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ESSAYS ON ECONOMICS OF MENTAL HEALTH

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ABSTRACT

This dissertation consists of an introductory chapter and three empirical essays that examine the linkages between economic activity and mental disorders. I examine two separate themes: the effect of migration on long-term mental health and the association of mental disorders and labor market performance.

The first article of the thesis exploits a historical natural experiment in forced migration in the World War II to study the impact of migration on mental health. The Finnish-Soviet wars resulted in the displacement of 11% of the Finnish population. As the forced migration of Finnish Karelians was unexpected and was conducted with full compliance, the displacement provides a compelling "natural-experiment" framework to study the mental health effects of forced migration free on confounding. We do not find evidence that supports migration being a risk factor for mental disorders in the long-term. This result is at odds with the general finding from non-experimental studies that point to a positive association between migration and mental disorders. Our results highlights the importance of an appropriate research design when measuring the impacts of migration.

The second article examines the lifetime labor market consequences of mental disorders. The main contribution stems from the scope of the data, which allows the identification of the emergence of severe mental disorders as the first psychiatric admission. By documenting that, the labor market deficits are the greater the earlier the mental health problems manifest, the paper motivates the need for early intervention to tackle these problems.

The third article focuses more closely on the immediate changes in labor market performance surrounding the first psychiatric admission. I exploit a recently popularized dynamic differences-in-differences strategy where counterfactuals are constructed from amongst the individuals with psychiatric admissions, but who are just treated for the first time a few years later than the treatment group. I show that this way the observable differences between treatment and control group are considerably reduced relative to case-control comparison. This strategy also produce results that do not violate the parallel trends assumption in anxiety disorders.

KEYWORDS: Migration, mental disorders, natural experiment, labor market performance, differences-in-differences

TIIVISTELMÄ

Tämä väitöskirja koostuu johdantoluvusta sekä kolmesta esseestä, jotka tarkastelevat taloudellista toimintaa ja mielenterveyshäiriöitä. Tarkastelu jakautuu kahteen aihepiiriin: muuttoliikkeen pitkän aikavälin mielenterveysvaikutuksiin sekä mielenterveyshäiriöiden yhteydestä työmarkkinamenestykseen.

Ensimmäisessä väitöskirjatutkimuksessani tarkastelen pakkosiirtolaisuuden pitkän aikavälin vaikutuksia mielenterveysongelmiin. Suomen ja Neuvostoliiton välillä käydyt sodat tarkoittivat sitä, että Neuvostoliitolle luovutetuilla asunut Suomen väestö tuli uudelleenasuttaa muualle Suomeen. Hyödynnämme Luovutetun Karjalan väestön pakkosiirtolaisuutta ns. ”luonnollisena kokeena”, joka mahdollistaa muuttoliikkeen mielenterveysvaikutusten tutkimisen ilman muuttoliikkeeseen tyypillisesti liittyvää valikoitumisharhaa. Aiemmista tutkimuksista poiketen emme havaitse muuttoliikkeen olevan yhteydessä kohonneeseen pitkän aikavälin mielenterveyshäiriöriskiin. Tutkimuksemme havainnollistaa tutkimusasetelman merkitystä muuttoliikkeeseen liittyvissä vaikutusarvioinneissa.

Toisessa paperissani tarkastelen mielenterveyshäiriöiden yhteyttä elinajan työmenestykseen. Tutkimus hyödyntää aiempaa kattavammin suomalaista rekisteriaineistoa, joka mahdollistaa ensimmäisten psykiatristen hoitokäyntien tunnistamisen. Tutkimuksessa havaitaan, että työuran työmarkkinamenestys on sitä heikompaa mitä aikaisemmin sairastuu vakavaan mielenterveyshäiriöön. Tämä havainto kannustaa arvioimaan psykiatristen varhaisten interventioiden vaikutusta myös taloudellisesta näkökulmasta.

Kolmannessa paperissani tarkastelen vakavien mielenterveysongelmien välitöntä yhteyttä työmarkkinamenestykseen. Hyödynnän tutkimuksessa dynaamista differences-in-differences -tutkimusasetelmaa, jossa sairastuneita verrataan muihin muutamaa vuotta myöhemmin sairastuneisiin. Havainnollistan, että tämänkaltainen vertailu vähentää valikoituvuusongelmaa suhteessa tyypilliseen tapaus-verrokkiasetelmaan sekä täyttää yhtenevien trendien oletuksen ahdistuneisuushäiriöissä.

VAINSANAT: Muuttoliike, mielenterveyshäiriöt, luonnollinen koe, työmarkkinamenestys, differences-in-differences

Acknowledgements

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List of Original Publications

This dissertation is based on the following original publications, which are referred to in the text by their Roman numerals:

I   Sarvimäki, Matti; Salokangas, Henri R.W.; Haukka, Jari; Martikainen, Pekka;Jaana Suvisaari. Forced migration and long-term mental disorders in post-WWII Finland.
II   Salokangas, Henri R.W. Mental disorders and lifetime earnings.
III Salokangas, Henri R.W. Economic consequences of psychiatric disorders: An Event study approach.

1   Introduction

This dissertation consists of three empirical essays that examine the linkages between economic activity and mental disorders. While mental health problems have been extensively studied in psychiatry, the topic has only recently gained interest among economists. This dissertation sheds new light on the interaction economic activity and mental health. In this introduction, I discuss the importance of examining mental health in the context of economics and outline the main contributions of the essays. I will also go through the methodological choices of these essays.

Recent decades have been seen increases in reported mental illnesses. This is alarming for the well-being of the individuals and families themselves, but the associated economic costs also raise fiscal concerns. Mental illness is the largest single illness among people of working age but it also accounts for half of all disability among people of working age. (Layard, 2013). Economists have highlighted certain attributes related mental illness that are of economic interest. First, the mental illnesses are chronic and therefore their economic consequences could be long-standing meaning that the economic evaluations in short-term might be misleading (Knapp and Wong, 2020). Second, undertreatment of psychiatric problems is typical and if the illnesses are treated, this happens often treated with a long time lag (Layard, 2013). Third, preventive measures, especially early intervention should be encouraged because early problems in mental health are associated with considerable welfare deficits later in life. Using high quality Finnish administrative data, I will advance the current literature by emphasizing the long-term perspective of the labor market and mental health but also documenting the immediate repercussions in labor market performance related to the manifestation of mental disorders.

This thesis contributes to the literature by a coherent documentation of the labor market repercussions of mental disorders, but also by emphasizing the importance of impact evaluation in mental health. Recent decades have overseen an exponentially increased focus in the research designs in economic research, i.e. so-called "credibility revolution". Carefully designed experiments that can credibly rule out the confounding and enable causal inference, have also been shown to be

politically influential (Angrist and Pischke, 2010). The randomized controlled trials (RCTs) are typically considered the gold standard of causal inference, but are very expensive to conduct and it can take long for the long-term effects of the design to unveil. Therefore, historical events that arise from administrative decisions or "historical accidents" have become a promising alternative. At best they can be generalized to considerably wider population relative to randomized controlled trials (RCTs) without considerable deficits in causal inference (internal validity) with a fraction of the costs of respective RCTs. Natural experiments, that take advantage of unanticipated, exogenous events and quasi-experiments, that are products of intentional and targeted treatments of a program, both mimic the exogeneity of the true random assignment.

