

LIIS ROOSAAR

Essays on labour mobility
and labour productivity



DISSERTATIONES RERUM OECONOMICARUM
UNIVERSITATIS TARTUENSIS

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School of Economics and Business Administration, University of Tartu, Estonia

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LIST OF THE AUTHOR'S PUBLICATIONS AND CONFERENCE PRESENTATIONS

Journal Articles

Roosaar, Liis; Mõtsmees, Pille; Varblane, Urmas. (2014). Occupational Mobility over the Business Cycle. *International Journal of Manpower*, 35 (6), 873–897.

Roosaar, Liis; Masso, Jaan; Varblane, Urmas. (2019). Age-related Productivity Decrease in High-waged and Low-waged Employees. *International Journal of Manpower*, 40 (6), 1151–1170.

Roosaar, Liis; Varblane, Urmas; Masso, Jaan. (2022). Churning and Labour Productivity in Economic Crisis, Differences Between Foreign and Domestic Firms. *Eastern European Economics*, 60 (2), 113–148.

Conference Presentations

Roosaar, L. (2017) The structural change and labour productivity of companies: do changes in age and wage structure of employees matter? 'Exploring technology upgrading in emerging and transition economies: from 'shifting wealth I' to 'shifting wealth II'?', UCL, London, United Kingdom, 26–27.06.2017

Roosaar, L. (2018) Relationship between the Age, Wage and Productivity of Employees in Estonia. AABS (the Association for the Advancement of Baltic Studies) conference, Stanford University, Palo Alto, USA, 1–3.06.2018

Roosaar, L. (2018) Relationship between the Age, Wage and Productivity of Employees in Estonia. The Inaugural Baltic Economic Conference, Vilnius, Lithuania, 11–12.06.2018

Roosaar, L. (2018) Relationship between the Age, Wage and Productivity of Employees in Estonia. EACES (European Association of Comparative Economic Studies) Conference, Warzaw, Poland, 6–8.09.2018.

Roosaar, L. (2021) Churning and Labour Productivity in Economic Crisis, Differences Between Foreign and Domestic Firms. Baltic Economic Conference, Tartu, Estonia, 7–8.06.2021.

INTRODUCTION

List of papers

The thesis consists of three publications, referred to in the text of this and subsequent chapters by their respective numbers:

Study 1: Roosaar, Liis; Masso, Jaan; Varblane, Urmas. (2019). Age-related Productivity Decrease in High-waged and Low-waged Employees. *International Journal of Manpower*, 40 (6), 1151–1170.

Study 2: Roosaar, Liis; Mõtsmees, Pille; Varblane, Urmas. (2014). Occupational Mobility over the Business Cycle. *International Journal of Manpower*, 35 (6), 873–897.

Study 3: Roosaar, Liis; Varblane, Urmas; Masso, Jaan. (2022). Churning and Labour Productivity in Economic Crisis, Differences Between Foreign and Domestic Firms. *Eastern European Economics*, 60 (2), 113–148.

Motivation for the research

Labour productivity indicates how much human capital delivers value to the firm. Labour productivity growth determines the developments in real output growth in the medium run, together with growth in total hours worked (Gomez-Salvador et al., 2006). Numerous factors affecting firm-level productivity have been analysed in the literature (see e.g. Syverson, 2011). This thesis concentrates on the role of labour mobility. As each worker can be described according to his/her individual productivity, the productivity of a firm is formed from the sum of the individual productivities of the workers. However, the firm's stock of workers can change for various reasons, and the change in the composition of workers may also affect the firm's productivity dependent on which workers have moved. The availability of register-based micro-level data has made it possible to add more detail to our knowledge of the role of labour in productivity. It has been shown that employee movements from foreign owned firms increase productivity in the receiving domestic firms (Görg and Strobl, 2005; Masso and Vahter, 2019). Stoyanov and Zubanov (2012) indicate that simply hiring employees from more productive firms increases productivity in the receiving firms. The effect appears to be larger if the moving employees have higher levels of human capital; for example, if they are managers and high-wage employees (Masso and Vahter, 2019) or highly skilled workers (as in Stoyanov and Zubanov, 2012). In addition, the time of the labour mobility may be important because in an economic crisis, reallocations may accelerate and resources may shift away from low-productivity firms towards high-productivity firms (Foster et al., 2016).

The time of labour mobility is considered in this thesis, analysing it in different phases of the business cycle, but the primary attention is turned to a period of

economic recession. Recessions cannot be avoided or escaped. As shown by the Covid-19 crisis the underlying reasons for recessions are not always economic and the outburst of a (global) crisis cannot always be predicted a long time in advance. Therefore, the most reasonable strategy is to be prepared and to make sure that all the options are used to keep the firm resilient in recessions. Changes in the nature of labour mobility during recessionary periods of the business cycle may affect the productivity of firms. Modestino et al. (2020) have shown that high unemployment during recessions may lead firms to raise their requirements for the education of future recruits and experience upskilling (also indicated in Devereux, 2002). However, the research is relatively scarce about the relationship between labour mobility and productivity in recessionary periods.

In short, gradually moving from general to more specific the following questions are investigated in this thesis: (i) How do individual characteristics affect the productivity of employees? (ii) How do the individual characteristics of moving employees change in different phases of the business cycle? (iii) Can firms use economic recessions as times of low level of voluntary labour mobility and a relatively large pool of unemployed employees to replace the least productive employees with relatively more productive ones?

Before analysing labour mobility, it is important to understand which characteristics potentially have a positive effect on the labour productivity of individuals. The productivity of future employees is an important factor for firms when choosing a suitable candidate among potential recruits. However, the individual productivity of candidates is difficult to determine. Therefore, firms may *inter alia* use observable signals from job candidates; for example, years of schooling and age. The ageing¹ of workers in the labour market is not considered a favourable quality, stereotypically older workers are perceived to be weaker and less adaptable to change than younger workers (Viviani et al., 2021). According to human capital theory, senior workers are less often offered opportunities to participate in training due to their shorter period of return and this may affect their human capital and productivity levels (Skirbekk, 2004). The age-productivity curve has been found to have an inverted U shape (see the literature survey by Skirbekk, 2004 and Viviani et al., 2021). Therefore, firms have less incentives to hire older employees. Nevertheless, some studies have found that the age-productivity curve may be different for some occupations (e.g. Veen 2008 and Van Ours 2009). If their result could be generalised to a larger group of occupations, efforts in dealing with productivity decreases related to ageing could be more focused on the occupations that show a significant decrease of productivity. This line of inquiry, dividing employees into high- and low-wage employees, is followed in this thesis.

