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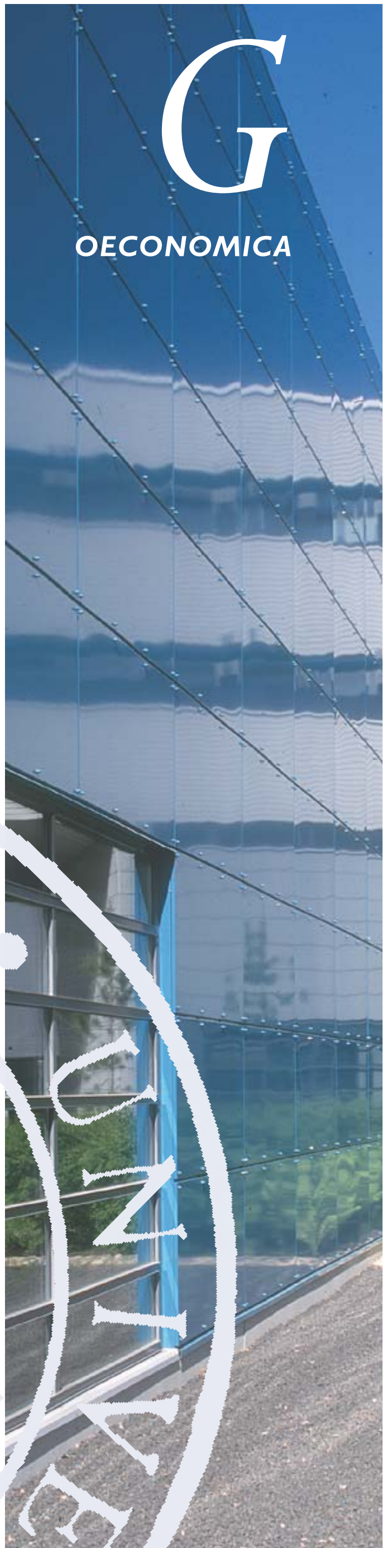

Sanna Huikari

EMPIRICAL STUDIES ON ECONOMICS OF SUICIDES AND DIVORCES

UNIVERSITY OF OULU GRADUATE SCHOOL;
UNIVERSITY OF OULU,
OULU BUSINESS SCHOOL,
DEPARTMENT OF ECONOMICS, ACCOUNTING AND FINANCE

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SANNA HUIKARI

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Abstract

This thesis includes three separate empirical studies on economic demography and health economics. The first study explores the effect of alcohol consumption on divorce across 23 OECD countries during the period 1960–2010. We find strong evidence that alcohol consumption is a major socioeconomic factor which influences divorces in these countries. We find robust evidence on the relationship between alcohol consumption and divorce rates both in the short and long run. In addition, using worldwide survey data on values we explore whether the change in values with respect to marriage, and moral values can explain our findings. It is noteworthy, that alcohol consumption has a significant effect on divorces even after controlling for moral values.

The second and third studies concentrate on the economics of suicide. In the second study, we explore the effects of unemployment on the well-being of the regional population with disaggregated suicide data across gender and age in Finland during 1991–2011. Our findings suggest that the increased job insecurity is associated with higher number of suicides than what is expected in good economic times. The effect is significant especially for the prime working-age (35–64 years old) male suicides. The second main contribution of this study is to relate the concept of social norm to unemployment. We show that in high unemployment areas the association between job loss and suicide mortality is not as severe as in low unemployment areas. An implication is that the burden of unemployment is reduced when it becomes socially more common and acceptable.

The goal of the third study is to provide evidence on the effects of economic crises on suicides in 21 OECD countries over the period between 1970 and 2011. In conclusion, this study shows that over 60 000 suicides are attributable to the economic/financial crises since 1970. Two main findings emerged from the data. First, the impact of the most recent global financial crisis (2008) on suicides was not particularly stronger than that of the previous major economic/financial crises. Second, stock market crashes and banking crises are the most severe economic crises in terms of excess suicides when calculated on population-level data.

Keywords: alcohol consumption, divorce, economic crises, Finland, OECD countries, social norm, suicide, unemployment, well-being

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Tiivistelmä

Tämä väitöskirja koostuu kolmesta empiirisestä tutkimuksesta. Tutkimukset keskittyvät väestötason kysymyksiin avioerojen määrään vaikuttavien sosioekonomisten tekijöiden, sekä makrotaloudellisten tekijöiden ja itsemurhien välisen yhteyden näkökulmasta. Ensimmäisessä tutkimuksessa tarkastellaan alkoholin kulutuksen vaikutusta avioerojen määrään 23 OECD-maassa vuosina 1960–2010. Tutkimuksessa havaitaan alkoholin kulutuksen olevan yksi merkittävimmistä avioeroihin vaikuttavista sosioekonomisista tekijöistä sekä lyhyellä että pitkällä aikavälillä tarkasteltuna. Tutkimuksen mukaan alkoholin kulutuksella näyttäisi olevan vaikutusta avioerojen lukumäärään myös silloin, kun moraaliarvoissa tapahtuneet muutokset on huomioitu.