The first article of the thesis exploits a historical natural experiment in forced migration in the World War II to study the impact of migration on mental health. The Finnish-Soviet wars resulted in the displacement of 11% of the Finnish population. As the forced migration of Finnish Karelians unexpected and conducted with full compliance (99.5% those living in ceded areas moved), the displacement provides a compelling "natural-experiment" framework to study the mental health effects of forced migration free on confounding. Comparable situations are caused by wars throughout the world even today, but in Finland the evacuation was well organized and the government supported those who were evacuated. By mitigating the confounding produced by the differences in pre-migration factors, selection to migration and potential post-migration discrimination in the labor market, the differences in outcomes between the nondisplaced and displaced Finns have potential to unveil the causal impact of migration on mental health.

The second and third article study the repercussions of mental disorder on labor market performance. While it is widely recognized that mental disorders are associated with decreases in labor market performance in terms of work productivity, sickness absence, and probability of employment, there are still gaps in economic research. The second article aims to provide a more comprehensive evidence of these repercussions by focusing on the lifetime labor market consequences of mental disorders, rather than studying associations stemming from shorter follow-ups. This paper also contributes by studying heterogeneity in lifetime market performance by age at first admission. By documenting that the labor market deficits are the greater the earlier the mental health problems manifest, the paper motivates the need for early intervention to tackle these problems.

The third article focuses more closely on the immediate changes in labor market performance surrounding the first psychiatric admission. The aim of the article is to examine the potential for the causal interpretations of the first psychiatric admission on labor market performance. I exploit a recently popularized dynamic differences-in-differences strategy where counterfactuals are constructed from amongst the

individuals with psychiatric admissions, but who are just treated for the first time a few years later than the treatment group. I show that this way the observable differences between treatment and control group are considerably reduced and to some extent this strategy provides signs that commonly insinuate that there are good grounds for causal interpretations.

The next section discusses the economic relevance of mental disorders and challenges related to studying the impacts between economic activity and mental health. Section 1.2 discusses the challenges related to studying the impact of migration on mental health and Section 1.3 explores the empirical strategies used in studying the mental health and labor market performance. Section 1.4 discusses the importance of the timing of the health event. Section 2 presents the summaries of the essays.

1.1   Economics and mental health

Fundamentally, economists are interested in how individuals and groups behave when they are constrained by scarce resources and how these agents may efficiently improve their well-being under these constraints. Along with enormous economic growth, humans have managed to mitigate some of the most crucial barriers of societal welfare during the last two centuries. For instance, we have witnessed vast improvements in reducing the absolute poverty and diseases and overseen increasing universal provision of education. However, the secular rise in the material well-being and the relative increases in equality of opportunity in a welfare country such as Finland has concurred with contrasting developments in some of the well-being indicators. While Finland has been ranked number one in World happiness report for three times in a row, the country is also highly 5th ranked is suicide rates within high-income countries. Although these selected indicators describe societal well-being only to a limited degree, they also indicate that the problems related to mental illnesses are not likely to diminish as humans have acquired more knowledge on how to control the conditions in their physical environment.

In fact, mental and substance disorders are now the most common reason for disability ages below 35 and the share of disability-adjusted life years (DALY) attributable to mental and substance use disorders is increasing. The costs of mental ill-health, direct and indirect combined, in Europe is estimated to be €600 billion or around 4% of GDP. Around 40% of estimated loss has been attributed to losses in work productivity (OECD, 2018). The World Economic Forum has even projected that mental illnesses will encompass for more than half of the global economic burden attributable to non-communicable diseases (Bloom et al., 2012).

As technological advancement has reduced the societal burden of the physical diseases for the working aged population, the share of the mental disorders of all disabilities become more pronounced. However, the reported incidence of mental disorders is on the rise as well. Several explanations have been given to the secular rise of (reported) mental illnesses. One of the most classic arguments was proposed by Emile Durkheim (1897) in his sociological study "Suicide". He argued that the greater the economic changes are, the greater is social disintegration and eventually the risk of suicide. The rapidly changing work of today can also be seen to pose such risk to health as job content is changing to keep up with the changing economic environment and this is reflected as contemporary increases in multitasking, psychologically and socially demanding tasks (Berkman et al., 2015). At the same time studies point to increases in job insecurity (Givord and Maurin, 2004), which has been shown to be associated with mental health problems (Kivimaki et al., 2007; Burgard et al., 2009; Rohde et al., 2016). Although the main underlying causes behind the rise of mental disorders are debatable, the economic importance of mental illnesses is becoming more evident.

Mental ill-health has an enormous impact on economics, but it is also important to consider the role of economic disadvantages on increasing the likelihood of mental illnesses. Low socio-economic status is associated with exposure to risk factors, poor access to education which further decrease the likelihood of rising through the social ranks. Economic analyses have potential to identify areas where targeted policy interventions would benefit the society as whole given the scarce resources. Recent decades have increased the possibilities for the economics to make a difference as better data are available for economic evaluations. (Knapp and Wong, 2020).

To understand the extent of the burden of mental disorders, the majority of the studies in psychiatric epidemiology and economics regarding psychiatric disorders have typically resorted to survey-based data. When a nationally representative survey includes a widely acknowledged psychiatric diagnostic interviews such as WHO Composite International Diagnostic Interview (CIDI), they have potential to capture psychiatric disorders with wide severity spectrum and the age of onset of the first psychiatric symptoms. Considering the estimated prevalence of mental disorder, a study on young adults has estimated the lifetime prevalence of any mental disorder to about 40 percent (Suvisaari et al., 2009). Similar magnitudes have estimated in the US for a general population sample (46%) (Kessler et al., 2005a), however 40 % of these cases were considered of mild severity (Kessler et al., 2005b). The main limitation of the survey-based studies is their representativeness, or lack thereof. Survey panel data in psychiatric epidemiology often suffer from biases related to non-participation and attrition (Haapea et al., 2008). Further problems might arise from imperfect recall or deliberate underreporting (Kessler et al., 2005b).

Studies that take advantage of national administrative data are able to avoid the problem of the non-representative sample. Besides representativeness, register-based studies have potential to reliable investigation of research designs that typically involve rare exposure and high drop-out rates. In psychiatric epidemiology, this strength is apparent in rare and severe diagnoses which most often result in hospitalizations or outpatient visits (Miettunen et al., 2011). On the downside, administrative registers only catch the tip of the iceberg in psychiatric conditions as only about 20 % are treated in hospitals for psychiatric reasons during their lifetime. However, from the economic perspective this tip is likely to capture the majority of the societal burden attributable to mental disorders because this group is typically least likely to be employed, consume health care resources more intensely during their lifespan and are more likely to suffer a premature death. People with mental illness are more likely to drop out from longitudinal surveys (Allgulander, 1989; Haapea et al., 2008; Cheung et al., 2017) and thus survey panels will likely miss the individuals who cause the highest cost burden to the society.

In the Nordic countries, where collaboration between registry agencies allows individual-level linkages of socio-economic and health information, possibilities arise for identifying the most severe mental disorders through a very long follow-up individual follow-up. In Finland, for instance, full scale high-quality population register data on socio-economic information (Census), hospitalizations (Finnish discharge register) and mortality (Register for the causes of death) data commenced in 1970. Since late 1980s, the applicability of administrative data in quantitative research has increased as birth registries, medical prescriptions, outpatient visits, health care center visits among others are now available the individual-level linkages. Through the extensive use of administrative register data, researchers can now identify linkages in mental disorders and outcomes related health services use and labor market performance.

