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Temporal well-being:

A central dimension of sustainable lifestyles?

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ABSTRACT

In this paper the concept of temporal well-being is developed, as well as related to ecological sustainability. Temporal well-being is, contrary to objective measures as quantity of leisure time, a subjective concept aiming to catch the role time plays in people's lives. We argue for the existence of at least two distinct dimensions of temporal well-being. One is time pressure and the other is a concept we call time use satisfaction which has to do with the individual's subjective valuation of how ones time is actually used.

In the second part of the paper we analyze the links between temporal well-being and ecologically sustainable lifestyles. Simple bivariate analyses illustrate that short work hours and commuting time can have positive consequences for both temporal well-being and greenhouse gas emissions.

INTRODUCTION

Time has become an increasingly important concern in people's everyday lives. This is indicated by the emergence of negative expressions like time pressure and time squeeze as well as positive expressions like work-life balance and time wealth. Leisure time is pinpointed as a central dimension of quality of life by Joseph Stiglitz och Amartya Sen in the French *Commission on the Measurement of Economic Performance and Social Progress* (2009).

But the commission also acknowledged a number of problems with using quantity of leisure time as a measure. One problem is that individual preferences vary; some find it more attractive to work than to have leisure time. Another problem is the difficulty in categorizing which non-work activities that should be classified as leisure. An example of this problem is that socializing is classified as leisure time in time use studies but imposed dinners with relatives are unbearable for some. Another example is that taking care of one's children usually is not classified as leisure time (instead as unpaid work), but for some it is the most highly valued activity of all.

Objective time measures have the inherent attribute that it is someone else who defines what is desirable. Well-being researchers often claim that objective dimensions cannot capture

individuals' actual quality of life since people have different experiences and expectations (e.g. Diener et al. 1999). In this paper, we will instead develop and explore the subjective concept temporal well-being[1].

We will also make some initial attempts to analyze the links between temporal well-being and ecologically sustainable lifestyles. This relates to the emerging discussion on the need to identify more attractive pathways towards low-carbon futures by including broader issues of societal goals such as quality of life. One study identified lifestyles that are combining high well-being with low ecological impact - a double dividend (Brown & Kasser 2005). Both the British and the Swedish EPAs have commissioned reports on how this type of research could benefit policymaking (Marks et al. 2006, Holmberg et al. 2012). These reports highlight some areas of particular interest, including shorter work hours and planning for reduced commuting. To our knowledge there are no previous research that are analyzing time use patterns in relation to temporal well-being and greenhouse gas emissions in an integrated manner. If there is time-use patterns which combine goals of temporal well-being and reductions of greenhouse gas emissions this could yield support for new policies.

The aim with this paper is to explore the concept of temporal well-being as well as to relate it to ecological sustainability. The following research questions are addressed:

1. What is temporal well-being?
2. What characterizes individuals with high temporal well-being?
3. Are there time use patterns which combine high temporal well-being with low greenhouse gas emissions?

The empirical part of the paper employs a new dataset, which was designed to facilitate analyses of the links between well-being and greenhouse gas emissions from consumption patterns. Over 1000 respondents in Western Sweden have answered the postal survey (response rate 40 %). In this study a subset of 763 respondents who are carrying out paid work is selected. The households' greenhouse gas emissions are measured comprehensively using a combination of register-based data (kilometres driven and fuel efficiency of cars, delivered electricity and fuels for heating) and self-reported estimates (food habits, air travel, and other consumption). For details see Nässén et al (2013). The time related variables are described where they are introduced later in the paper.

CONCEPTS OF TEMPORAL WELL-BEING

There are many theories of what lies behind people's experiences of time squeeze , e.g. that it is due to a more demanding working life (Hochschild 1997), increasing wealth (Burenstam Linder 1970), difficulties in co-ordination due to individualization (Southerton 2003) or accelerating mobility (Rosa 2003). But few have focused on how the consequences of time problems can be conceptualized and measured. Both objective and subjective ways to measure people's relationship to time are possible.

Most common in both time research and time statistics is to focus on the objective dimensions like the amount of leisure time and the related figure for the number of work hours (Robinson &

[1] The expression Temporal well-being has previously been used in a theological context, e.g. with the expression "spiritual and temporal well-being". In that context temporal is synonymous with worldly or secular.