Toinen ja kolmas tutkimus keskittyvät itsemurhien taloustieteeseen. Toisessa tutkimuksessa tarkastellaan työttömyyden vaikutuksia hyvinvointiin. Aineistona käytetään maakuntatason sukupuoli- ja ikäryhmäjaoteltua aineistoa itsemurhakuolleisuudesta Suomessa vuosina 1991–2011. Tutkimuksen mukaan kasvava epävarmuus työpaikan pysyvyydestä voi johtaa korkeampiin itsemurhalukuihin kuin mitä olisi odotettavissa parempina taloudellisina aikoina. Tämä tulos näyttäytyy erityisesti työikäisten miesten keskuudessa. Toinen tutkimuksen päätuloksista liittyy sosiaalisten normien näkymiseen siinä, miten työttömyys vaikuttaa itsemurhakuolleisuuteen. Tulokset osoittavat, että korkeamman työttömyyden alueilla työn menettämisen ja itsemurhakuolleisuuden välinen yhteys ei ole niin voimakas kuin matalamman työttömyyden alueilla. Sosiaalisten normien vaikutus näyttäisi suojaavan ihmisiä itsemurhakuolleisuudelta niissä tapauksissa, jolloin työttömyys on yleisempää.

Kolmas tutkimus tarjoaa tietoa talouskriisien vaikutuksista itsemurhiin 21 OECD-maassa vuosina 1970–2011. Tutkimuksen mukaan yli 60 tuhannen itsemurhan voidaan katsoa olevan yhteydessä talouskriiseihin vuodesta 1970 lähtien. Löydökset osoittavat, etteivät viimeisimmän globaalin finassikriisin vaikutukset itsemurhakuolleisuuteen poikenneet merkittävästi aikaisempiin laajoihin kriiseihin verrattuna. Lisäksi pankki- ja osakemarkkinakriiseillä näyttäisi olevan muita talouskriisejä vakavammat vaikutukset itsemurhakuolleisuuteen väestötasolla tarkasteltuna.

Asiasanat: alkoholin kulutus, avioero, itsemurha, OECD-maat, sosiaalinen normi, Suomi, talouskriisit, työttömyys

To the memory of my grandmother Helvi and big sister Miia

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The third [lecture] was by far the finest, a great and unforgettable experience. I understood nothing and the rabbi didn't understand much either. -Niels Bohr-

The fact that I sit here at this very moment, living the life that I have, having completed doctoral studies in economics, and the manuscript of this thesis in my hands, is the result of a process during which I have become indebted to numerous people. Although probably none of the debts can in no way be paid back, what follows, is my humble acknowledgement of my debts to those people.

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The apples of my eye, Onni and Helmi, thank you for teaching me at daily basis tremendously much about you, about me, and especially about life itself. And you my beloved husband Juha, thank you, for dancing with me to the end of love in the rhythm of "Vana Jõgi". I know that I would miss you even if I had never met you.

Only gods on mount Olympus know what I'd be without you all.

Oulu, July 2018 Sanna Huikari

Original studies

This thesis is based on the following publications, which are referred throughout the text by their Roman numerals:

I Huikari, S., Korhonen, M., & Puhakka, M. (2016). ‘Til booze do us part: Alcohol consumption and marital dissolution. *Empirical Economics, 51*(2), 831-852.

II Huikari, S., & Korhonen, M. (2016). The impact of unemployment on well-being: Evidence from the regional level suicide data in Finland. *Social Indicators Research, 128*(3), 1103-1119.

III Huikari, S., Miettunen, J., & Korhonen, M. (2018). Economic crises and suicides between 1970 and 2011: Time trend study in 21 developed countries. Manuscript.

Contents

1 Introduction

1.1 Background

Economists, mainly following the lead of the Nobel Prize laureate in Economics, Gary S. Becker (1930–2014), started to apply their tools and methods to study such phenomena as crime, social interactions, family, and other related topics beginning in the 1960s. Becker pioneered the use of economic models to study social issues not typically analyzed in economics. He expanded the boundaries of economic inquiry to many other aspects of human behavior, and demonstrated how economics could inform other disciplines such as sociology and psychology.

For Becker the economic approach is an extremely robust and multi-dimensional method of analysis. His view was that economics has something insightful to say about many types of human activity. According to Becker (1993, p. 386), "The analysis assumes that individuals maximize welfare as they conceive it, whether they be selfish, altruistic, loyal, spiteful, or masochistic." In addition, Becker stated that individuals behave in a forward-looking manner, and that behavior is assumed consistent over time. Under uncertainty, people try as best as they can to foresee outcomes of their actions.

In an interview by Bowmaker (2005, pp. xvii–xix), Becker talks about the common belief that economics is a cold discipline. According to Becker, people sometimes wonder how he can scientifically analyze emotionally charged issues like marriage, divorce, or crime and punishment with cold calculus. Becker explains that instead of cold calculus, economics offers a theoretical way to look at people's behavior, which has a lot of common sense to it. In his book, *Economic Approach to Human Behavior* (1976, p. 163), Becker states, "Everyone more or less agrees that rational behavior simply implies consistent maximization of a well-ordered function such as utility or profit function." According to him, when one restates, for example, the assumption of rationality by saying that people want to do as best as they can, one finds that many people begin to agree saying, 'that's kind of obvious'.

Using the tools of economics to understand human behavior assumes that individuals act to achieve their objectives. By applying an economic approach to understand behavior we may make better sense of the world around us. The tools of economics provide one way of attempting to understand human behavior and to test that understanding against the observed facts. Economics is also used to figure out what people ought to do. Economics is used to help decide what laws should be passed, what policies governments should implement, or how to allocate public funds in effective ways (Friedman, 2005, pp. 1–3).

1.2 Objectives of the thesis

This thesis includes three separate empirical studies that contribute to the literature on "family economics" and "the economics of suicides". Despite the studies being self-contained and thematically somewhat diverse, they are all empirical analyses concentrating on economic demography and health economics. Building on the legacy of Gary S. Becker's pioneering and path-breaking research, this thesis applies economic reasoning and analysis to the determinants of well-being and family life. The thesis seeks to find answers to questions which are both social and economics by nature. Socially complex 'unwanted' behavior, like committing suicide or getting a divorce, is considered undesirable from the view point of human or social perspective. In addition, the loss of life or a divorce always involves some economic cost.