The evidence produced by survey data and register data complement each other. In long follow-ups, survey-based studies have potential to capture the individuals with mental health problems of relatively low severity and study their associations with possible causes that are not detected in studies that rely solely on administrative data, such as experience in bullying and parental neglect in childhood. The advantage of administrative data kicks in when the subjects grow up and when attrition rates rise as subjects migrate from the region of origin or otherwise become at risk being lost in follow-up in cohort studies. The future research in mental health should benefit from integrating these two approaches in order to capture the broadest possible spectrum of mental illnesses in a very long follow-up.

1.2   Migration and mental health

Psychiatric research has long considered migration as a risk factor for mental illnesses. Most notably Brown and Harris (1978) contended that life events have causal importance for the onset of depression. Contrary to the contemporary psychiatric tradition, the authors suggested that the causal link was present also for psychotic conditions, which for long were considered to originate from primarily from genetic tendencies. Brown and Harris (1978) suggested that social factors both play a role in provoking the onset but also in creating vulnerabilities which may explains differences in responses to life events. Although many of the provoking agents of depression are not discrete events, such as long-term difficulties related to bad housing or financial difficulties, Brown and Harris (1978) argue that events that are associated with long-term threat or loss are of greatest importance. Such events include death of a close relative or a friend, job loss and enforced change of residence among others.

Now, focusing on changes in residence, to quantify the impact of migration on mental health, it is common to run a regression of the form

$$y_{ijt} = \alpha + \beta D_i + X_{i,t0}\Omega + \varepsilon_{ijt}, \tag{1}$$

where y_{ijt} is a psychiatric admission for individual i, at time t at region j, D_i the indicator of migration, β is the coefficient of interest and ε_{ijt} is an error term. The main problem is that there is practically always missing information that interferes with the identification of the true migration effect. In the regression equation, this is represented by the error term. The problem emerges from the fact that there are missing variables, confounders, that both affect the migration decision and the outcome of interest. The unobservables can consist of individual specific unobserved factors (u_{it}) and location specific factors (v_{jt}). Because we do not observe the counterfactual for those who migrated, we need to estimate this counterfactual by providing those who migrated a plausible control group.

Prior research has documented large differences in mental health between migrants and non-migrants. The classic work by Ødegaard (1932) studied Norwegian emigrants in Minnesota and found them to have a two-fold risk of psychiatric illnesses relative to Norwegians who stayed home . Since then, several studies have reported that immigrant status (Cantor-Graae and Pedersen, 2013; Cantor-Graae and Selten, 2005; Montgomery and Foldspang, 2008; Swinnen and Selten, 2007) or internal displacement status (Getanda et al., 2015; Tsuchiya et al., 2017; Bhugra, 2004) is associated with poor mental health. In the U.S., however, the first generation Hispanic immigrants were found to be healthier than white US residents (Goldman et al., 2014; Case and Deaton, 2015; Grant et al., 2004) although in the second

generation this gap was converged (Giuntella, 2017; Garcia-Perez, 2016). The mixed evidence highlights the challenge of estimating the causal effect of migration on mental health. Migration processes are heterogeneous, as push and pull factors vary greatly from context to another (Ravenstein, 1885; Lee, 1966). As suggested by Ødegaard (1932), the challenge arises from unobserved confounding factors between the migrants and the natives. Migration is generally selective (Lee, 1966), and the related selection bias may be further exacerbated by return migration (Riosmena et al., 2013; Dustmann and Gorlach, 2016) as is likely also the case behind the "Hispanic health paradox" (Palloni and Arias, 2004). Thus, the interpretation of the causes related to these health disparities can be attributed to the subjective mixtures of confounding factors in the pre-migration, migration and post-migration phases.

Randomized controlled trials (RCT) are typically considered the gold standard for causal inference. In RCTs, the study subjects are randomly allocated to treatment group(s) and control group(s). On expectation, the control group would exhibit post-treatment period behavior similar to that of the treated in the hypothetical case in which the treated would not have been treated. However, RCTs are typically costly and may not be generalizable even if they produce internally consistent results. Moreover, they are ethically and politically often infeasible. As randomized control trials are not conducted in the migration context, non-RCT experimental research designs based on historical events and administrative decisions provide more plausible settings for causal inference. In the domain of mental health, such experiments are rare, with relatively recent studies based on temporary evacuation of children during armed conflict (Santavirta et al., 2015, 2017) and randomized visa ballots for Tongans to migrate to New Zealand (Stillman et al., 2009, 2015) providing notable exceptions.

In the first article of this dissertation, we add to this experimental literature on migration and mental health and study the internal displacement of 430,000 Finns after World War II as a "natural experiment". This historical episode creates a compelling research design, because displaced and non-displaced populations were similar to each other before the war and there is no self-selection into migration among those living in the ceded area. The paper uses an implicit difference-in-differences design. Although we do not observe the mental health or pre-disposition of the mental disorders of the study sample before exposure, we observe the socio-economic background to be largely similar between the displaced and displaced. To identify the causal impact of the displacement on mental health, our identifying assumption is that, conditional on observed prewar characteristics, the displacement status is not correlated with unobserved individual characteristics ($Cov(u_{it}|Xi, t0) = 0$).

However, while the Finnish experiment is able to substantially mitigate the role of selection bias driving the native-migrant differences in mental health, the location

specific factors can still affect the interpretation of the results. Prior research based on the Finnish evacuation has found that displacement increased the long-term earnings of those working in the agriculture, and this is largely explained by faster mobility away from the traditional rural occupations to modern occupations (Sarvimäki et al., 2019). Thus displacement in the Finnish context is positively correlated with post-war local labor market conditions. On the other hand, displacement status may to some extent also be negatively correlated with certain factors in the post-war new living environment that affect mental wellbeing. For instance, survey study conducted by Waris et al. (1952) suggested that displaced people faced discrimination in their new home municipalities. Besides the differences in genes, psychiatric literature has considered social defeat, i.e. long-term experience of being excluded from the majority group, to be one potential explanation of migrant-native disparities in mental health. Perceived discrimination is linked with schizophrenia risk whereas strong family networks among migrants are associated with a smaller risk of schizophrenia (Selten and Cantor-Graae, 2005). In the presence of confounding, social defeat could be considered a consequence of genetic factors rather than a cause of increased schizophrenia risk (Selten et al., 2016). However, in our study differences in genetic heritage is negligible relative to the typical research designs that study the associations of international migration and mental health.

Nevertheless, it is important to note that improvements in economic wellbeing following migration may coincide with decreases in psychological wellbeing. To what extent changes in psychological wellbeing is reflected in mental illnesses is uncertain. For instance, Stillman et al. (2009, 2015) found that people who won in the migration lottery to move from Tonga to New Zealand saw improvements in mental health and economic well-being but decreases in subjective well-being in comparison to people who lost in the lottery. The authors speculate that this discrepancy in the results may be a product of failing to meet the rising aspirations in the new, more prosperous living environment or retrospective reports that may reflect filtered past memories. It is challenging to assess changes in subjective well-being, because the baseline to which contemporary of subjective well-being is compared to may be affected by imperfect recall of the past (unpleasant) episodes. This might lead to unrealistic extrapolations of the counterfactual well-being as lesser weights are put upon negative experiences of the pre-migration period.