Godbey 1997, Gershuny 2000). Another objective measure is how much of one's time that is left after spending a minimal amount of time for paid work. This so called *discretionary time* has been calculated by relating the individual's hourly wage to necessary living costs in the society where the individual is living (Goodin et al. 2004, Eriksson et al. 2007).

Undoubtedly access to leisure time is a possible, and perhaps also a very important, temporal dimension of life. But, as mentioned in the introduction, all objective dimensions have their shortcomings. It can be claimed that they should be treated as instrumental, rather than final, values. It can be added that objective dimensions also have a tendency to be politically colored.

Despite these drawbacks with objective measures they supply relevant information regarding temporal welfare. We believe, however, that they should be complemented with measures of subjective dimensions of temporal well-being. So far there has been relatively little focus on how subjective temporal dimensions can be measured. However, there have been some indexes for temporal experiences developed in quantitative studies (Robinson & Godbey 1997, Garhammer 2002). An analysis of these indexes show that they involve at least two different types of time experiences, one typically revolves around feeling rushed, the other has to do with how one's time is spent, e.g. whether one gets enough time for sleep or friends. Below we define two[2] central dimensions of subjective temporal well-being: *Time pressure* and what we call *Time use satisfaction*.

Time Pressure

We define Time pressure as the feeling of discomfort due to problems in managing everything one has to do. This is similar to the definition used by Gunthorpe and Lyons (2004) but it adds that *feelings of discomfort* have to be involved. To have a lot to do in itself, without negative feelings, is subsequently not time pressure according to our definition. This is in line with Southerton (2003) who uses the expression "harriedness", the experience of being chased, as the essence of time pressure. Time pressure relates to the concept of stress in the way that it is one of many contributing factors; other examples are relational or economic problems. Our definition, which highlights the existence of negative feelings, does not rule out that one can have positive feelings simultaneously. Examples of this are the relief it can give to get things done, and that a high tempo can give acknowledgement and status (Robinson & Godbey 1997, Enokson 2005).

Another part of our definition of Time pressure is that it follows from problems of managing everything one *has to do*. Naturally what one thinks one has to do is extremely subjective and varies tremendously between different individuals: e.g. regarding how much time one needs to spend for cleaning the house, or for doing paid work in order to achieve the expected consumption level. But it is this subjective judgment of what has to be done that contributes to time pressure.

Time Use Satisfaction

This dimension of temporal well-being focuses on the individual's subjective valuation of how ones time is actually used. One part of this is how the work/life balance is perceived. But there are also many other time use issues that the individual can be more or less satisfied with, e.g.

[2] There are also other possible dimensions of subjective temporal welfare. One example is linked to the concept of mindfulness which relates to being mentally focused on the present instead of on the past or the future.

regarding the balance between housework and leisure time. A high time use satisfaction also covers having what one finds as reasonable amount of time for things that are considered important, e.g. family, friends, exercise, sleep, meals, hobbies or volunteering. Accordingly a high time use satisfaction means that not too much time is spent on non-prioritized activities.

There is no word for this dimension of subjective temporal well-being and therefore we introduce a new concept: Time use satisfaction. We define it as the degree of satisfaction with how ones time is actually spent. The highest level of Time use satisfaction is when one does not wish to do any changes of how one's time is divided between different types of activities. A low degree of Time use satisfaction means that one very seldom uses time for what one really prioritizes[3].

Preferences for time use are naturally subjective and vary between individuals but also for the same individuals relating to e.g. life phase. One possible basis for such preferences is to use as much time as possible for activities that are linked to positive feelings. A large study found that exercise and conversations on average are linked to the most positive feelings and that working and commuting are associated with more negative feelings (Killingsworth & Gilbert 2010). Naturally there are many other bases for valuing ones time use, possible examples are the wish to spend time for granting economic security, enhancing social position, improving society or devoting oneself to God.

EMPIRICAL ANALYSIS OF SUBJECTIVE TEMPORAL WELL-BEING

In this paper, subjective temporal well-being is analyzed empirically based on questions in the survey. The degree of Time pressure is based on both the frequency and the intensity of the feeling of discomfort. A time pressure index has been developed by adding the respondents' answers on these two questions:

- *How often do you experience discomfort due to managing everything that has to be done?* (Seven-point Likert-scale ranging from "Never" to "Always".)
- *How strong are these feelings of discomfort?* (Seven-point Likert-scale ranging from "Barely noticeable" to " Unbearable".)