Characteristics of employees may *inter alia* be important determinants indicating which groups of workers are more mobile compared to other groups. This makes it possible to clarify which groups of workers are not mobile enough and

¹ Ageing has been defined as the ‘persistent decline in the age-specific fitness components of an organism due to internal physiological deterioration’ (Rose, 1991:20).

which groups may be too mobile in the labour market. Occupational mobility as a form of labour mobility is analysed in this thesis. Occupational mobility shifts the industry or occupation-specific human capital between economic sectors (Song et al., 2003; Masso et al., 2012) and also supports innovation in firms through knowledge transfers (Kaiser et al., 2011), but according to Kambourov and Manovskii (2004), it could also lead to the loss of occupation-specific knowledge. Therefore, occupational mobility could act as a facilitator or as the hinderer of structural change over the business cycles. However, the role of different individual characteristics that are related to occupational mobility over the business cycle is relatively under-researched. Therefore, the previous result by Moscarini and Vella (2008) that the role of personal characteristics decreases in recessions is reinvestigated and elaborated on in this thesis.

Theoretically, more productive firms are in general more motivated and able to attract capital as well as labour compared to less productive firms. Therefore, the latter are forced to increase their productivity or stop operating. (Barnett et al., 2014) During recessions the process of reallocation may accelerate. The speed of labour reallocation in the economy is usually measured using labour turnover (Cazes and Nesporova, 2001). Based on Estonian data, job turnover has been analysed (Rõõm and Viilmann, 2003) as well as worker reallocation during the Great Recession (Meriküll, 2011). The author of the latter stresses in the conclusion that the importance of the effect of human capital on labour mobility increased during the crisis. Therefore, it is of interest to investigate other phenomena that take place during the recessionary period in addition to structural changes. As structural changes only relate to job creation and destruction, the preferred indicator in this thesis is labour churning rate² that enables us to analyse labour mobility that is not related to structural reasons (Cazes and Nesporova, 2001). Moreover, the inversed U-shape of the relationship between employee turnover rate and productivity has already been shown to exist by Harris et al. (2006) (in an Australian sample of small and medium firms, years 1995–97) and De Winne et al. (2019) (for Belgian firms 1999–2008). For churning, a positive relationship with TFP has been indicated by Ilmakunnas and Maliranta (2007). This thesis shows that the relationship between churning rate and labour productivity has the shape of an inverted U and it changes with the phases of the business cycle.

² Churning is labour reallocation in excess of that required to accommodate gross job flows (OECD, 2009). Churning includes hiring and separation, and churning rate is larger than zero only if hirings as well as separations occur during the observed period. If some workers leave but no new workers are hired, labour turnover is larger than zero and churning is zero. Hiring without any workers leaving affects neither of the indicators. If all employees are replaced, then labour turnover is 100%, but churning is 200% because this indicator also includes hiring, but both are divided by the number of employees. In the case of an equal number of hirings and separations during the observed period, labour turnover always equals half of the churning rate. If one of the two numbers (hirings or separations) is higher, the churning rate decreases.

Changes in the nature of labour mobility during recessionary periods of the business cycle may affect only the productivity of certain groups of firms. Foreign owned firms are more productive than domestic firms (Xu et al., 2022). Moreover, foreign-owned firms may have ownership advantages (e.g. financial), which may help them compete in the market during turbulent times (Varum and Rocha, 2011). Therefore, they may profit more than domestic firms from labour mobility related to non-structural reasons due to upskilling during recessions. There is a whole strand of literature comparing the domestic and foreign firms in crisis periods. In positive cases, foreign-owned firms may act as stabilisers because compared to domestic firms in the host country less employees lose jobs and as a result the economy in the host country can recover relatively faster³ (empirically shown in Athukorala, 2003; Lipsey, 2004). Previous empirical research has compared, for example, firm survival (see extensive overview in Wagner and Gelübcke, 2012), and employment growth (Alvarez and Görg, 2007). However, labour churning in domestic and foreign firms during recessionary periods have not been compared to the best of the author's knowledge.

Estonia is a perfect case study for analysing labour mobility during economic recession. Estonia is a former transition country where radical economic and social reforms started between 1989 and 1992; but the period of 1995–1998 has already been described as a period of economic stabilisation (Lauristin and Vihalemm, 2009). By 2003, Estonia had reached the final stage of the transition process and considerably less structural changes were expected than during the decade before (Rõõm and Viilmann, 2003). If transition in the labour market is defined as the displacement of many employees from manufacturing and agriculture to the service sector, the transition in Estonia was relatively faster than in other Baltic states, and by 2001 the employment structure was approaching the averages of the European Union (Arro et al., 2001).

Independent Estonia faced a typical transitional crisis in the early 1990s, in late 1998 there was a crisis in Estonia as a consequence of the Russian crisis (Eamets et al., 2003). In 2009, Estonian GDP fell 14.1 per cent due to a crisis that was a combination of the global financial crisis as well as overheating of the Estonian economy caused by the lending boom of Scandinavian banks through 2004–2007. This crisis was exceptional due to the severity of the decline in GDP. It was also the first economic crisis where transition processes did not have an important role to play. At the same time, public expenditure was not increased in Estonia and fiscal consolidation was the chosen strategy (Raudla and Kattel, 2011). Additionally, monetary policy could be used as an adjustment tool only to a limited extent (Varblane, 2017). This is very different compared to the next

³ In economic recessions the role of foreign-owned firms in the host country may also be negative. Foreign-owned firms can transfer production facilities internationally and simply exit the host economy in case of difficulties (Varum and Rocha, 2011). Then the foreign-owned firms act as destabilizers because compared to domestic firms in the host country more jobs are lost, output and business activities of the host country decline, and it takes longer to recover from the recession.

global Covid-19 related crisis that included a stimulus package by the government estimated at approximately 4.5% of GDP in Estonia (Raudla and Douglas, 2020). Therefore, in 2009 most of the adjustment had to take place in the labour market. As labour markets in the Baltic states are highly flexible (Masso and Krillo, 2011), the Estonian labour market at that time forms an almost perfect experimental setting where all the processes of labour mobility during a recession should be observable.