What can an economic researcher's role be in helping to protect health or well-being in times of economic crisis, or to reduce the number of family breakups? She can promote an evidence-based approach to the relationships of economic conditions and public health, and determine socioeconomic factors affecting family decisions. This kind of analysis may lead to better understanding of why some people, households, communities, and societies are less resilient to external shocks as compared to others (Stuckler, Basu, & McKee, 2010).

In the first study of this thesis, the effect of alcohol consumption on divorce is explored by using the differenced fixed effect panel regression and panel vector error correction (PVECM) method across 23 OECD countries during the period 1960–2010. The study extends the previous literature in several ways. As far as we know, the effect of alcohol consumption on divorces across countries has not been previously explored. Performing the investigation in a many country context allows us to make more convincing conclusions about the factors affecting marital dissolution. Second, we use both short-run and long-run analyses to emphasize the relation between alcohol consumption and divorces. We find robust evidence on the relationship between alcohol consumption and divorce rates both in the short and long run.

The second and third studies concentrate on the economics of suicide. In the second study, we explore well-being effects of unemployment on regional population with disaggregated suicide data across gender and age in Finland during 1991–2011. We utilize the theory of "rational suicide" together with the theory of social norm of unemployment. We extend the literature which examines the effect of unemployment on well-being by exploring how expectations of future job loss might affect suicides. To the best of our knowledge, this is the first systematic analysis to study how a person's expectation to lose one's job affects suicides. The second main contribution of this study is to explore whether the association between unemployment and suicide is affected significantly by the social norm of unemployment.

The goal of the third paper is to provide evidence on the effects of economic crises on suicides in developed countries. We use data for 21 Organization for Economic Cooperation and Development (OECD) countries over the period between 1970 and 2011. The recent studies on the relation between economic downturns and suicides have almost completely concentrated on the most recent global financial crisis. We take a broader view by comparing severities of distinct economic crises on suicide mortality. We explore how the suicide rates have responded to different economic/financial crises in the developed countries in modern times. Secondly, the economic control variables and long time period in our analysis alleviate the confounding and time biases reported in the previous studies.

2 Economics of marriage and divorce

In the field of the economics of the family, Gary Becker (1974) extended the economic framework to consider topics such as marriage and divorce. Following Becker's seminal work, this section presents a basic model of relationship formation. The model describes how couples decide whether to enter into or leave a relationship, two actions which we refer to as getting married and divorcing. Whatever men or women decide regarding family life, they make their decisions attempting to raise their welfare by comparing benefits and costs (Becker, 1993). Persons marry if they expect to be better off than if they remained single. Accordingly, they divorce if they think that they will be better off than staying married.

Consider two persons, a and b, who face a decision of whether to marry or remain single. Marriage in this framework simply means that persons share the same household. Following Becker assume, that marriage occurs if, and only if, both individuals expect to be better off – that is, getting married is expected to increase their utility. In this framework, it is assumed that utility depends directly on the commodities produced by household. The commodities are produced partly with market goods and services and partly with the own time of separate household members.

According to Becker (1973, pp. 815–818), household-produced commodities cover a much broader range of human activities and aims, and cannot therefore be identified with consumption or output as usually measured. Those commodities may include the quality of meals, the quality and quantity of children, prestige, recreation, companionship, love, and health status. It is assumed that all commodities can be combined into a single aggregate denoted by Z.

Maximizing utility thus becomes equivalent to maximize the amount of Z that he or she receives. If Z_a and Z_b represent the maximum outputs of single persons a and b, and R_a and R_b their incomes when married, a necessary condition for a and b to marry is that $R_a \geq Z_a$ and $R_b \geq Z_b$. If the total income produced by the marriage, $R_a + R_b$, is identified with the output of the marriage, a necessary condition for marriage is then that $R_a + R_b \equiv Z \geq Z_a + Z_b$. In words, persons will get married if the total value to the couple of forming a relationship is greater than, or equal to, the total value to the couple of being single (Becker, 1973, pp. 815–818; Becker, 1981, p. 82).

Consider a married couple. According to the previous argument, for a couple to stay married, the total net value of the relationship has to be positive at least at the time when the decision to marry is made. If the total net value later on becomes negative, $R_a + R_b - Z_a + Z_b < 0$, then separation will make the spouses better off than staying married.

According to Friedberg and Stern (2005, p.158), several key aspects can be recognized in the transitions into and out of marriage. One such aspect is that understanding changes in relationships is important when considering divorces. If nothing changes in a marriage, then also the total net value would remain positive, and the couple stays together. Respectively, for the total net value of a relationship to become negative resulting in marital dissolution, something about the relationship must change.

In the Becker's framework of formation and dissolution of relationships (Becker, 1993), couples maximize their utility by comparing the benefits and costs of getting/staying married. Thus, the couple decides to marry when their expected utility exceeds the utility received when single. Analogously people divorce when the marital dissolution is expected to raise their welfare. Becker (1993) notes, that according to economic analysis of family decisions, wealthier couples are more likely to stay married than poorer couples, because they tend to have greater utility when remaining married. Many poorer couples tend not to gain that much from the relationship, and a poor spouse may well doubt whether it is worth staying in marriage. By the same line of thought, divorce might raise the welfare, if spouse's alcohol consumption has become a problem. That could be one possible explanation behind the long-run relationship of alcohol consumption and divorces, which is studied in the first study of this thesis.