The Time use satisfaction is based on one single question:

- *If you think of how your time is divided between e.g. paid work, housework, commuting, sleep, meals, exercise, socializing with family/friends and other leisure time. How satisfied are you then with the actual distribution of your time during a typical week?* (Seven-point Likert-scale ranging from "Very dissatisfied" to "Completely satisfied".)

Table 1 provides a correlation matrix where these two dimensions of temporal well-being are related to the two dimensions of overall subjective well-being, i.e. life satisfaction[4] and affective well-being[5] (sometimes referred to as happiness).

[3] The concept Time use satisfaction doesn't aim to cover discontent with the impossibility of spending more time on many activities without cutting back on others. This instead relates to problems with accepting the increasing discrepancy between the 24 hour day and the amount of possible and affordable activities.

[4] Life satisfaction was measured with the question "how satisfied are you on the whole with the life you live?" where the outer alternatives were "not at all satisfied" and "very satisfied" respectively.

Table 1: Correlation matrix for temporal well-being and overall subjective well-being

	Time Pressure	Time Use Satisfaction	Life satisfaction	Affective well-being
Time Pressure	1			
Time Use Satisfaction	-0.43**	1		
Life satisfaction	-0.25**	0.39**	1	
Affective well-being	0.26**	0.33**	0.75**	1

Correlations (Pearson r) are significant. **p<0.01 (2-tailed)

If the questions behind Time use satisfaction and Time pressure would have measured the same underlying phenomena the correlation would have been close to one. The correlation is far from that (-0.43) which shows that these are two distinctly separate dimensions.

It is also worth noting that Time use satisfaction is more strongly correlated than Time pressure with both life satisfaction and affective well-being. Time use satisfaction appears to be a central dimension of overall well-being, while Time pressure is a more isolated phenomenon.

Besides analyzing the two different temporal dimensions separately we argue that it is also reasonable to use a Temporal well-being index. This can be constructed by adding the answers from Time use satisfaction and Time pressure index which give both dimensions equal weight. Even if they are two different dimensions we believe that it makes sense to combine them. The reason behind this is that it is unreasonable that a temporal situation with low time pressure, but with dissatisfaction with how ones time is used, should be defined as a situation with a high overall temporal well-being. The same applies for a situation with a high time use satisfaction, but with major problems with time pressure.

PREVALENCE OF DIFFERENT TEMPORAL WELL-BEING POSITIONS

The two dimensions of temporal well-being give four possible temporal well-being positions. This is analyzed empirically by splitting the respondents in two groups with equal size (based on mean answer) both regarding time pressure and time use satisfaction[6]. Figure 1 shows mean numbers and distribution between the positions.

[5] The affective well-being was measured by asking how he/she "feels in general" on a seven-point Likert scale where 1 means "sad" and 7 means "happy".

[6] Due to the scale used the groups could not be divided in two with the exact same size. The N for each position in figure 1 has been adjusted so that the low and the high have equal size.

Figure 1: Four different temporal well-being positions

Time Pressure	Low	**1** Time pressure: 3.1 Time use satisfaction: 3.9 N = 134	**2** **Highest temporal well-being** Time pressure: 2.5 Time use satisfaction: 8.0 N = 246
	High	**3** **Lowest temporal well-being** Time pressure: 6.6 Time use satisfaction: 3.4 N = 246	4 Time pressure: 6.1 Time use satisfaction: 7.5 N = 135
		Low	High
		Time Use Satisfaction	

The way that the mean figures for time pressure and time use satisfaction varies is a result from the construction of the groups. But it is empirically interesting to note that the experience of time pressure and time use satisfaction varies to such a large extent. The means are about twice in the "high" positions compared to the "low" positions.

It is also interesting that all four groups do exist empirically. They are all fairly common among the respondents. The two positions with the highest and the lowest temporal well-being are the most common positions. Even if time pressure and time use satisfaction capture different dimensions they are still correlated (see table 1). If a person experiences high time pressure a dissatisfaction with how his or her actual time-use is more likely. One explanation for this can be that a person with problems managing everything that has to be done often find that this squeeze out highly valued activities, and vice versa, for a person who doesn't have problems with time pressure it is easier to spend time in accordance with the preferences.