Conceptualisation of the research

Many papers analyse sector-specific productivity factors referring to long lists of very specific factors to determine the most important ones in this sector (e.g. Wagner and Ruhe, 2018; Mandloi and Singh, 2022). There are also multiple ways these productivity-related factors can be divided into categories. This thesis uses the two broad categories specified by Syverson (2011) (external and firm-level productivity factors) and instead of discussing the relative importance of different factors, the categories are used to create a systematic overview of the most general factors that affect firm productivity as well as to indicate the position of labour mobility among other factors.

Knowledge base among firm-level productivity factors is dependent on the workers of the firm (and more specifically on their skills and human capital). According to human capital theory, deliberate investments in education help to acquire skills/human capital, and therefore increase the individual's productivity, that in turn can increase the earnings of the individual (Becker, 1964, 1967; Ben-Porath, 1967; Mincer, 1958).

Firms control the knowledge base mainly through job flows (job creation and job destruction). In the case of firing current workers and hiring new ones as replacements, firms affect the knowledge base through worker flows. However, workers themselves also initiate worker flows through voluntary moves that the firm cannot fully control, and in the case of their best workers would like to avoid. Workers may decide to move between labour market states (e.g. leave employment for inactivity etc.), they may change occupations and change jobs. Job flows and worker flows together form labour market flexibility at the micro level (Eamets, 2013). Voluntary moves make the knowledge base only partly a firm-level productivity factor since it partly remains an external productivity factor. In addition, a firm's decisions concerning job flows are also made based on external conditions, and this makes the knowledge base an external productivity factor to an even greater extent.

Job-to-job flows in general are caused by people trying to find the best job for their skill sets (Bosler and Petrosky-Nadeau, 2016); in other words, people try to find a good match. A good match is a necessary condition for the worker to stay in his/her job in a firm for a long time. Matches result from trade in the labour market and the matching function describes the flow of matches based on two arguments: searching workers and vacant jobs. Labour market frictions caused

by information imperfections or other similar factors are captured without explicit reference to the source of the friction. The low mobility of workers is considered one such form of frictions. (Petrongolo and Pissarides, 2001)

The theoretical foundations of job-to-job mobility are stated in search theory. In the traditional model, unemployed choose a reservation wage before an offer is received from a firm and the job that offers at least the reservation wage is held until retirement. Choosing two reservation wages makes it possible to continue the costly job search if the job offer involves a wage that remains between the two reservation wages. (Burdett, 1978)

Another firm-level productivity factor in focus in this thesis is ownership, as according to the OLI paradigm, multinational firms have three types of advantages compared to other firms: ownership (represented by O), location (L) and internalisation (I) advantages (Dunning, 2001). This also leads to productivity advantages through channels like higher engagement in innovation, telecommunication, and labour cost reduction, while financial constraints are less likely for foreign-owned firms (Xu et al., 2022).

During recessions, the decline in demand forces firms to decrease recruitment and as a result unemployed have less opportunities to be hired (Jackman and Savouri, 1992). Decreasing recruitment means that a smaller number of jobs is created, and more jobs are destroyed than during an economic boom. If there are less jobs available, information costs increase and awareness of the crisis lowers the reservation wages of the unemployed (Faggian, 2021). Resulting from lower job search activity, the mobility of labour also decreases (McDonald and Felmingham, 1999).

Two effects of an economic recession are possible in matching theory. First, according to the traditional view, a cleansing effect may lead to the destruction of low-productivity matches, as firms have a bigger pool of applicants available (Schumpeter, [1943] 2003; Bachmann, 2005). Second, a sully effect may worsen the quality of newly created matches if the job search (that could lead to better matches) declines and workers accept poorer matches (Barlevy, 2002). If the cleansing effect is present in the economy during an economic crisis, (labour) resources should move to the most productive firms, thus to a large extent to foreign owned firms that have also other advantages next to higher productivity.

Research aims and tasks

The aim of this thesis is to provide insights into labour market flexibility at the micro level as a factor of labour productivity in different phases of the business cycle.

All three studies (the central part of this thesis) use data for Estonia covering inter alia the period of the economic crisis (Great Recession) in 2008–2009. Therefore, in studies 2 and 3 the data are divided into three phases of the business cycle and the differences between the results have been analysed. Although Study 1 also analyses the data from the three phases of the business cycle, there were no

discernible differences between the three periods and this part of the analysis had to be left out of Study 1. Worker flows and job flows (that form labour market flexibility at the micro level) play a central role in all three studies, but different specific measures are used across the studies. The existence of job-to-job flows in general makes it possible to analyse the productivity of employees in Study 1. Occupational mobility analysed in Study 2 is a more specific type of job-to-job flow involving in addition to job changes also changes in occupation. The compact indicator churning that joins the concepts of worker flows and job flows is the main object of interest in Study 3. Another common trait in all three studies is turning attention to the quality of labour that partly presents the knowledge base (which is a factor related to labour productivity). Although occupational mobility influences the productivity of firms, productivity is not analysed in Study 2, while Study 1 and Study 3 both turn attention to labour productivity. Total Factor Productivity (TFP) was also calculated, but labour productivity was preferred because of the more robust results and because of the smaller number of missing observations. As employers and employees meet in the labour market, the viewpoints in studies also change. Study 1 uses information from both sides – conclusions about the employee age-productivity curve (separating additionally low-wage and high-wage employees) are made based on the firm level indicator of labour productivity. Study 2 looks at labour mobility mainly from the side of the employees and Study 3 looks at labour mobility from the firm's side.

Figure 1 below depicts the general scheme of the most important topics or aspects of each of the three studies in the framework of firm-level factors of productivity. Inputs (capital, intangible capital and labour) are used in firms to generate output. The ratio of a firm's output to its inputs (productivity) is often used to describe this process. Firms can affect productivity inter alia through changes in management, ownership and the knowledge base. Productivity-related factors outside the focus of this thesis are not depicted in the figure. The business cycle is an important factor in the background that affects the whole system (e.g. through external factors like competition). The business cycle also affects labour market flexibility at the micro level that determines how the knowledge base of the firm can be formed and transformed in time.