3 Economics of suicide

Sociologist Emile Durkheim provided the first significant academic contribution to the theory of suicide in 1897. He defines the social implications of suicide through two dimensions: the need for integration into social groups and institutions, and the imbalance between means and needs. He identified four categories of suicide: anomic, fatalistic, egoistic, and altruistic. According to Durkheim, the core reason for any of these is that the individual is unable to integrate his or her own needs adequately with those of the society. What follows, is that people who do not feel they fit into society as 'normal' are at risk of suicide (Friedman, 2005, pp. 230–232).

Durkheim located four types of suicides within a grid of social regulation. Anomic suicide is the result of dramatic changes in society or in the personal situation of an individual. The strain of the situation may force an individual to commit suicide in a society where a degree of regulation or external constraint on individuals is too low. In contrast to anomic, fatalistic suicide may occur when regulation is too strong or individual feels that her/his future is somehow blocked. Egoistic suicide stems from the insufficient integration within society, resulting in a feeling of not belonging to any meaningful social group. According to Durkheim, individuals who are strongly integrated into some type of integrative group, e.g. family, or a religious group, are less likely to experience these feelings and commit suicide. Altruistic suicide results from too much integration and from the willingness to sacrifice self for the benefit of others. Generally, in some societies it is not unknown for older persons to take their own lives with the thought behind the drastic act that they will not want to become a burden to their relatives. This can thought to be an intergenerational transfer of utility. Despite the criticism for Durkheim's approach, his work was seminal in opening up the discussion about suicide as a subject for social scientific debate, instead of mainly moral and religious discussion of earlier times (Friedman, 2005, pp. 230–232).

Prior to twentieth century, economists had shown little interest in the subject. In 1759, Adam Smith discussed suicide in several pages in his book, *The Theory of Moral Sentiments*. This discussion was mainly on the matter of whether it was morally wrong to kill oneself (Friedman, 2005, pp. 230–232). A few years earlier, in 1755, David Hume in his essay "Of Suicide" discussed the same issues. Hume (1777, 1755) says:

> *That Suicide may often be consistent with interest and with our duty to ourselves, no one can question, who allows, that age, sickness, or misfortune may render life a burthen, and make it worse even than annihilation. I believe that no man ever threw away life, while it was worth keeping.*

In other words, Hume says that it is rational to kill yourself when life is no longer worth living. He viewed suicide as a perfectly reasonable act in bleak circumstances. Hume also mentions age and misfortune as possible causes of choosing to kill oneself, which are the main drivers of the decision in the modern economic theory of suicide, too.

Since Durkheim, in addition to a great deal of writing on the subject by philosophers, psychiatrists and sociologists, economists have been developing models of suicidal behavior. Arguably, the pioneering article in the field, "An Economic Theory of Suicide", is by Hamermesh and Soss in 1974. They build a model of utility maximization with a notion that suicide occurs when the discounted stream of expected utility over a person's lifetime is sufficiently low. It means that a person contemplating suicide weighs up rationally (although not necessarily consciously) if the discounted stream of expected utility she/he would derive from the rest of her/his life is enough to continue living.

So, as social scientists and economists why should we be interested in suicides and why try to fit suicides into an economic model in the first place? One interesting perspective can be derived from Martin Kusch's (1984, p. 72) arguments when he discusses the taboo surrounding suicides in society. According to Kusch, everyone who commits suicide radically challenges the quality and value of one's own society. By ending one's own life, an individual leaves his or her own society. With this action, the person indicates that even death is a better option than living in their society. Suicides therefore bring dishonor on the whole community, and societies may try to remove the shame either by keeping quiet about them or by considering people who commit suicide mentally ill. Examining suicides in the relation to economic conditions gives evidence on an individual's subjective perception of well-being during economic downturns and expansions. Suicide data provide an alternative measure of life-satisfaction, since they can be regarded as revealed choices made by individuals who have considered the value of continuing to live versus not (Daly, Wilson, & Johnson, 2013).

3.1 On the microeconomics of suicide

Hamermesh and Soss (1974) argue that although much of the variation in suicide rates can be explained by several sociological theories, several aspects of the problem, particularly variations in suicides by age and income, may well be rationalized by economic theory. They admit that some suicidal behavior cannot be attributed to economic factors at all. However, they contend, that economic decision making can not be ignored, suggesting that a part of the variation in suicide rates can be explained by using hypotheses derived from economic theory.

To support their contention, Hamermesh and Soss develop an economic model of suicidal behavior. The idea of their model is that the individual maximizes her/his total discounted lifetime utility. Utility is a function of consumption, which in turn is a function of age and income. Hamermesh and Soss further assume that the individual has a given discount rate, which is known over his or her lifetime. In order for suicide to make the individual better off, she/he must have reached the point where living any further brings about negative discounted utility.

Their model is the following. The discounted present value of average individual's expected lifetime utility, Z, at age a, is given by:

$$Z(a, YP) = \int_a^{\omega} e^{-r(m-a)} U[C(m, YP) - K(m)] P(m)\, d(m) \qquad (1)$$

where $U[\cdot]$ and $C(\cdot)$ are utility and consumption functions respectively, m is age, YP is permanent income, K describes the cost of each period of keeping oneself alive, ω denotes the maximum life expectancy, $P(m)$ is the probability of living at age m given survival to age a, and r is a given discount rate. Thus $U[\cdot]$, the utility of the average individual, is a function of consumption, which in turn depends upon age and income.