While subjective well-being or nostalgia-driven comparisons over time may not enable appropriate welfare analysis, inference based on the objective measurement of mental health are more reliable. However, one could also speculate that our outcome of interest, the risk of psychiatric admissions, may not measure the true relative incidences of psychiatric illnesses across the migrant status and destination regions. If the displacement reduced the propensity to seek treatment, the relative

incidences of mental disorders are underestimated for the displaced. In this regard reliable evidence of such differences in the treatment seeking behavior or selective availability of psychiatric treatment in Finland has not been brought forward. If such differences exist, it is likely that the related biases would be more severe in the context of international migration flows than in the context of the displacement of Finnish Karelians.

Although the title of paper suggests otherwise, the Finnish experiment can be considered more as a plausible exogenous shock to (labor) migration rather than forced migration in the usual sense. Forced migration studies often focus on refugee migration or internal displacement where migrants face diminished prospects for taking advantage of their pre-migration occupation-specific skills that consist of task-location specific components. In the Finnish context of World War II, the risks often related to internal displacement were cushioned by small differences in the background between the natives and migrants whether measured in terms of ethnicity, economic activity or native language. The relocation policy also helped the displaced place of accommodation for the duration of the war, compensate for the property left behind the ceded areas and to preserve livelihood and social networks for the people working in agriculture. From economic perspective, the displaced persons did not fare worse than the non-displaced peers. In fact, prior evidence suggests that the displaced Karelians have integrated into the labor market relative well. The Finnish experience suggests that the negative impacts related to population displacements are not unavoidable. We argue that efficient and humane evacuation and resettlement policies have potential to mitigate the risks typically associated with population displacements.

1.3 Mental health and labor market outcomes

The second and third essays in this thesis examine the link between mental disorders and labor market performance. The second article documents the association of the age at the first psychiatric admission and lifetime earnings. The aim of these two articles is to shed light to the magnitude of the labor market deficit related to mental disorders. Unlike in the first article, where forced displacement served as an exogenous source of migration, there are no natural experiments or RCTs that would allow identifying the impact of mental ill health on labor market performance. Therefore mental health will be correlated with unobserved individual characteristics, and therefore confounding factors are always a concern for causal inference.

The second article which documents the lifetime earnings associations, also used the sibling and twin fixed effects approaches. These two approaches have occasionally been implemented in economics literature to mitigate the role of confounders that arise from genetic and environmental distance between the treated and the controls. These approaches provide valid estimates for causal inference only if the selection on observables corresponds exactly to selection-on-unobservables (Altonji et al., 2008). However, it hard to think of a setting in which the only variation in labor market performance stems from mental disorders even in twin comparisons. Bound and Solon (1999) note that small differences between identical twins exist starting from birth weight which is positively correlated with the educational attainment and the occupational position. Low birth weight is also found to have a positive correlation with childhood problem behavior (van Os et al., 2001; Hultman et al., 2007). Instead of mental disorders having an independent effect on labor market performance there is a good chance that differences in mental health or birth endowments linked future paths in mental health to are just intermediate outcomes of the differences in the prenatal environment (Rose, 2005) or possible discordances in post-birth shocks. The reported twin and sibling comparisons should therefore be assessed with caution and considered as a complement to other approaches to tighten the upper bound of the true effect (Bound and Solon, 1999).

Acknowledging the massive challenge of providing causal interpretation in a case-control environment, the second article instead aims to document the extent of the labor market deficits of those with a history of psychiatric admissions relative to peers with no admissions. This analysis also sheds light to the heterogeneity in the deficit by age at first admission. While previous literature in psychiatry has highlighted the positive association of early onset psychiatric disorders and the lifetime projected risk of mental disorders (having the disorder by the end of their life) (Kessler et al., 2007), the linkage to the lifetime labor market performance has not yet been properly documented. This article aims to fill this gap in the literature.

When studying more immediate links of mental disorders and labor market performance, instrumental variable techniques have been used to tackle the problem of endogeneity. A valid instrument in this context is strongly correlated with changes in mental health and would affect labor market performance only through changes in mental health. For example, the death of a close friend (Frijters et al., 2014) has been introduced as an instrument which satisfies this exclusion criterion. However, it is not obvious how generalizable and long lasting these effects are.

The third article studies the immediate changes in labor market performance following the first psychiatric admission in the dynamic differences-in-differences framework. Departing from the typical case-control perspective, where those with psychiatric admissions are compared with those who have no recorded psychiatric admissions, I construct counterfactuals for the treated individuals from within the

treated. The individuals in the control group are similar on observed characteristics relative to the ones in the treatment group but are just admitted to psychiatric treatment a few years later. To draw causal implications between psychiatric admissions and labor market performance of the treatment and control group would follow parallel trends in the counterfactual world in which the psychiatric admission would not have occurred. The identifying variation arises between individuals in the timing of the first psychiatric admission.

In the context of unanticipated health shocks, this research design has been claimed to resemble "quasi-experimental" setting. However, in the case of endogenous treatment such the first psychiatric admission, the change in the health condition is less unanticipated. Instead, the design can be seen as a more refined selection-on-observables research method in the context mental health. Thus, it should be noted that this method is accompanied with the same limitations as in the case-control case, but just to a more limited degree.

These two papers on mental disorders and labor market outcomes come close to recent contribution to the literature provided by Hakulinen et al. (2019a,b). In their first paper, they examine the associations between early onset (before the age of 25) of serious mental disorders (schizophrenia, alcohol use disorders, other substance use disorders, other non-affective psychoses, bipolar disorders, depressive disorders, other mood disorders, anxiety disorders) with subsequent employment, income, and education outcomes using outcomes from the years 1988-2015, Finnish Discharge register for years 1986-2015 and focusing on individuals born 1963-1990. In the second paper, the authors study labor market performance trajectories surrounding the year of the first admission of a severe mental disorder (schizophrenia, other non-affective psychoses and bipolar disorder). Here the authors treat individuals who were hospitalized with a severe mental disorder between ages 15-60 as cases and randomly selected 5 matched participation from the rest of population as controls. They find that the labor market performance drops already before hospitalization and that the individuals who are hospitalized due to severe mental illness become dependent on social income transfers (Hakulinen et al., 2019b). The authors also show visually changes in median income and employment surrounding the first observable event of hospitalization but do not proceed to a closer investigation and examine the magnitudes of changes in labor market performance.

I complement Hakulinen et al. (2019a,b) in two ways. First, I provide a lifetime approach in labor market performance and mental disorders in the second paper of the dissertation. This helps us to improve our understanding about the magnitude of the losses in work productivity related to mental disorders. Second, using counterfactuals for the treatment group from amongst the treated allows a more accurate description of the immediate consequence of psychiatric hospital admission near the event of the first psychiatric admission. This approach is able to mitigate the

role selection bias related to the relationship between mental disorders and labor market performance.

1.4 The importance of the timing of the health event

In this section, I provide rationale why researchers should pay attention to the timing of the health event matters instead of the incidence itself. First, I describe why the evaluation of a health risk should be conducted using duration analysis when long individual-level panel data is available. Second, then I motivate why information on the age at the serious health event (or shock) possesses great economic importance. Finally, I shortly provide a rationale why policy-makers that value equity should pay attention to early age health shocks and their repercussions.

1.4.1 Assessing the differences in risk

There are occasions where linear regression models are not the most appropriate methods in studying health outcomes. A researcher could be interested in studying the effect of a policy intervention on health outcomes or active labor market policies on employment. Both of these could be studied using linear regression models but duration analysis is also a potential alternative. In fact, duration methods could be more relevant if the timing of the outcome event itself possesses crucial information not only the occurrence of the event.