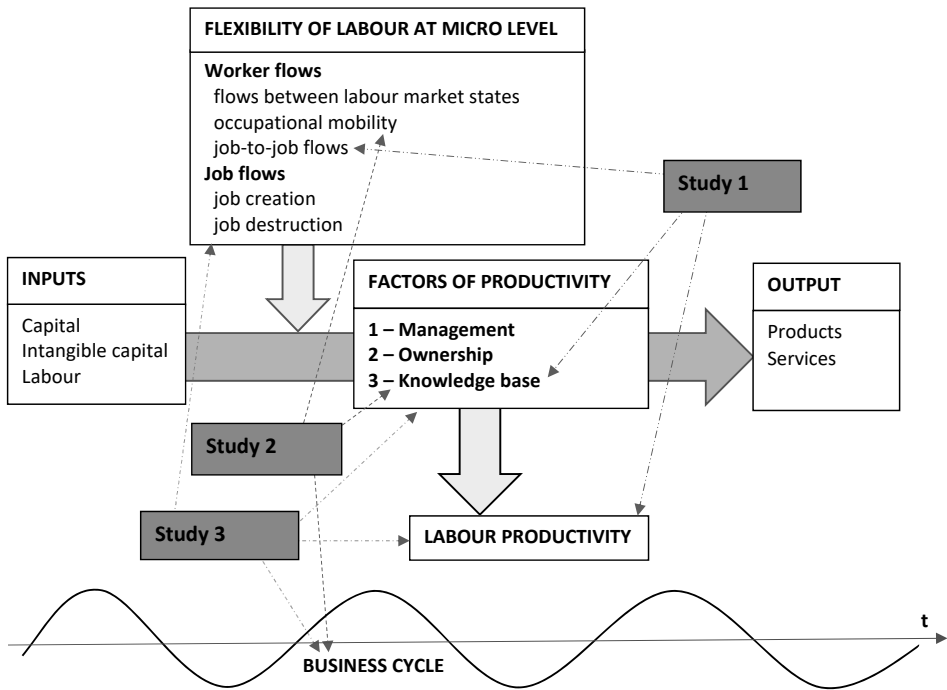


Figure 1. Firm-level factors of productivity

Source: Syverson 2011 and Eamets 2013, with modifications by the author.

Note: Gray dotted lines indicate which objects are considered in each of the studies.

Study 1 contributes to literature related to **human capital theory**, clarifying empirically how differences in the working experience (and thus differences in learning by doing⁴) of high-waged and low-waged employees can generate differences in the age-productivity curve for the two groups of workers. Study 2 contributes to the literature on **search and matching theory**, indicating empirically which characteristics of employees are related to occupational change in all phases of the business cycle, even in a recession where high unemployment has lowered the search effort. Study 3 contributes to the literature on **search and matching theory** by analysing empirically the relationship between labour churning and labour productivity in times of economic crises, when higher unemployment allows firms to increase their education and experience requirements for future recruits. Study 3 also contributes to the literature related to **Dunning’s OLI** paradigm indicating another labour mobility indicator (churning) that foreign owned firms may be able to use in order to be more resilient than domestic owned firms during an economic crisis.

⁴ Learning by doing was not part of the initial human capital theory, but it was added by Killingsworth (1982).

To fulfil the aim of this thesis, the following specific research tasks are addressed.

Theoretical and empirical background of the thesis (Chapter 1 of this thesis)

1. To provide a general overview of the factors of productivity, indicate the effect of the business cycle on these factors and illustrate the position of labour mobility among factors of productivity.

Study 1

2. To compare the productivity of hired high-waged and low-waged employees in different economic sectors.
3. To measure the productivity of hired young, middle-aged and old employees and compare the results.
4. To evaluate the productivity differences of high-waged employees and low-waged employees in three different age groups.

Study 2

5. To investigate the level of occupational mobility in all phases of the business cycle.
6. To compare the occupational mobility for blue- and white-collar employees of different skill levels over the business cycle.
7. To evaluate the role of individual characteristics explaining occupational mobility in three phases of the business cycle.

Study 3

8. To examine the level of churning for foreign and domestic firms in three phases of the business cycle.
9. To measure and compare the relationship between productivity change for all firms and labour churning during economic crisis, boom and recovery.
10. To analyse the difference of the relationship between labour churning and labour productivity in foreign and domestic firms.

Data and methodology

Studies 1 and 3 use Estonian employer-employee data combining different data from several surveys and databases. Data on the wages of individual employees and employing firms comes from the Estonian Register of Employment (*Töötamise register*) owned by the Estonian Tax and Customs Office and containing all employees with whom an employer has entered into an employment contract. Background information on firm level is taken from the Estonian Commercial Register (*Äriregister*). The register includes government-owned firms but government institutions and non-profit organisations are excluded. Unfortunately, the background information for employees is more difficult to obtain. Using the unique anonymised personal code of employees, the employment registry data is matched with the data collected via other surveys and registers. The age and gender

variables, for example, are taken from the Estonian Population and Housing Census (*rahvaloendus*) 2011 from Statistics Estonia. While the birth year of the employee does not vary year by year, the education variable is more troublesome. This variable, at the time of writing Study 3 had to be merged from the 2011 Census, and had to be assumed to be the same during all years of the survey.⁵ The initial merge also required some additional data for firms (e.g. data related to exporting) to be merged from Statistics Estonia's Statistical Profile for Enterprises (*Eesti ettevõtjate statistiline profiil*) 2006–2013.

Although the data is available for all months of the year in the register of employment, in Study 1 and Study 3 the wage data from January each year has been considered. January is a logical choice as it is a month of 31 days and all new regulations like minimum wage increases and changes in individual taxation usually enter into force at the beginning of this month. Also, seasonal workers are unlikely to distort the data in January. For each person, only the wage of his/her main job is taken into account (in case of more than one job, the job with the highest wage has been chosen). In more recent research using the same data, some authors have also used the wages from October because structural statistics on earnings and on labour costs are calculated based on data from October by Statistics Estonia (e.g. Masso et al., 2021a).