Within this framework, suicide can be regarded as a rather straightforward investment value decision. $Z(a, YP)$ represents the value of the life an individual may have left. It is assumed that an individual ends her/his life when the discounted stream of utility remaining to her/him falls below some critical threshold. The model predicts that suicide rate increases with age, and is inversely related to permanent income. Hamermesh and Soss (1974) test these two hypotheses with both cross section and time series data from the United States and other developed countries. They find evidence to support the predicted relation of suicide by age, and predictions of the model about both the response of suicide to increased income and the change in that response as income increases. In general, the results in subsequent empirical work has been similar (see e.g. Gunnell, Middleton, Whitley, Dorling, & Frankel, 2003; Neumayer, 2003; Daly & Wilson, 2006; Helliwell, 2007; Minoiu & Rodríguez, 2008).

Dixit and Pindyck (1994) extend this model. They (1994, pp. 24–25) argue that far from being an excessively rational model of an irrational action, the Hamermesh-Soss model is not rational enough, because it forgets the option value of staying alive. They argue, that under conditions of irreversibility and uncertainty, people thinking of committing suicide may have an option to see if situation will improve. Therefore Dixit and Pindyck (1994, pp. 24–25) suggest that the option value of waiting for a while should be very large. Applying the idea of Dixit and Pindyck, Cutler, Glaeser, and Norberg (2001) formulate utility to be maximized sequentially over time and add an option value from delaying suicide if times get better. They also point out that, in general, data do not support Hamermesh and Soss' result that suicides increase with age. Koo and Cox (2008) advance the basic Hamermesh-Soss model by including human capital as another primary determinant of expected utility. The relation between suicide rate and age can then be explained by the rate of depreciation of human capital, which differs across age groups.

In Durkheim's social framework of suicidal behavior, greater social integration and regulation results in lower suicide rates. In that framework, both economic booms and economic busts weaken social integration and regulation compared to the times of normal economic situation increasing the suicide rate, accordingly. In a departure from the Durkheimian model, Henry and Short's (1954) countercyclical theory is based on a frustration-aggression hypothesis. Henry and Short (1954) propose that during times of economic busts suicide rates tend to rise, whereas during economic booms they tend to decline. The theory is based on the frustration-aggression premise – the idea is that suicide results from individuals' frustration when they fail in their attempts to achieve their social goals. Ensuing aggressive feelings are then directed either at themselves (suicide) or at others (homicide). Concentrating most of their empirical work on the relation of suicide rates to business cycles, Henry and Short's (1954) theory implies a positive correlation between suicide rates and status. The idea is, that during business contractions, some high-status persons commit suicide due to their loss of relative status, whereas during business expansions persons of high economic status gain relative status lowering their probability of killing themselves (Lester, 2001).

Distinctly differing from Durkheim's and Henry and Short's predictions, Ginsberg's (1966, cited by Lester, 2001) procyclical theory of suicide implies that suicide rates are lower during economic contractions and higher in economic expansions. According to Ginsberg (1966, cited by Lester, 2001), suicides at the societal level are caused by discrepancy between aspirations and rewards. As the economy expands, the prosperous economic environment pushes aspirations up at a rate faster than the rewards. As a result, disparity, and therefore dissatisfaction, grows. This in turn triggers suicides. On the contrary, when the economy contracts, the disparity between aspirations and rewards shrinks, and thus fewer suicides occur. The three sociological theories of suicide and the business cycle: (a) Durkheim's U-shaped theory (b) Ginsberg's procyclical theory, and (c) Henry and Short's countercyclical theory are reformulated mathematically by Lester and Yang (1997) and Lester (2001). The relationship between business cycles and suicide are empirically tested in second and third study of this thesis.

3.2 Social norm, unemployment and suicide mortality

Adam Smith (1759, p. 173) wrote: "The great source of both the misery and disorders of human life, seems to arise from over-rating the difference between one permanent situation and another." If the present and future income seem to have a stable relationship with respect to what the previous trend suggests, the individual's well-being does not seem to change much. People evaluate their current economic situation with respect to their own in the past, and an individual's evaluation of her/his current economic situation is normally negatively affected by her/his own past economic situation (Baggio & Papyrakis, 2014). In addition to comparing present income level to the past level, people also compare their economic situation to that of others'. This social comparison is made with respect to one's peers, that is with respect to one's reference group. This idea extends from income comparison to evaluating one's employment situation. Whether you compare your income or your labor market situation to those of others', it is the relative status among your peers that matters. It may well be socially more acceptable, and therefore not so harmful, to lose a job or be constrained to lower consumption level and living standards when there is more unemployment around you.

The central idea of economic models of social norms is that individuals interact in other ways than via the price system or the exchange of information (Clark, 2003). In Akerlof (1980), norms are referred to as beliefs held by other members of the reference group. For example, for the unemployment norm, the reference group may well not be everyone, but rather those living in the same region. The social norm of unemployment implies that the possible negative effect of an individual's own unemployment will be reduced by a higher level of unemployment among her/his reference group. Literature on social norm effect of unemployment predicts that the effect is related to the labor market situation especially around the unemployed person.

Using the British Household Panel Survey (BHPS), Clark (2003) finds evidence that regional unemployment has a positive effect on unemployed men, which means that their well-being rises with the regional unemployment rate. Following the methods of Clark (2003) and using data for Germany, Clark, Knabe, and Rätzel (2009) examine how the subjective well-being of the employed and the unemployed is affected by regional unemployment rates. They find strong evidence for a social norm effect of unemployment in Germany. While employed men suffer from the unemployment of other men in their region, unemployed men are significantly less negatively affected. Similar results are found in other studies (see e.g., Clark, Knabe & Rätzel, 2010; Stutzer & Lalive, 2004). The second study of this thesis provides evidence of the social norm of unemployment in Finland.