However the other two positions are also empirically prevalent. Respondents in position 1 have low time pressure but they don't manage to use their time as they wish to do. There are countless reasons for this, e.g. a lack of energy, money, friends or lacking health. Respondents in position 4 are time pressured but at the same time they are satisfied with how they use their time.

TIME USE, TEMPORAL WELL-BEING AND GREENHOUSE GAS EMISSIONS

In this section we will analyze the links between temporal well-being and ecologically sustainable lifestyles. There are time use patterns where this does not go hand in hand, e.g. holidays that involve long-distance flights might be associated with high temporal well-being but they also cause high greenhouse gas emissions. We want to analyze if there are time use patterns which combine high temporal well-being with low greenhouse gas emissions. Brown & Kasser (2005) found that their ideologically oriented respondents (voluntary simplifiers) had lower ecological footprint as well as higher subjective well-being. But their research did not specifically explore time use patterns. In order for us to do that we must first identify which types of time use that could have the double dividend of high temporal well-being and low greenhouse gas emissions. In Holmberg et al (2012) we identified that commuting and paid work may be two types of time use with this potential.

Commuting, which often is made by car, is a type of activity which is associated with high emissions. In a previous study we analyzed energy use per hour for different activities and found that car driving was the single most energy demanding type of time use (Nässén et al. 2009).

Long commuting time is also usually negative from a well-being perspective. It has been shown to correlate with higher time pressure in everyday life (Larsson 2007) and very long commuting times has even been shown to cause health problems (Hansson 2011). According to a study by Stutzer & Frey (2008), the benefit that long commuting times deliver, such as better housing, more profitable work etc., are not sufficient to reduce the negative effect that long commuting times have on life satisfaction. The study shows that total life satisfaction becomes significantly lower for every additional ten minutes that a person commutes.

The basis for a link between work hours and greenhouse gas emissions is that work generates income which is used for consumption. We have previously done a micro level study of this, using Swedish data, and found that a decrease in work time by 1 percent reduced GHG emissions by about 0.8 percent (Nässén et al. 2009). This result is in line with macro level analysis. Schor (2005) conducted an analysis, using data from 18 OECD-countries, linking national ecological footprints and average hours per employee, and found a significant positive correlation. A more detailed cross-national analysis by Hayden and Shandra (2009) also provides statistical support for a strong link between work hours and environmental impact. In the same vein, economists Rosnick and Weisbrot (2007) compared work time and energy use in 48 countries. Their results indicate that if European nations would adopt the longer American work hours, then energy demand would increase by at least 15 percent.

Research indicates that a reduction in work hours is associated with higher temporal well-being. Studies show that a shorter work-week is linked with lower levels of time pressure (Lippe 2007, Larsson 2012), which in turn, is closely correlated with a higher overall subjective well-being (Kasser & Sheldon 2009). Shorter work hours also make more time available for socializing, exercise and volunteer work - activities that have shown to be more important for subjective well-being than a high level of material consumption (Layard 2005). A Swedish experiment where 400 employees reduced their work time to six hours per day, over 18 months, showed positive effects on life satisfaction and self-reported health (Bildt 2007).

Besides spending less time for commuting and paid work there are also other time use patterns with the potential to combine a high temporal well-being with low greenhouse gas emissions. Activities which do not involve transportation are generally associated with lower environmental load per hour (Druckman et al. 2012). Combining this with well-being levels during different activities (Krueger et al. 2009, Killingsworth & Gilbert 2010) give that for example the following activities have a possible double dividend: socializing, walking/running, reading, eating, meditating/praying and relaxing. However, in this study we do not have data to analyze these activities.

Time for commuting and paid work are analyzed based on questionnaire items on the number of weekly work hours and the number of minutes spent on commuting. In this paper these variables are analyzed using only bivariate analysis in order to make a first brief exploration of correlations with time pressure, time use satisfaction and greenhouse gas emissions.

For individuals living together with a partner this might blur the consequences of work hours and commuting time, e.g. a person's consumption level is usually higher if one has a partner with high income. In order to isolate these "partner-effects" the analysis is also done for the subsample of the individuals living as single adults in the household.