In Study 2, data from the Estonian Labour Force Survey (ELFS) has been used. This is a survey that uses stratified systematic sampling. Stratification ensures that different groups of the population are represented because a sample is selected in each smaller non-overlapping homogenous group – stratum (Labour force survey...). In the ELFS, stratification is made by place of residence. The 15 counties of Estonia and Tallinn are partitioned into four strata according to population size (I – Tallinn, II – four bigger counties (Harju (without Tallinn), Ida-Viru, Pärnu, Tartu), III – ten smaller counties (Jõgeva, Järva, Lääne, Lääne-Viru, Põlva, Rapla, Saare, Valga, Viljandi, Võru), IV – (Hiiumaa county)). The target population comprises all people aged 15–74 years residing permanently in Estonia. Different inclusion probabilities are used in each stratum. (Pettai and Lelumäe, 2013)

The ELFS has been carried out as a quarterly survey since 2000, although it started as an annual survey in 1997. Rotation is used as respondents who are interviewed in two consecutive quarters are temporarily removed for the next two quarters and interviewed again for the following two quarters. The data is collected practically uniformly over all the weeks of the quarter. (European Commission 2014) The ELFS data offers a wide range of information related to working status, characteristics of the employing firm as well as the job itself or reasons for inactivity or unemployment. Moreover, there is data concerning the

⁵ Starting with year 2012 the data from population register can be merged to the employer-employee database based on the anonymised personal code. The population register was not available for researchers at the time when Study 3 was written. Also, the education information in the population register may not be up-to-date because updating it is not compulsory or necessary for receiving any services from the state.

person's background (e.g. language skills and education level). An ad hoc module with questions varying each year adds more depth to the indicators in the database. The only drawback of the ELFS is the limited sample size. In 2007, the sample was increased from 2,500 to 3,000 households questioned quarterly (European Commission 2014). In Study 2, data from the years 2001 to 2010 is used. This covers 64,300 observations from three stages of the Estonian business cycle – recovery from the previous crisis 2001–2004, the boom period 2005–2007 and the recession 2008–2010.

In Study 1, the methodology follows the decomposition technique proposed by Ilmakunnas and Maliranta (2007). The technique is repeated three times: first, to compare high-wage employees with low-wage employees, then to check the result of Ilmakunnas and Maliranta (2007), the productivity of three age groups has been compared and finally both variables are used together to compose age-productivity curves for high-waged and low-waged employees. In addition, employees are divided into groups of hired, separated and staying employees based on whether they joined the firm, left it or stayed in the same firm. Based on the shares for these groups, the relative measures for the productivity of newly hired employees and separated employees of a certain type are calculated. Ilmakunnas and Maliranta (2007) used the ordinary least squares method and instrumental variables, but it was not possible to use instrumental variables in calculations with Estonian data. For example, the shares of homeowners for separations would have been available only for 2011 from the Census. The ordinary least squares technique with firm-level fixed effects has been used in this thesis. As a robustness check the threshold for separating between high-wage and low-wage employees was changed by one standard error.

In Study 2, the probability of employees changing their occupation has been analysed. A binary regression was used to explore the relationship of explanatory variables with the binary dependent variable. The main independent variables were age, gender, marital status, four occupational groups (high-skilled and low-skilled, white- and blue-collar), region (5 NUTS 3 level regions), Estonian language, sector (primary, secondary and tertiary and construction separately), number of employees in the workplace, and number of subordinates. Interactions of the ownership variable and four occupational skill groups were added to better understand the relationship of the ownership variable. In the second specification, interactions of four occupational skill groups and sectors were analysed. The whole sample has been divided into three periods to check if the relationships change in the three phases of the business cycle.

Study 3 uses the multivariate ordinary least squares technique with firm or year fixed effects to explore the relationship between labour productivity change and churning flows. In order to reduce the possibility of inverse causality affecting the results, lagged variables are used where possible. In particular, the churning variable is lagged. In addition, the regression equations include the firm and year fixed effects. As an additional robustness analysis, to minimise the differences between the samples of foreign and domestic firms, propensity score matching has been used. Due to using employee-employer data in Study 3 and a general churning

variable, the focus is not on personal variables although they are included as background information for the quality of churning. None of the methods used in the thesis is able to detect causality, thus all the conclusions are only based on relationships between variables.

Research tasks and data availability have shaped the research methodology used in the three studies. In Table 1 below the methods and data sources are shown next to the research tasks.

Table 1. Research methods and data used in the thesis

Study	Task	Method	Data
1	Tasks 2–4	Decomposition of total labour productivity growth, multivariate OLS with firm and year fixed effects.	Estonian matched employee-employer data 2006–2014
2	Tasks 5–7	Descriptive analysis Binary regression with and without interaction terms	Estonian Labour Force Survey 2001–2010
3	Task 8–10	Descriptive analysis Multivariate OLS with firm and year fixed effects, propensity score matching	Estonian matched employee-employer data 2006–2013

Source: based on Studies 1–3.

Structure and scope of the thesis

This thesis consists of three chapters that proceed as follows. Chapter 1 provides a detailed overview of the theoretical and empirical background to productivity related factors. The information has been organised into four sub-chapters

- The first sub-chapter introduces the concepts of productivity and the business cycle.
- The second sub-chapter gives a short overview of the productivity factors in the external environment of the firm.
- The third sub-chapter is devoted to productivity factors within firms that the firms can influence themselves.
- The fourth sub-chapter provides an overview of labour related decisions that form labour market flexibility at the micro level.

Three original empirical research papers are provided in Chapter 2. In Chapter 3 the first sub-chapter gives a short overview of the empirical findings of each study included in the thesis. The second sub-chapter discusses the results synthesizing the findings with the research tasks. In addition, the limitations of the current thesis and ideas for future research are listed in the third sub-chapter.