3.3 Economic crises and suicides

Economic crises can affect well-being in many ways. They can often cause sudden changes in individuals' economic environments resulting in unexpected changes in life, which in turn are strongly linked to depression, anxiety disorders and suicides (Yang and Lester 1995). Therefore, periods of "economic stress or hardship" might lead to increases in the incidence of suicides (Korhonen, Puhakka, & Viren, 2016).

Especially after the global economic crisis in 2008–2010, there was wide spread concern that there might be more suicides in countries strongly affected by the global economic crisis. Chang, Stuckler, Yip, & Gunnell (2013) present evidence that economic downturns, and associated rises in unemployment, are followed by increases in suicide. There has been an ongoing debate on whether health, in general, is pro- or counter-cyclical (Ruhm, 2000, 2015; Economou, Nikolaou, & Theodossiou, 2008; Gerdtham & Ruhm, 2006). Employing aggregate time series data, studies confirm the procyclicality of total mortality for many countries and different time periods (Ruhm, 2000; Neumayer, 2004; Tapia Granados 2005; Gerdtham & Ruhm, 2006; Ariizumi & Schirle, 2012).

Using 1970–2010 U.S. data, Ruhm (2015) provids evidence that procyclicality of total mortality has diminished markedly over time. Unlike other causes of death, suicide mortality is generally reported to be countercyclical or neutral (Chang, Gunnell, Sterne, Lu, & Cheng, 2009; Stuckler, Basu, Suhrcke, Coutts, & McKee, 2009; Gunnell & Chang, 2016; Chang, et al., 2013). The effects vary from country to country, depending on, for example, variations in austerity measures, and the severity and duration of the crises (Stuckler et al., 2009; Stuckler & Basu, 2013). However, what lacks evidence is the relative importance of the different aspects of economic downturns that cause misery, and whether there is difference between various groups of people in how they are affected by recessions.

Unemployment rates are the most common proxy for macroeconomic conditions when effects of economic crises on total and cause-specific mortality are studied. The negative association between unemployment and suicides has been found by several scholars, including Nordt, Warnke, Seifritz, and Kawohl (2015), Blakely, Collings, and Atkinson (2003), Paul and Moser (2009), and Platt and Hawton (2000). Recessions are obviously accompanied by increases in unemployment. According to Barr, Taylor-Robinson, Scott-Samuel, McKee, and Stuckler (2012) and Chang et al. (2009) rises in unemployment, however, account for less than half of the impact of recession on suicides. Thus, it is likely that there are also other factors impacting the rate of suicide, possibly, but not limited to, increased mental illness, self-harm, or alcohol abuse. In addition to unemployment as a key risk factor for suicide, Gunnell and Chang (2016) list other stressors that are likely consequences of economic recession. Their list includes factors such as increases in debt as individuals have less money to cover household expenses, increasing difficulties in keeping up with mortgage repayments, cuts in government spending and other austerity measures, and increased stress and workload of those who remain in work after staffing reductions.

In the third study of this thesis, evidence on the major economic crises after 1970 on suicide mortality in developed countries is provided. The study compares severities of different types of economic or financial crises (stock market, currency, inflation or banking crises), when regarding the effect of these crises on suicide mortality. Two main findings are especially noteworthy. First, the impact of the recent global financial crisis (2008–2010) on suicide mortality was not particularly stronger than that of the previous major economic crises. Second, the stock market and the banking crises seem to be the most severe economic crises for suicides.

4 Issues related to data

Much of the existing empirical literature in economics dealing with human behavior has used aggregate data mainly due to limitations on individual level data. Although adequate individual level data are becoming more and more available, there is still room for carefully formulated and conducted aggregate analyses for policy purposes.

Studies in this thesis, based on aggregate data, cannot formally distinguish the aggregate level effect from the individual effect. Our studies on suicide mortality are not designed to assess whether unemployed people are more likely to die by suicide than employed people. This individual association is already demonstrated by Blakely at el. (2003), among others. It is plausible that this association explains at least part of the positive unemployment-suicide association found in studies conducted at the aggregate level, such as the one of Laanani, Ghosn, Jougla, and Rey (2015). Instead of individual-level causality, these studies enable evaluating not only suicides of unemployed people, or those directly affected by economic or financial crises, but also by others around them. More generally, aggregate data make it possible to explore suicides attributable to pressures on the labor market and the economy as a whole.

Since the studies of this thesis are based on aggregate data, the causality is not easily detected, even when invoking the "representative agent" assumption. However, lacking evidence of causality does not imply that one should systematically disregard aggregate-level analysis. For policy purposes, the knowledge of, say, how macroeconomic conditions affect people on society level, should be of interest. Policymakers, who have to make decisions on how to allocate limited financial resources, for instance, for preventing suicides, might benefit from aggregate level findings, since that is the level at which decisions on public finances are made.

Suicide mortality is a public health problem. For example, the state of the economy (e.g. the phase of the business cycle) can have a substantial effect on suicides. During recession people lose their jobs or may go into debt, and lower economic growth affects a wider community via reduced government spending due to austerity measures. Recession is thus an aggregate risk, and for this reason studies utilizing aggregate data are useful for examining the impact of economy-wide conditions (Gunnell & Chang, 2016). According to Stuckler et al. (2010) austerity programs may exacerbate the health risks posed by financial crises. A study by Stuckler et al. (2009) finds that expenses on labor market policies could mitigate the public health consequences of economic crises including the increase in suicides. There is no doubt that recessions themselves pose a risk to health, but empirical data can reveal that the decisions made by governments crucially determine how bad the outcome will be (see eg. Fishback, Haines, & Kantor, 2007; Stuckler et al., 2009; Stuckler, King, & McKee, 2009).