Table 3: Bivariate correlations (Pearson r) between time use, temporal well-being and GHG-emissions

	Time pressure		Time use satisfaction		GHG-emissions	
	Full sample	Singles	Full sample	Singles	Full sample	Singles
Work hours	0.12**	0.20**	- 0.10**	- 0.15*	0.16**	0.29**
Commuting time	0.04	0.18*	- 0.08*	- 0.16*	0.15**	0.16*

+=p<0.1; *= p<0.05; **= p<0.01; ***= p<0.001

N: Full sample > 739, Singles > 167

The results illustrate that the shorter work hours and commuting time are associated with both lower time pressure and higher time use satisfaction[7]. Long hours of paid work and commuting also give less time for managing everything that has to be done (causing time pressure) and less time for highly valued activities (causing lower time use satisfaction). This result is in line with previous research which have shown that both paid work and commuting are linked with low level of emotional well-being during these activities (Krueger et al. 2009, Killingsworth & Gilbert 2010).

As expected the correlations are higher for singles. We interpret these as the more "pure" effect of working hours. The results for married/cohabitating are blurred by the fact that a person with short work hours (typically a woman) often has a partner with long work hours (typically a man). This partly neutralizes the positive temporal well-being effect of having short work hours. This is in line with research showing that the partners work hours affects one's own level of time pressure (Larsson 2007).

Shorter work hours and commuting time are also associated with lower greenhouse gas emissions. This is also in line with the expected results. The isolated effect on greenhouse gas emissions from varying number of work hours and commuting time are also best shown through the results for the singles.

In order to illustrate the results, groups of individuals in the sample have been created. The correlation between work hours and GHG-emissions is stronger than between commuting time and GHG-emissions therefore we only illustrate the results related to work hours. The analysis is made by creating three categories for weekly work hours:

- around 30 hours (span between 1 – 38 hours with a mean of 30.4)
- around 40 hours (span between 39 – 41 hours with a mean of 40.0)
- around 50 hours (span between 42 - 95 hours with a mean of 49.4).

[7] However, the correlation between commuting time and time pressure is only significant for the singles, and not for the full sample. No explanation for this has been identified.

These work hours categories are not only related to GHG-emission and temporal well-being but also to other possible consequences. One type of consequence is how often the respondent is exercising and spending time with friends[8]. The variable total net income refers to household income after taxes and financial satisfaction illustrates to which extent the individual finds the income to be sufficient[9].

The averages for middle group, working the standard work week of 40 hours, have been standardized to 100%, in order to illustrate how the other two groups diverge.

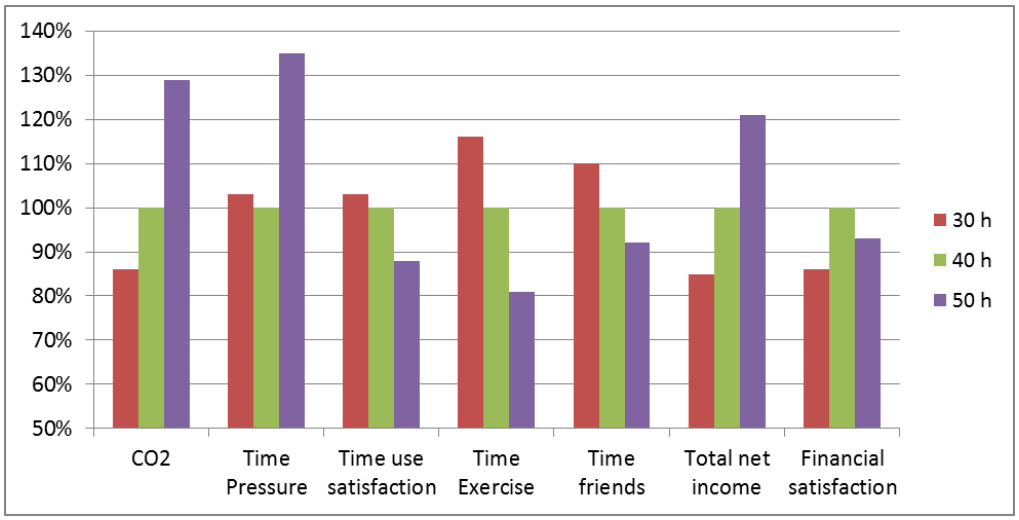

Figure 3: Singles sample - data on individuals based on work hours
N= 49 for working 30 hours, 86 for working 40 hours, 37 for working 50 hours.

