)
1.securityCXc.hw			0.0129**	(4.10)
1.variedCXc.hw			0.00701*	(2.09)
1.part_autonomyCXc.part_hw			0.0179**	(5.06)
1.part_workloadCXc.part_hw			0.0233**	(6.69)
1.part_securityCXc.part_hw			0.0379**	(10.85)
1.part_variedCXc.part_hw			-0.00137	(-0.37)
N	28215		28215	
Couples	1881		1881	

Notes: Data from HILDA; suffix "\_part" indicates variables for wives. educD equals 0 when respondent has university degree and 1 otherwise; t-statistics in parentheses. Indicated levels of significance are \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

C. Additional Statistics for chapter 4

Table C.4.: Labour Supply Elasticities for Augmented Model

	CL		JCCL	
wageelas	0.0953***	(5.39)	0.0486**	(2.81)
pottfincelas	-0.194**	(-3.10)	-0.249***	(-3.85)
nwtfincelas	-0.0109*	(-2.11)	-0.0149**	(-2.68)
part_wageelas_part	0.109***	(4.20)	0.0522*	(2.19)
pottfincelas_part	-0.458***	(-5.44)	-0.487***	(-5.55)
nwtfincelas_part	-0.0222***	(-4.36)	-0.0239***	(-4.33)
N	28215			
N_clust	1881			
Rep	200			

Notes: Data from HILDA; suffix "\_part" indicates variables for wives; t-statistics in parentheses. Indicated levels of significance are \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

Table C.5.: Differences in Labour Supply Elasticities for Augmented Model

	men				women			
	wageelas		pincelas		wageelas		pincelas	
autonomy	-0.0357*	(-2.23)	0.171***	(3.63)	-0.0248	(-1.95)	0.0989***	(3.40)
workload	-0.0356*	(-2.17)	0.190***	(3.89)	-0.0336**	(-2.60)	0.169***	(4.42)
security	-0.0279**	(-2.75)	0.119***	(3.30)	-0.0518***	(-3.90)	0.264***	(5.33)
varied	-0.0296*	(-1.96)	0.151***	(3.48)	-0.0287*	(-2.06)	0.102**	(3.10)
N	28215							
N_clust	1881							
Rep	200							

Notes: Data from HILDA; t-statistics, based on  $\widehat{se}_{Boot}(\hat{\epsilon}_{JC=1} - \hat{\epsilon}_{JC=0})$ , in parentheses. Indicated levels of significance are \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

## Erklärung

Ich versichere, dass ich diese Dissertation selbständig verfasst habe. Bei der Erstellung der Arbeit habe ich mich ausschließlich der angegebenen Hilfsmittel bedient. Die Dissertation ist nicht bereits Gegenstand eines erfolgreich abgeschlossenen Promotions- oder Prüfungsverfahrens gewesen.

Dortmund, den 5. September 2013

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