5 Summary of original studies

5.1 Study I: ‘Til booze do us part: Alcohol consumption and marital dissolution

In the first study, which is co-authored with Professors Mikko Puhakka and Marko Korhonen, we explore the effect of alcohol consumption on divorce. Previous research on the relevant socioeconomic factors affecting divorce rates has mainly concentrated on the effects of divorce law reforms, unemployment, fertility rate, and female labor force participation (Amato, 2010; Kesserling & Bremmer, 2006; Stevenson, 2008; Korhonen & Puhakka, 2015). The effects of alcohol consumption are not so often explored, although alcohol abuse is often cited as one of the leading causes of marital dissolution (Amato & Previti, 2013).

We use annual data from 23 OECD countries over the period 1960–2010. The variables include divorce rate (the number of annual divorces per 1000 inhabitants), unemployment rate, and female labor force participation, fertility rates (the number of births per woman), and alcohol consumption (liters per capita). As control variables we use the urbanization rate (the percentage of national population in urban areas), the share of elderly population (aged 65 and over as the percentage of population), and the indicator variable denoting the year of divorce law reform in a country.

This study contributes to the previous literature at least in three ways. First, the investigation is performed in a many country context, which allows making more convincing conclusions about the factors affecting the marriage dissolution. Second, both short-run and long-run analyses are used to emphasize the relation between alcohol consumption and divorces. Third, alcohol consumption is used as an explanatory variable together with other relevant explanatory variables. To the best of our knowledge, this study is the first to explore effect of alcohol consumption on divorces across countries.

For the short-run analysis we employ a fixed-effect panel estimation, and for the long-run analysis we use panel vector error correction method (PVECM). We establish a significant unidirectional Granger-causality from alcohol consumption to divorce rates across countries. Further-more, a long-run equilibrium relation between divorce rates and alcohol consumption is discovered. The results are robust to the inclusion of socio-economic factors, such as unemployment and fertility rate, in the regression. The study provides strong evidence that alcohol consumption is a major socio-economic factor which influences divorces in the countries studied. In addition, using worldwide survey data on values we explore whether the change in values respect to marriage, and moral values could explain our findings. It is noteworthy, that alcohol consumption has a significant effect on divorces even after controlling the changes in moral values.

Our study suggests that changes in alcohol consumption have major effects on aggregate divorce rates. As a policy implication, the government could try to influence the alcohol abuse apart from the public health perspective, also from the family and marriage perspectives.

5.2 Study II: The impact of unemployment on well-being: Evidence from the regional level suicide data in Finland

In economics the concept of well-being is widely used, but not always with a clear definition. The recent literature has shown that economic conditions and especially unemployment are crucial determinants of well-being. For example, Di Tella, MacCulloch, and Oswald (2001) provide evidence of the strong relationship between self-reported happiness and macroeconomic conditions.

In the second study, which is co-authored with Professor Marko Korhonen, we examine well-being effects of unemployment on regional population in Finland during 1991–2011 using disaggregated suicide data across gender and age. According to Daly et al. (2013) suicide data have several advantages over the happiness surveys in explaining well-being, because they can directly measure well-being of an individual. In addition, Daly et al. (2013) argue that suicide data are also more objective measure than, for example, survey data on self-reported well-being or self-reported health statistics. We point out that the suicide data illuminate the relation between unemployment and well-being. Suicide can be thought as revealed choice by rational individuals as argued by Hamermesh and Soss (1974), which is an important point in our analysis. The premise in this study is that some individuals consider their economic situation now or in the future so gloomy that they have decided to commit suicides.

The data used in the analysis are nationwide and regional data for both aggregate and age-specific suicide mortality rates in Finland for the period 1991–2011. The gender-specific unemployment rate is also measured at both the aggregate and regional level. As a proxy for unemployment expectations we use a balance figure[1], which indicates the expectations about individual's threat to become unemployed within next 12 months. The balance figure is measured at regional level among total population. The possible omitted variable bias is controlled for by employing several additional explanatory variables, which are GDP per capita, average age of population, divorce rate, and fertility rate at regional level, and aggregate alcohol consumption at national level. We use well-established two-way fixed-effects (FE) panel data estimation technique in our analysis. The method is widely utilized in empirical analyses, which use socio-economic and health data (see e.g. Ruhm, 2000; Neumayer, 2003; Andrés, 2005; Breuer, 2015). The fixed-effect estimation method is especially appropriate for our purpose, since it enables exploiting the regional level variation in unemployment and suicide mortality.

We present countercyclical evidence between expected unemployment and suicides. Our findings suggest that the increased expectations of job insecurity are associated with the number of committed suicides more often than what is expected in good economic times. The effect is significant especially on the prime working-age (35–64 years old) male suicides. The results are in line with the forward-looking nature of rational suicide models.

The second main contribution of this study is to relate the concept of social norm to unemployment (e.g. Clark & Oswald, 1994; Clark et al., 2010). We are able to show that the rising unemployment is associated with the lower suicide mortality in areas where unemployment is more common. An implication is that the burden of unemployment is reduced when it becomes socially more common and acceptable. It is further shown that job losses have more severe effects on the well-being of prime aged male workers in low unemployment regions than in high unemployment regions. These results support Durkheim's (1897) claim that suicide is partly related to social integration, which binds individual to society through the social norm and values of the group.

In addition, it is found that a relatively stronger shock in regional unemployment rate compared to the national level is associated with higher regional suicide rates. However, a relatively stronger regional shock compared to the regional average has no significant effect on suicides. The association between unemployment and suicides can thus be regarded as region-specific in Finland.