Duration methods are useful in analyzing data about terminal events and censored observations. Figure 1 describes different types of censoring. For censored observations, the event does not occur within follow-up. Usually, researchers in health and social sciences encounter with right censoring which occurs due to the expiration of the follow-up (episode E and G), discontinuance of follow-up due to migration or non-participation (episode D) or entry after the expiration of the follow-up (episode F). Left-censoring occurs when the subjects exit before the follow-up starts (episode A) or has been exposed to the risk for some time before the start of follow-up (episode B and G). The latter is also called left-truncation. Left-truncation is a serious problem if it is unclear when the timing of exposure is unknown. Sometimes the panel data includes retrospective information on the past which allows to track the moment of exposure. Such is the case with the research on the forced migration of Finnish Karelians. The research design uses the Finnish Census

1950 10% sample as the basis of the study sample. The Census includes information on the municipality of residence, socio-economic status and sector of occupation in September 1939, two months before the outbreak of the Winter War between Finland and Soviet Union. The residential location is the key to determining the exposure: practically all individuals from the municipalities ceded to Soviet Union, were evacuated to the rest of Finland thus we are able to identify the exposure with high precision.
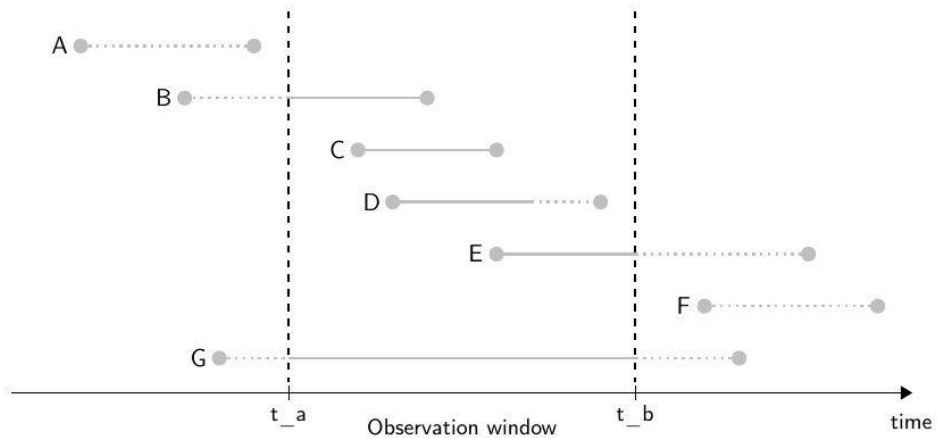
Figure 1.   Types of censoring. Illustration inspired by Blossfeld et al. (2007).

Duration methods are a natural choice for historical studies that use administrative data. Haukka et al. (2017) study the impact of forced migration on mortality with study population born 1870-1939. This means that the exposure occurs when the individuals are 0-69 years old and the health follow-up starts when they are 31-100 years old and last for 40 years. In such case, a large fraction of the study sample die during the follow-up and it is hard to identify the effect by comparing death rates between the treatment group and the control group. Instead, differences in the timing of the death would provide more valuable information about relative risks between people the exposed to the intervention and the non-exposed counterparts.

To demonstrate this, I investigate differences in the impact of forced migration on mortality by replicating the results from Haukka et al. (2017). Haukka et al. (2017) study how internal displacement of Finnish Karelians during World War II affected their mortality outcomes. The study was conducted with duration analysis using

Poisson regression. Thus the outcome was time until death rather than the incidence of death. I now focus on all-cause mortality and compare the estimates produced by least squares estimation (risk ratio) and duration analysis. Table 1 describes some descriptive statistics of the follow-up and the impact estimates produced by these two methods. Looking at the overall mortality risk ratios, we see that the displacement is associated with 9.5 percentage point high risk of death during the follow-up between the years 1970-2010. The summary statistics points out that the average time in follow-up is different between the two groups. On average, the displaced die earlier than the nondisplaced during the 40-year follow-up.

Table 1. Displacement and all-cause mortality: Risk ratios and incidence rate ratios

Column 1	Displaced	Non-displaced
Observations	20277	221798
Age at start of follow-up	51.8	48.9
All-cause mortality	14482	144618
Person-years (1000 years)	521.44	5955.9
Average years in follow-up	25.72	26.85
RELATIVE *MORTALITY*: DISPLACED VS.NON-DISPLACED		
Risk-ratio	$1.095 = \dfrac{14482/20277}{144618/221798}$	
Incidence risk rate	$1.144 = \dfrac{14482/521.44}{144618/5955.9}$	
Adj. risk ratio (Full model)	1.011 (95% CI, 1.003-1.018)	
Adj. incidence risk rate (Full model)	1.027 (95% CI, 1.009-1.045)	

Note: Calculations are based on the information from the Supplement material of Haukka et al. (2017).

Because the displaced and non-displaced are different from each other in terms of mean age at the start of follow-up, which explains the difference in the timing of death. Because the time in follow-up calculated only by time alive during the follow-up (no data on emigration), duration analysis now takes into account the timing of the death. In effect, instead using the total number of observation by displacement status, we now insert the total person-years in the follow-up to the denominator. In this case, the risk rate suggests the displacement is associated with 14.4 pp higher mortality risk with respect to non-displaced population. To take further account the differences background characteristics, I also compute estimates that adjust for sex and year of birth for the risk ratio and incidence rate ratio for the displacement status.

The covariate adjustment results reduces the point estimates. We see that the relative risk decrease considerably as the risk ratio is now 1.011 and IRR 1.027. In absolute terms, the difference between estimates is not large, but in relative terms still considerable. The results suggest that the internal displacement is associated with higher mortality risk and that the displaced persons also died earlier than their comparisons in the rest of Finland. However, the auxiliary analysis in Haukka et al. (2017) also found that the difference attenuated when the displaced were compared with people who lived in the nearby provinces before the war.

The first article of the dissertation differs from Haukka et al. (2017) by focusing on younger birth cohorts (born 1910-1945), and studying the time until the first psychiatric admission. In this case, the people are considered to at risk until the first psychiatric admission, death or end of follow-up. Thus the differences in the estimates between survival analysis and linear regression may come from the denominator being affected by both the timing of the event of interest (psychiatric admission) and the differences in longevity (death). In this case it turns out that the differences in the main results are negligible whether duration analysis or linear regression is used. However, for the contrasts between experimental (forced) and non-experimental (voluntary) evidence in migration, the results are substantially different in duration analysis than in linear regression.