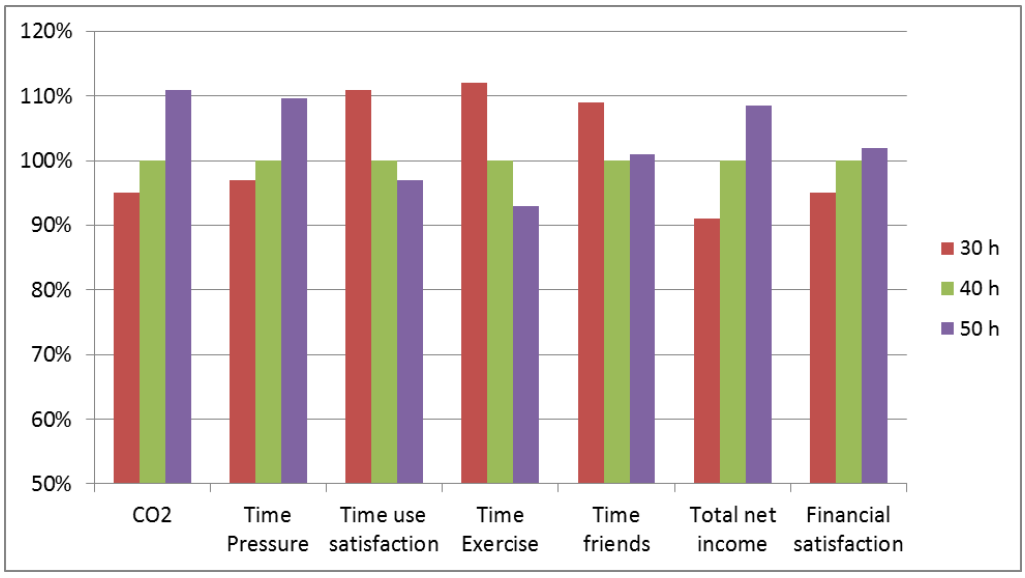

Figure 4: Full sample - data on individuals based on working hours
N= 200 for working 30 hours, 348 for working 40 hours, 219 for working 50 hours.

[8] Both of these variables were measured by a question with 8 alternative answers, ranging from never to every day.
[9] Seven alternative answers ranging from "it is very hard to get by on the income" to "the income is perfectly adequate".

The group of singles working 30 hours has about 34 percent lower GHG-emissions compared to those working 50 hours. 30 hours is 40 percent less than 50 hours. This means on average that 1 percent shorter working time equals 0.85 percent lower greenhouse gas emissions. This is well in line with our more theoretical study of this which gave the result that one percent shorter working time led to around 0.8 percent less greenhouse gas emissions (Nässén et al. 2009).

Those working 30-40 hours have lower time pressure and higher time use satisfaction than those working around 50 hours a week. The results regarding time for exercise and time with friends are very clear cut. Those working 30 hours spends substantially more time for exercise and friends that those with longer working time.

The price for the short work hours is a substantially lower income. This is probably also the main reason for the lower GHG-emissions. From a general well-being point of view the absolute level of income is of less importance than relative income as well as how satisfied one is with one's financial situation (Diener et al. 2010).

CONCLUSION AND DISCUSSION

We claim that time pressure and time use satisfaction are two important dimensions of temporal well-being. These dimensions refer to two distinct temporal phenomena and can be used as separate measures. But we also argue that for a person to experience temporal well-being, time should be spent in a way that benefits both a low level of time pressure and a high level of time satisfaction. Hence, there is reason to create a combined index of temporal well-being. The empirical analysis of temporal well-being in this paper indicates that it is a useful concept for catching the role time plays in people's lives.

The second part of the analysis illustrates that short work hours and commuting time can have positive consequences for both temporal well-being and greenhouse gas emissions. This explorative paper only gives some tentative results which have to be tested using multivariate analyses as well as using other datasets and other contexts.

If the results hold they could form a basis for policies that support both higher well-being and lower greenhouse gas emissions. Other researchers, e.g. economist Richard Layard (2005) have argued for higher marginal taxes on work since people, from a well-being perspective, make irrational choices between work and leisure. In this paper his conclusion is reinforced with both well-being and ecological arguments. In the same vein our results regarding commuting question existing policies that encourage long distance commuting in order to enlarge labor markets. Instead higher commuting cost, e.g. through fuel taxes, could be considered. However, in order to identify the well-being effects of these types of policies for the whole population they need to be analyzed from a macro perspective as well as analyzed in relation to other goals, e.g. regarding low unemployment.

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