Contribution of individual authors to the studies of the dissertation

All three studies are co-authored, but the author of the current dissertation has performed the central part of all the studies. Studies 1 and 3 were co-authored with associate professor Jaan Masso and professor Urmas Varblane, who both contributed to conceptualising the initial idea of the studies, providing guidelines related to the theoretical framework and presentation of the results. Jaan Masso also provided advice related to data analysis and writing codes in Stata. Study 2 was co-authored with Pille Mõtsmees and professor Urmas Varblane, who contributed to formulating the research question, setting up the theoretical background and discussing and presenting the results. All co-authors for each study provided feedback on the text written by the main author. The author is solely responsible for any errors or omissions in this thesis.

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To say *I have learned a lot* would be an extreme understatement of the extent of knowledge I gained during my PhD studies, and many people have played an important role during that journey.

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1. FRAMEWORK FOR ANALYSING LABOUR MOBILITY AND PRODUCTIVITY IN THE PHASES OF THE BUSINESS CYCLE

1.1. Productivity and the business cycle

According to the most general definition, productivity is the ability to convert inputs into outputs (Syverson, 2011). There are three possible ways to conceptualise productivity: (i) a factor-neutral (aka Hicks-neutral) shifter of the production function (e.g. more output produced with the same amount of input causes a shift down and left in the production function's isoquants); (ii) a ratio of output to inputs (this is total factor productivity); (iii) shifter of the producer's cost curve (lower level of costs allows to produce more outputs per input) (De Loecker and Syverson, 2021). Although productivity is a simple statistic in practice, the importance of productivity lies in its relation to overall economic growth, growth in real per capita incomes, and inflation; therefore, productivity growth can be considered a fundamental measure of economic health (Steindel and Stiroh, 2001). Small percentages are common for describing annual productivity growth, but a productivity growth from 1 per cent to 2 per cent could halve the time (from 72 to 36 years) needed to double living standards (Sharpe, 2002).

Productivity can be measured via multifactor productivity (MFP) or total factor productivity (TFP) if all the inputs are included, and it can be defined as the increase in output resulting from technological change holding all inputs constant (Kohli, 2004). Lipsey and Carlaw (2000) call this the "conventional view" of total factor productivity and partially support the definition where TFP measures externalities and scale effects of technological change. If the output is only related to one input (e.g. capital or labour), it is a partial measure of productivity. The most well-known of the partial productivity measures is labour productivity. It has been argued that labour productivity is more closely related to current living standards, while TFP depends on arbitrary assumptions. (Sargent and Rodriguez, 2001) Sharpe (2002) clarifies that although labour productivity by name only describes the effects of labour, it actually includes the effect of all factors that affect productivity, including capital accumulation, technical change and the organization of production. The intensity of labour effort that labour productivity also presents is usually rather small compared to these factors. Over the long term, the standard of living can only be increased through a productivity increase⁶ (Sharpe, 2002). Tangen (2005) emphasizes that productivity is relative and a decrease or increase in productivity can only be determined through variations from "standard" over time or through changes over time. For accurate

⁶ Actually, the standard of living depends on the relationship between wages and labour productivity. Wages growing faster than labour productivity lead to lower levels of investment in capital and slower technological development causes labour productivity (as well as wages) to decrease over longer period of time. (Tamašauskienė and Stankaitytė, 2013)

international comparisons, Sharpe (2002) thinks exchange rates based on purchasing power parities (PPP) are more appropriate, as the exchange rate should equalise the basket of goods and services between countries.

Historically, Solow (1957) first concluded in his model that technological change was responsible for most economic growth based on the residual after the contribution of labour and capital had been calculated. Denison (1962) broke down the rate of real national income or product for the USA among its sources and attributed economic growth to several sources, such as increases in the education of the labour force, economies of scale, the contribution of capital, advances of knowledge and the speed with which it is incorporated into production. In more recent models, for example, in the neoclassical view, capital accumulation (broadly defined) drives growth in the short-run, but in the long run the diminishing returns cause productivity growth to result from exogenous technical progress. In the new growth theory, productivity growth can continue indefinitely, and technical change is explained internally (Stiroh, 2001). This means that technology is viewed as a product of economic activity, and it is internalised into a model of how markets operate (Cortright, 2001). While ideas are considered to be the most important factor for growth in new growth theories, different authors may stress different sources of ideas; for example, investment in human capital, investment in new capital goods, or spending on research and development (Sargent and Rodriguez, 2001). For example, Romer (1990) in his model lets growth be driven by technological change that arises from intentional investment decisions made by profit-maximising agents.

The business cycle was first defined in 1927 by Mitchell and later revised in Burns and Mitchell in 1946 (page 3). It is considered a classic definition and frequently used in the literature:

Business Cycles are a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises: a cycle consists of expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle; this sequence of changes is recurrent but not periodic; in duration business cycles vary from more than one year to ten or twelve years; they are not divisible into shorter cycles of similar character with amplitudes approximating their own.

The slowing down or cessation of growth is not enough to qualify as a business cycle contraction. Therefore, contractions cannot be too short (as they are cumulative movements) and a decline of less than six months historically has not been considered a contraction. Instead of a single indicator, it is important to look at many diverse activities that cannot be easily reduced into a single aggregate. (Moore and Zarnowitz, 1984) Moreover, these economic indicators may fluctuate at different speeds and thus be in diametrically different turning points at the same time (Gabisch and Lorenz, 1989).

The normal state of the economy is expansion. There is a Business Cycle Dating Committee in the National Bureau of Economic Research that keeps a record of the chronology of US business cycles. The committee defines a recession as the period between a peak of economic activity and its subsequent trough, or lowest point. Three interchangeable criteria are used: (i) depth (the recession has to involve a significant decline in economic activity), (ii) diffusion (the recession has to be spread across the economy), and (iii) duration (the recession has to last more than a few months). If one criterion reveals extreme conditions the recession may be announced despite weaker signs from others (Business Cycle Dating, 2021) Before Juglar different economic crises were viewed as disconnected events, but he discovered (as set by Schumpeter) that crises are turning points between prosperity and depression and they cannot be separated from the whole wave-like movement of recurrent expansions and contractions (Schumpeter, 1939; Moore and Zarnowitz 1984). Thus, Juglar moved the crisis *per se* out of focus and the problem of the economic cycle became important instead (Legrand and Hagemann, 2007).