1.4.2   Fiscal considerations

The timing of the health event may matters also from the fiscal perspective. Quoting a Belgian social statistician, Quetelet, (1842): "In his early years, man lives at the expense of society; he contracts a debt which he must one day discharge; and if he dies before he has succeeded in doing so, his life will have been a burden rather than a benefit to his fellow citizens". Thus if the lifelong work capacity is inversely related to the age of the first crucial health event, this could have enormous fiscal implications. Assuming the expected life spans to be equal, an early negative health event would increase the societal burden through lost tax revenues but also through increased social transfers. One way to think about this is through the age-profile of net income transfers paid by the government.
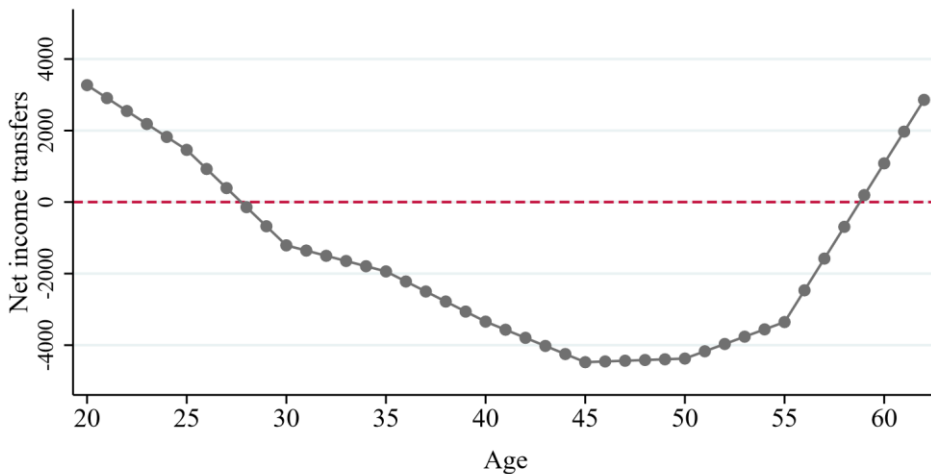
Figure 1.   Age-benefit profile of net income transfers in Finland. The data on the age-profile of net income transfers of native Finnish citizens is based on the calculations done by Sarvimäki et al. (2014). Net income transfers calculated by subtracting taxes paid on labor income other taxable income items from gained income transfers.

Figure 2 describe the net income transfers in Finland by age. Assuming that the individuals live their whole in Finland, the Finnish citizens are net receivers of government income transfers at ages 0-30 and over 60. Between ages 30-60 pay taxes more than they gain in transfer payment. Let's now consider individuals who suffered from psychiatric symptoms before age 30 while doing their university degree. This could mean that their work capacity is reduced in such way that the years in which they are expected to be net contributors in social transfers is reduced dramatically. The second article of the thesis observes that the employment rate is below 0.5 at ages 50-60 for those with early age admissions (below age 40), which suggests that who have their first psychiatric admission before age 40 are expected to be net receivers of income transfers for the majority of their lives. Besides being negatively correlated with lifetime projected risk of mental disorders, the age of onset is also negatively linked to the fiscal burden. The third article of the thesis confirms this notion: net income transfers increase by over €1000 the year of first treatment contact for anxiety disorders and this effect lasts for at least three years after the admission year.

The detrimental effect of early age morbidity is reflected also in the second article of the thesis, which brings forth the lifetime earnings differences related to age at the first psychiatric admission. A prior study using Danish administrative register data on schizophrenia and employment reported a surprising result: employment rate difference between the treated and untreated increases with age at

first admission (Greve and Nielsen, 2013). I find the relationship to be quite the opposite and more in line with the findings of the psychiatric literature that emphasize positive association between the age of onset and work capacity. Since I found out that the early psychiatric admissions are positively correlated with lifetime labor deficits, this study suggests that the timing of the health event possesses economically valuable information.

For instance, let's consider the measurement of the long-term health effects of plausibly exogenous changes in education or immigration policies. As argued above, survival methods and ordinary least squares methods may provide different results. Both sets of point estimates may be informative in their own right but, from the fiscal perspective, the estimates stemming from survival methods potentially provide more economically valuable information on the differences in outcomes between different treatment groups especially in very long follow-ups.

1.4.3   Fair innings

Besides the economic rationale, there are equity principles in health care that place priority in resource allocation to the young rather the old. According to the so-called "fair innings" argument, premature death is a misfortune whereas it is not a tragedy die in old age (Williams, 1997). This argument suggests that all people are entitled to equal expected quality-adjusted life years, and those who have already exceeded this the fair share of health, should be given less priority in resource allocation in health care. Considering the repercussions related to mental health shocks and poor mental health states at young age, the "fair innings" argument support the idea that governments that value equity should emphasize measures that reduce this health inequality. To be in line with fair innings, early intervention in mental health is be used as an integral measure in public health care in order to allow more equal opportunities for those with worse than average health endowments.

2 SUMMARY OF THE ESSAYS

2.1 Forced migration and long-term mental disorders in post-WWII Finland

In this essay, we examine the impact of forced migration in the World War II on long-term mental health. Psychiatric literature considers migration as a risk factor mental disorders, including schizophrenia and mood disorders. Immigrant status is often associated with poor mental health, but contrasting results have also been found. The mixed evidence highlights the challenge of estimating causal effect of migration on mental health. This challenge arises from unobserved confounding factors between the migrants and the natives. Finnish-Soviet wars during World War II provide a compelling "natural experiment" framework in forced migration that eradicates problems related to these confounders. The end of World War II caused considerable territorial losses for Finland. Altogether, 430 000 people (11 percent of the entire Finland's population), living in the ceded regions had to be evacuated. These Finnish Karelian evacuees were resettled to the remaining parts of the country. The Finnish resettlement policy, aimed relocate the displaced Finns to areas that resembled their place of origin and together with their fellow villagers. Farmers were given land and assistance to establish new farms in locations resembling their old farms in terms of soil quality and average temperature. Furthermore, the forced migrants were compensated for their financial losses.

Using high-quality Finnish administrative register data, we have an unusual opportunity to study the long-term effects of forced migration on mental disorders. The basis of our data is 10% sample of Census 1950. This Census 1950 provides information on the date of birth, municipality of birth and residence, family, occupations and education. Most importantly, this data includes also retrospective data on the municipality of residence, socio-economic status and occupation for September 1939. Because these measures date to two months before the start of the Winter War, we are able to identify those who are displaced and who are not with high precision.

Using personal identifiers, we are able link the individual-level data from Census 1950 with nationwide hospital discharge and outpatient visits register data and drug register information on mental health and combine these with socioeconomic register data from 1970 to 2012. This data allows us to track individuals born 1910-1945 from 1939 until 2012 and to examine their psychiatric admission history in 1971-2012.

Benefiting from this very long administrative data follow-up, we find that forced migration had a small protective effect against mental disorders in later life. In contrast, the self-selected group of non-displaced persons who migrated voluntarily during the same period has a higher risk of psychiatric admissions than non-migrants.

This difference between non-experimental and experimental results highlights the importance of an appropriate research design when measuring the impacts of migration. Overall, the results indicate that migration itself may not pose a risk in mental disorders but the positive association typically found between migration and mental disorders is likely driven by confounders.

2.2 Mental disorders and lifetime earnings

We have witnessed a secular rise in the documented share of mental and substance disorders of the global disease burden. The burden is particularly high among ages below 30. Yet little is known about lifetime labor market costs attributable to mental disorders nor the related heterogeneity by the age of onset of psychiatric conditions. This paper contributes by documenting the lifetime labor market performance deficits related to severe mental health-related problems. Using longitudinal socio-economic and health register data with a 45-year follow-up, I document that psychiatric admission history is associated with substantial losses in labor market performance. The lifetime perspective minimizes biases related to shorter snapshots in follow-ups which might occur because association between current and lifetime earnings differ systematically by age, adolescent-onset psychiatric disorders are subject to relatively high mortality rates and dropout in survey-data. I show that the length of follow-up differs considerably by age at first admission and that the excess mortality is particularly high among the ones who are treated at young ages. This will lead to a discrepancy between the lifetime and contemporary associations.