As for policy implication, maybe we should focus more on the well-being of individuals who are at risk of losing their job in low unemployment regions.

[1] The data on balance figure is obtained from the Consumer Survey conducted by Statistics of Finland.

Furthermore, in high unemployment areas the association between job loss and suicides may not actually be as severe as we might think. The social norm effect of unemployment seems to be associated with suicide mortality and thus can reduce the suicidal consequences of economic shocks.

5.3 Study III: Economic crises and suicides between 1970 and 2011: Time trend study in 21 developed countries

The third study, which is co-authored with Professors Marko Korhonen and Jouko Miettunen, provides evidence on how economic crises affect suicides in developed countries. It fills some important gaps in the literature on economics of suicide. First, it is explored whether the recent global financial crisis (2008) has had a more severe effect on the suicidal behavioral than the previous global economic or financial crises. We estimate pre-crises suicide trends for every crisis. Based on these estimations, we calculate the expected numbers of suicides. Expected is defined as what the suicide numbers would have been, if the pre-crises trends had continued. Then by quantifying the deviation of actual suicide rates and numbers from the expected ones, we calculate the excess suicide rates and numbers as well. We compare the effects of economic crises on the obtained excess suicides across countries and between genders.

Second, the robustness of our findings is checked by exploring whether including unemployment and the growth rates of aggregate output as explanatory variables will change the main results. This is a crucial step, since as Laanani et al. (2015) state, it is important to clearly define the actual origin of increases in suicides during economic downturns. Especially, it is shown that the effect of economic crises on excess suicides is strong even if we take unemployment and income into account. This implies that economic crises per se are important economic factors leading to excess suicides.

Third, we examine whether different types of economic or financial crises (e.g. stock market, currency, inflation or banking crises) have had a different effect on suicides. Despite the huge amount of research investigating the association of economic crises with suicide, there are no studies, to our knowledge, that investigate this issue. Our study provides a comprehensive evidence how different types of economic crises affect suicides in developed countries.

We use data on economic/financial crises and suicides for the period 1970–2011. The countries included are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy Japan, the Netherlands, New

Zealand, Norway, Portugal, Spain Sweden, Switzerland, the United Kingdom, and the United States of America. The variables that are most commonly used in measuring macroeconomic conditions are unemployment rates and growth rates of real Gross Domestic Product (GDP) per capita. The growth rate of real GDP per capita reflects general economic activity and its development indicates economic cycles. Unemployment rate is an indicator of labor market performance. We emphasize that the use of these additional variables is important, since while the crisis effect might explain a rise in suicides we should also control other important economic factors that might affect suicidal behavior during crises.

Our study concentrates on the most severe economic or financial crises after the 1970's. The crises include the oil-shock recession of 1974, inflation-defeating recession of 1982, Black Monday crash of 1987, Nordic banking crisis of 1991, European Exchange Rate Mechanism (ERM) crisis of 1992, Asian financial crisis of 1997, the Dot-com bubble of 2001, global financial crisis of 2008 ("the Great Recession"), and the Eurozone debt crisis of 2010. In addition, we explore the effects of a variety of country-specific crises, namely inflation, banking, and currency crises and stock market crashes, on suicides.

We find that, apart from the ERM crisis 1992, every major economic/financial crisis since 1970 led to excess suicide mortality in developed countries. Among the males excess suicide rate per 100 000 persons) varied from 1.1 (95% confidence interval 0.7 to 1.5) to 9.5 (7.6 to 11.2), and among the females from 0 to 2.4 (1.9 to 2.9). The impact of the most recent global financial crisis on suicides seems not to have been particularly stronger than that of previous major economic crises.

Altogether, our analysis indicates that the economic/financial crises have caused over 60 000 excess economic suicides in developed countries after 1970. The Asian crisis (1997) has been the most damaging when measuring the severity by excess suicides associated with economic/financial crises. Japan accounted for almost all of the suicide deaths, whereas among other countries, economic crises experienced in the 2000's seem to have caused the most excess suicides. Evidence shows that the specific economic crises have different effects on global excess suicides, and that these crises seem to have huge negative effect on well-being in advanced countries. According to our results, the suicide mortality increases among both sexes mostly due to the stock market and banking crises.

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Original studies

This thesis is based on the following publications, which are referred throughout the text by their Roman numerals:

I Huikari, S., Korhonen, M., & Puhakka, M. (2016). 'Til booze do us part: Alcohol consumption and marital dissolution. *Empirical Economics, 51*(2), 831-852.

II Huikari, S., & Korhonen, M. (2016). The impact of unemployment on well-being: Evidence from the regional level suicide data in Finland. *Social Indicators Research, 128*(3), 1103-1119.

III Huikari, S., Miettunen, J., & Korhonen, M. (2018). Economic crises and suicides between 1970 and 2011: Time trend study in 21 developed countries. Manuscript.

Original publications are not included in the electronic version of the dissertation.

84. Iivari, Marika (2016) Exploring business models in ecosystemic contexts
85. Nadeem, Waqar (2016) Examining consumers' acceptance of social commerce in clothing e-retail
86. Nykänen, Risto (2016) Emergence of an energy saving market : the rise of energy service companies
87. Wang, Fan (2016) From relational capital to venture capital : financing entrepreneurial international new ventures
88. Rantakari, Anniina (2016) Strategy as 'dispositive' : essays on productive power and resistance in strategy-making
89. Henttu-Aho, Tiina (2016) The emerging practices of modern budgeting and the role of controller
90. Koivuranta, Matti (2017) Studies on macroeconomics and uncertainty
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