The medium-length waves (around 7–11 years) are called Juglar cycles. Usually Juglar cycles are the business cycles that are discussed without specifying the name of the cycle, but there are longer and shorter cycles among the four that are considered classical cycles. Juglar considers three periods in a business cycle: the crisis, the period before the crisis (prosperity) and the period after the crisis (liquidation). He says that the duration of the phases varies, and therefore each crisis is different. (Juglar, 1886) He admits that crises create difficulties, but says that they are useful and necessary to eliminate excess and bring equilibrium back to the system (Besomi, 2010). Gabisch and Lorenz (1989) claim that after World War II the average length of Juglar cycles has diminished to 5–7 years in most Western countries.

1.2. External factors of productivity

External factors of productivity are productivity factors that firms as a rule cannot affect in order to change their productivity. Figure 2 below illustrates that external productivity factors can be divided into four categories. Some subcategories are also brought out to better indicate the position of labour market flexibility at the micro level among external productivity factors. Three of the productivity factors below are very briefly described as they form the background for the analysis of firm-level productivity factors.

The activities of firms may affect the productivity levels of other firms through the spillover effect (Syverson, 2011). Due to the comparison of foreign firms and domestic firms in Study 3 the spillover effects between these two groups of firms are of interest here. A voluminous amount of research has been devoted to analysing the spillover effects from foreign direct investments (FDI) to domestic firms due to the higher productivity of firms with FDI compared to domestic firms.

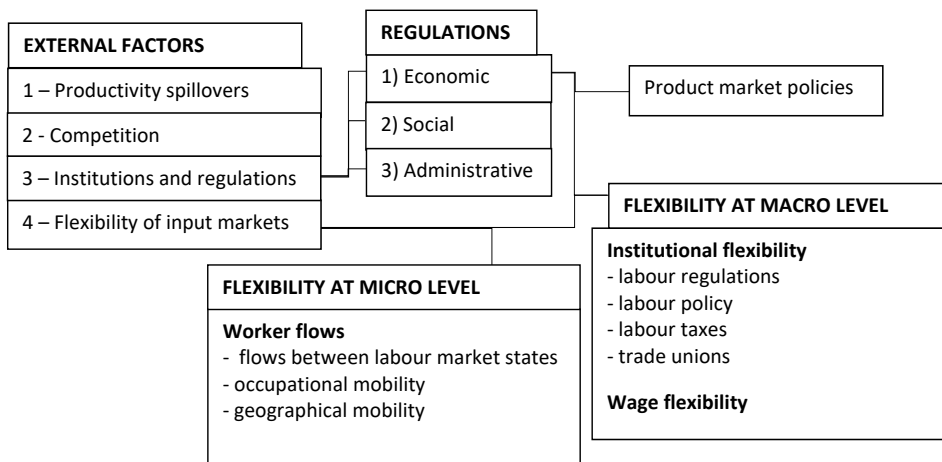


Figure 2. External productivity factors (that the firm cannot control) with subcategories and interrelations

Source: Syverson 2011 and Eamets 2013, with modifications by the author.

Note: At the micro level, labour market flexibility also includes job flows that the firm can control and therefore are not shown in this figure. The categories not shown are not described in detail in the text.

There are several dimensions to consider in such analyses; for example, whether the spillovers are horizontal (within the same sector), backward (from FDI to local suppliers) or forward (from FDI to local buyers), whether the spillovers are technological (and channelled through imitation behaviour, increased competition, labour mobility or vertical linkages) or whether there is a negative market stealing effect. In addition, different definitions of foreign firms may be used. A meta-analysis based on 52 quantitative studies of EU-15 and new member states concluded that FDI has indeed an indirect spillover impact on productivity and ultimately on economic growth, and although the size of the impact differs, policies promoting inflows of FDI can enhance productivity⁷ (Bruno and Cipollina, 2018). Spatial analysis using inter alia GPS data from China indicates that intra-regionally spillovers do not depend on spillover channels and tend to be negative; the sign of the inter-regional spillovers depends on the channels. Knowledge spillovers, for example, have relatively wider geographic scope. Furthermore, the negative market stealing effect does not seem to have a boundary in China. (Lin and Kwan, 2016) MacGaughey et al. (2018) found weakening and finally disappearing positive effects for FDI with a 10% threshold of shares, but for FDI with at least 50% of shares they found positive and robust spillovers. Economic recessions are only seldom considered in the analysis of spillovers, but results

⁷ The authors used the MRA (meta-regression analysis) approach combining empirical results from different studies. They tested the null hypothesis that different point estimates, treated as individual observations, are equal to zero. They used all three estimates – horizontal, backward and forward spillovers.

based on Spanish data indicate that horizontal and forward spillovers are greater in magnitude during recession years while the negative effect of backward spillovers is smaller in magnitude (Barge-Gil et al., 2019).

Competition as a factor of productivity is included in this thesis due to its importance in the context of economic recessions. Escribano and Stucchi (2014) even interpret a recession as an exogenous increase in competition that causes a reduction in demand and increases the threat of liquidation. The selection effect and treatment effect can be differentiated in the analysis of competition. The selection effect means that in competitive markets, market selection based on productivity makes the correlation between productivity and competition observable only among surviving plants, and low-productivity plants are forced out of the market. In the case of the treatment effect, (competition is considered an input of the production function) more competitive markets act as an incentive to take various actions in order to increase productivity. Aggregated productivity may thus increase due to both within-firm effects and between-firm effects of competition. In a recent survey, competition was shown to have a treatment effect on productivity (Backus, 2020). An earlier literature survey indeed confirmed that in nearly all the reviewed studies increases in competition led to increases in industry productivity (Holmes and Schmitz, 2010). In services, firms with higher TFP had higher survival probability but an increase in competition did not provide an incentive to raise their TFP (Breda et al., 2019). Economic recession substantially changes the impact of this factor. Based on Spanish manufacturing firms, Escribano and Stucchi (2014) show that convergence in productivity levels between firms during the recession in 1992–1993, where low-productivity laggard firms were forced to become more productive, while the threat seemed less ominous for market leaders.