I demonstrate that the lifetime earnings of those with a psychiatric admission history is about 37 percent smaller relative to those with no psychiatric admission history. Age of first admission matters for the labor market deficit of mental disorders. Having the first admission one year earlier than the affected controls is associated with €10 000-13 000 loss. The results are broadly similar whether the comparisons are made between upper secondary school students with similar school performance,

within same-sex siblings or within same-sex twins. Overall, results provide an economic rationale for early intervention in mental illnesses as productivity deficits are larger, the earlier first psychiatric admissions emerge.

2.3 Economic consequences of psychiatric disorders: An event study approach

There is a vast amount of literature documenting the link between mental disorders and labor market performance. However, due to the endogenous relationship between mental health and labor market performance, it is challenging or even practically impossible to find a research design that could provide an unbiased estimate for an effect. This paper provides new evidence on immediate changes in labor market outcomes following the first psychiatric admission to a health care facility. To reduce the confounding in selection to psychiatric treatment, I exploit variation in the timing of the first psychiatric admission to estimate the effect of first psychiatric treatment on labor market performance. In effect, I implement a dynamic difference-in-differences estimation that aims to provide the treatment group a control group that exhibits close to parallel trends (or common trends) in outcomes before the admission. To interpret the estimates for labor supply responses as causal, we need to impose an assumption that the timing of the shocks within a short period of time is as good as random.

I show that comparison of affected individuals who vary only with regard to the timing of psychiatric admission, one is able to bring the labor market trajectories of these two groups closer to each other. However, the tests for pre-trends show that parallel trends assumption is does not hold for the majority of the psychiatric disorders. Taking the analysis to subsamples according to types of psychiatric diagnosis, I show that anxiety and other stress-related disorders exhibit common trends between the treatment and the control group. This suggests that anticipation bias is a considerably smaller concern in anxiety disorder diagnoses. This result is likely to due to the nature of anxiety disorders: they tend to be of acute nature relative to other psychiatric diagnoses. The negative response in the labor market participation is particularly strong and lost lasting in acute stress disorders and post-traumatic stress disorders.

The study shows that a careful choice of control group may provide more meaningful descriptions of an effect in studying the relationships between mental disorders and labor market outcomes. However, the assumption of parallel trends is primarily met only in psychiatric conditions that are of acute nature rather than chronic. For policymakers, the results provide information on the short- and medium term losses

in productivity and societal resources following the first psychiatric admission. I demonstrate that the expected losses are comparable to those caused by cancer in the medium-term.

List of References

Allgulander, C., 1989. Psychoactive drug use in a general population sample, Sweden: correlates with perceived health, psychiatric diagnoses, and mortality in an automated record-linkage study. American journal of public health, 79(8):1006–1010.

Altonji, J. G., Elder, T. E., and Taber, C. R., 2008. Using selection on observed variables to assess bias from unobservables when evaluating Swan-Ganz catheterization. American Economic Review, 98(2):345–50.

Angrist, J. D. and Pischke, J.-S., 2010. The credibility revolution in empirical economics: How better research design is taking the con out of econometrics. Journal of economic perspectives, 24(2):3–30.

Berkman, L. F., Kawachi, I., and Theorell, T., 2015. Working Conditions and Health. Oxford University Press, Oxford, UK.

Bhugra, D., 2004. Migration and mental health. Acta Psychiat Scand, 109(4):243–258.

Bloom, D. E., Cafiero, E., Jane-Llopis, E., Abrahams-Gessel, S., Bloom, L. R., Fathima, S., Feigl, A. B., Gaziano, T., Hamandi, A., Mowafi, M., et al., 2012. The global economic burden of non-communicable diseases. Technical report, Program on the Global Demography of Aging.

Blossfeld, H., Golsch, K., and Rohwer, G., 2007. Event History Analysis with Stata. Taylor & Francis.

Bound, J. and Solon, G., 1999. Double trouble: on the value of twins-based estimation of the return to schooling. Economics of Education Review.

Brown, G. W. and Harris, T., 1978. Social origins of depression: A study of psychiatric disorder in women, volume 1. New York: Free Press.

Burgard, S. A., Brand, J. E., and House, J. S., 2009. Perceived job insecurity and worker health in the United States. Soc Sci Med, 69(5):777–785.

Cantor-Graae, E. and Pedersen, C. B., 2013. Full spectrum of psychiatric disorders related to foreign migration: A danish population-based cohort study. JAMA Psychiatry, 70(4):427– 435.

Cantor-Graae, E. and Selten, J.-P., 2005. Schizophrenia and migration: A meta-analysis and review. Am. J. Psychiatry, 162(1):12–24.

Case, A. and Deaton, A., 2015. Rising morbidity and mortality in midlife among white non-Hispanic Americans in the 21st century. Proc Natl Acad Sci U S A, 112(49):15078–15083.

Cheung, K. L., Ten Klooster, P. M., Smit, C., de Vries, H., and Pieterse, M. E., 2017. The impact of non-response bias due to sampling in public health studies: A comparison of voluntary versus mandatory recruitment in a Dutch national survey on adolescent health. BMC public health, 17(1):276.

Ødegaard, O., 1932. Emigration and insanity. Acta. Psychiatr. Neurol., Suppl.

Durkheim, E. (1897. Suicide (translated into English by John A. Spaulding and George Simpson). [Edited by George Simpson]. The Free Press.

Dustmann, C. and Gorlach, J.-S., 2016. The economics of temporary migrations. Journal of Economic Literature, 54(1):98–136.

Frijters, P., Johnston, D. W., and Shields, M. A., 2014. The effect of mental health on employment: Evidence from Australian panel data. Health Economics, 23(9):1058–1071.

Garcia-Perez, M., 2016. Converging to American: Healthy immigrant effect in children of immigrants. American Economic Review, 106(5):461–66.

Getanda, E. M., Papadopoulos, C., and Evans, H., 2015. The mental health, quality of life and life satisfaction of internally displaced persons living in nakuru county, kenya. BMC Public Health, 15:755.

Giuntella, O., 2017. Why does the health of Mexican immigrants deteriorate? new evidence from linked birth records. Journal of Health Economics, 54(Supplement C):1–16.

Givord, P. and Maurin, E., 2004. Changes in job security and their causes: An empirical analysis for France, 1982-2002. European Economic Review, 48(3):595–615.

Goldman, N., Pebley, A. R., Creighton, M. J., Teruel, G. M., Rubalcava, L. N., and Chung, C., 2014). The consequences of migration to the united states for short-term changes in the health of Mexican immigrants. Demography, 51(4):1159–1173.

Grant, B. F., Stinson, F. S., Hasin, D. S., Dawson, D. A., Chou, S., and Anderson, K., 2004. Immigration and lifetime prevalence of DSM-IV psychiatric disorders among Mexican-Americans and non-hispanic whites in the united states: Results from the national epidemiologic survey on alcohol and related conditions. Archives of General Psychiatry, 61(12):1226– 1233.

Greve, J. and Nielsen, L. H., 2013. Useful beautiful minds—An analysis of the relationship between schizophrenia and employment. Journal of Health Economics, 32(6):1066–1076.

Haapea, M., Miettunen, J., Läärä, E., Joukamaa, M. I., Järvelin, M.-R., Isohanni, M. K., and Veijola, J. M., 2008. Non-participation in a field survey with respect to psychiatric disorders. Scandinavian Journal of Public Health, 36(7):728–736.

Hakulinen, C., Elovainio, M., Arffman, M., Lumme, S., Pirkola, S., Keskimaki, I., Mander- backa, K., and Böckerman, P., 2019a. Mental disorders and long-term labour market outcomes: Nationwide cohort study of 2 055 720 individuals. Acta Psychiatrica Scandinavica, 140(ja).

Hakulinen, C., Elovainio, M., Arffman, M., Lumme, S., Suokas, K., Pirkola, S., Keskimäki, I., Manderbacka, K., and Böckerman, P., 2019b. Employment status and personal income before and after onset of a severe mental disorder: A Case-Control Study. Psychiatric Services.

Haukka, J., Suvisaari, J., Sarvimaki, M., and Martikainen, P., 2017. The impact of forced migration on mortality: A cohort study of 242,075 Finns from 1939–2010. Epidemiology, 28(4).

Hultman, C. M., Torrang, A., Tuvblad, C., Cnattingius, S., Larsson, J.-O., and Lichtenstein, P., 2007. Birth Weight and Attention-Deficit/Hyperactivity Symptoms in Childhood and Early Adolescence: A Prospective Swedish Twin Study. J Am Acad Child Adolesc Psychiatry, 46(3):370–377.

Kessler, R. C., Angermeyer, M., Anthony, J. C., De Graaf, R., Demyttenaere, K., Gasquet, I., De Girolamo, G., Gluzman, S., Gureje, O., Haro, J. M., et al., 2007. Lifetime prevalence and age-of-onset distributions of mental disorders in the world health organization's world mental health survey initiative. World psychiatry, 6(3):168.

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., and Walters, E. E., 2005a. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the national comorbidity survey replication. Archives of general psychiatry, 62(6):593–602.

Kessler, R. C., Chiu, W. T., Demler, O., and Walters, E. E., 2005b. Prevalence, severity, and comorbidity of 12-Month DSM-IV disorders in the national comorbidity survey replication. Arch Gen Psychiatry, 62(6):617–627.

Kivimaki, M., Honkonen, T., Wahlbeck, K., Elovainio, M., Pentti, J., Klaukka, T., Virtanen, M.,änd Vahtera, J., 2007. Organisational downsizing and increased use of psychotropic drugs among employees who remain in employment. J Epidemiol Community Health, 61(2):154– 158.

Knapp, M. and Wong, G., 2020. Economics and mental health: The current scenario. World Psychiatry, 19(1):3–14.

Layard, R., 2013. Mental health: The new frontier for labour economics. IZA Journal of Labor Policy, 2(1):1–16.

Lee, E. S., 1966. A theory of migration. Demography, 3(1):47–57.

Miettunen, J., Suvisaari, J., Haukka, J., and Isohanni, M., 2011. Use of register data for psychiatric epidemiology in the Nordic countries, chapter 8, pages 117–131. John Wiley & Sons, Ltd.

Montgomery, E. and Foldspang, A., 2008). Discrimination, mental problems and social adaptation in young refugees. European journal of public health, 18(2):156–161.

OECD, 2018. Health at a Glance: Europe 2018. Health at a glance: Europe. OECD.

Palloni, A. and Arias, E., 2004. Paradox lost: Explaining the Hispanic adult mortality advantage. Demography, 41(3):385–415.

Quetelet, L. 1842. A Treatise on Man and the development of his faculties (translated into English by Dr. R. Knox). [Edited by T. Smibert.].

Ravenstein, E. G. (1885). The laws of migration. J. R. Stat. Soc ., 48(2):167–235.

Riosmena, F., Wong, R., and Palloni, A., 2013. Migration selection, protection, and acculturation in health: A binational perspective on older adults. Demography, 50(3):1039–1064.

Rohde, N., Tang, K., Osberg, L., and Rao, P., 2016. The effect of economic insecurity on mental health: Recent evidence from Australian panel data. Social Science & Medicine, 151:250 – 258.

Rose, R. J., 2005. Prenatal programming of behavior: a twin-study perspective. Neuroscience & Biobehavioral Reviews, 29(2):321–327.

Salokangas, R. K. R., 1973. Mielisairaus yhteiskunnallisena ilmiönä: Sosiologinen tutkimus vuosina 1949-50 ja 1959-60 psykoosin vuoksi ensikertaa mielisairaalaan tulleista turkulaisista henkilöistä. Master's thesis, University of Turku, Finland

Santavirta, T., Santavirta, N., Betancourt, T. S., and Gilman, S. E., 2015. Long-term mental health outcomes of Finnish children evacuated to Swedish families during the second World War and their non-evacuated siblings: cohort study. Br. Med. J., 350.

Santavirta, T., Santavirta, N., and Gilman, S. E., 2017. Association of the world war II Finnish evacuation of children with psychiatric hospitalization in the next generation. JAMA Psychiatry.

Sarvimäki, M., Ansala, L., Eerola, E., Hämäläinen, K., Hämäläinen, U., Pesola, H., and Riihela, M., 2014. Maahanmuuttajien integroituminen suomeen: Liite vatt analyysin lukuun 5. Technical Report 67.

Sarvimäki, M., Uusitalo, R., and Jäntti, M., 2019. Habit formation and misallocation of labor: Evidence from forced migrations. available at https://ssrn.com/abstract=3361356.

Selten, J.-P. and Cantor-Graae, E., 2005. Social defeat: Risk factor for schizophrenia? Br J Psychiatry, 187(2):101.

Selten, J.-P., van Os, J., and Cantor-Graae, E., 2016. The social defeat hypothesis of schizophrenia: Issues of measurement and reverse causality. World Psychiatry, 15(3):294– 295.

Stenback, A. and Achté, K., 1964. An epidemiological study of psychiatric morbidity in Helsinki. Acta Psychiatrica Scandinavia, 39(S180):287–307.

Stillman, S., Gibson, J., McKenzie, D., and Rohorua, H., 2015. Miserable migrants? Natural experiment evidence on international migration and objective and subjective well-being. World Development, 65:79–93.

Stillman, S., McKenzie, D., and Gibson, J., 2009. Migration and mental health: Evidence from a natural experiment. J. Health Econ., 28(3):677–687.

Suvisaari, J., Aalto-Setalä, T., Tuulio-Henriksson, A., Härkänen, T., Saarni, S. I., Perälä, J., Schreck, M., Castaneda, A., Hintikka, J., Kestila, L., Lähteenmäki, S., Latvala, A., Koskinen, S., Marttunen, M., Aro, H., and Lonnqvist, J., 2009. Mental disorders in young adulthood. Psychological Medicine, 39(2):287–299.

Swinnen, S. and Selten, J.-P., 2007. Mood disorders and migration. Br J Psychiatry, 190(1):6.

Tsuchiya, N., Nakaya, N., Nakamura, T., Narita, A., Kogure, M., Aida, J., Tsuji, I., Hozawa, A., and Tomita, H., 2017. Impact of social capital on psychological distress and interaction with house destruction and displacement after the Great East Japan earthquake of 2011. Psychiatry and Clinical Neurosciences, 71(1):52–60.

van Os, J., Wichers, M., Danckaerts, M., Van Gestel, S., Derom, C., and Vlietinck, R., 2001. A prospective twin study of birth weight discordance and child problem behavior. Biol Psychiatry, 50(8):593–599.

Waris, H., Jyrkila, V., Raitasuo, K., and Siipi, J., 1952.Siirtovaen sopeutuminen. Otava, Helsinki.

Williams, A., 1997. Intergenerational equity: An exploration of the 'fair innings' argument.

Health Economics, 6(2):117–132.

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