In general, ‘institutions are formalised rules that may be enforced by calling upon a third party’ (Streeck and Thelen, 2005:10) and policies are institutions as they set legitimate rules that are implemented and if necessary, enforced by a third party (Streeck and Thelen, 2005). The OECD (1997) divides regulations into three categories: (i) economic regulations intervene directly in market decisions such as pricing, competition, market entry, or exit; (ii) social regulations defend public interests⁸ (e.g. health, safety, the environment, and social cohesion) and (iii) administrative regulations can be described as paperwork and administrative formalities (for collecting information and interfering in individual economic decisions.) Labour market institutions are part of labour market flexibility at the macro level, and therefore set the conditions for flexibility at the micro level. For example, policies that enhance labour market flexibility are expected to reduce unemployment (Bernal-Verdugo et al., 2012). As the data used in all three studies

⁸ The effect of social regulations on productivity is acknowledged. Porter hypothesis for example states that opposite to the hitherto prevalent views strict environmental policies could enhance productivity through pollution-reducing innovation (Porter, 1991). Several research articles have confirmed the hypothesis (e.g. Franco and Marin 2017 or Hassan and Rousselière, 2021). However, the hypothesis is not discussed in more detail to maintain the focus of the thesis.

in Chapter 2 of this thesis are from Estonia only, the effect of institutions and regulations does not need to be analysed in great detail. However, some examples of regulations affecting productivity and some interrelationships between different regulations are briefly described below.

Significant links between product market policies and productivity have been found. Lowering entry barriers and state control seems to hasten the process of catching-up to best-practice technologies in manufacturing industries. Privatisation also seems to add direct productivity gains. (Nicoletti and Scarpetta, 2003) Égert (2016) confirmed the relationship between anticompetitive product market regulations and lower MFP levels. However, based on his empirical results (OECD countries, annual data for 30 years), he also proposed that this relationship between regulations and MFP may depend on the level of labour market regulations. Lower MFP levels can be detected in the case of more stringent employment protection, and more restrictive barriers on trade and investment. In a similar manner, the impact of labour market regulations on productivity also seems more complex and not clear cut. The comparison between the UK, which has more lenient employment regulations, and highly regulated Germany has pointed out that the general negative linear relationship between regulatory stringency and productivity growth does not always hold. Therefore, the general question of less or more regulations does not seem to be accurate. Instead it should be asked if the regulations and institutions could be tailored in the best possible way to support achieving the necessary outcomes. (Brookes et al., 2018) Égert (2016) can conclude that spending on active labour market has a positive influence on MFP only if employment protection is low.

Economic crises without doubt affect policies. In the UK, for example, an emergency budget was introduced in June 2020 that on the one hand dealt with the challenge of rebalancing the UK economy but on the other hand still had to provide the conditions for sustainable growth (Cook et al., 2020). Rebalancing is not such a pressing question during an economic upturn. Bourlès et al. (2010) also emphasize that the need to find ways to improve productivity growth through suitable policies is particularly important in the recovery phase. In Estonia during the Great Recession, the implementation of the new Employment Contracts Act in 2009 was impacted by the government's need to balance the state budget. As a result, measures increasing the security and protection of workers were postponed because increases in the spending of the Unemployment Insurance Fund could not be allowed. As during the recovery phase, social guarantees were still not increased in line with growing state revenues, the reform reduced security and increased flexibility in the labour market.⁹ (Eamets et al., 2017; Tavits, 2012)

⁹ In some other countries too flexibility part of flexicurity has been implemented without security part and it has not necessarily involved any economic crisis.

1.3. Factors of productivity within the firm

Firm-level productivity factors such as management, ownership and knowledge base are described in more detail in this subchapter. While management is the narrowest concept of the three factors and not directly the focus of the three studies, it is still mentioned in this thesis, as managerial advantages may partly form the ownership advantage (as intangible capital) that the firm possesses according to the OLI paradigm to start competing successfully in a foreign country (Driffield et al., 2021). Knowledge base to a great extent refers to the people who work in the firm and they are the main focus of this thesis; therefore, more in-depth analysis of this factor follows in the next chapter. However, other important components of knowledge base are briefly explained in the current chapter, such as learning-by-doing and intangibles, ICT, R&D and innovation. Ownership as a firm-level productivity factor in this thesis is considered to include two aspects: (i) ownership of shares by foreign firms, and (ii) ownership of certain production processes (instead of outsourcing) in vertical or horizontal integration.

Poor management can lead to discordant production operations, but managerial inputs can be very abstract and difficult to measure, resulting in researchers analysing one single industry or firm in one article (Syverson, 2011). Based on international telephone interviews with open questions, Bloom and Van Reenen (2007) have empirically shown that better management practices are strongly associated with superior firm performance in terms of productivity. They also claim that apparently inferior management practices are related to the combination of (i) low product market competition and (ii) the primogeniture principle in family firms. More recently, Broszeit et al. (2019) have confirmed the positive relationship between management score and establishment level productivity in Germany. The larger the establishment size the stronger the relationship because in smaller firms the role of management is also smaller. A comparison of management scores in the United States and Germany allows the authors to even conclude that management partly causes differences between aggregate productivity between Germany and the United States. For the construction sector in New Zealand, Ghodrati et al. (2018) tested different management strategies and found that communication and incentive programmes have a strong positive relationship with labour productivity in construction.

Phases of the business cycle may have an important role in how firms are managed. Adjusting more quickly than other firms or even anticipating a recession could have a positive effect on a firm's performance (Navarro et al., 2010; Kash and Darling, 1998). Mascarenhas and Aaker (1989) indeed find that adjusting strategies systematically over the stages of the business cycle and taking action before other firms typically act may help to profit from lower adjustment costs or help to differentiate a firm from others. For example, in technologically demanding and highly innovative industries, instead of cutbacks and retrenchment during recessions (but also during boom periods) increasing sales and advertising, breadth of production, and geographic coverage has been shown to improve performance (Pearce and Michael, 1997). In the case of using cost-cutting such as cutbacks,

layoffs or downsizing, the psychological safety of stayers is an important aspect for the management and re-engaging stayers (which is often forgotten) may be key to future success (Tiwari and Lenka, 2016). Moreover, based on Swedish data, seemingly great crisis managers may be less capable of managing relationships, which may be detrimental to crisis management in the long term (Fors Brandebo, 2020).

Information technology (IT) and research and development (R&D) are both part of the knowledge base in a firm and have been both shown to be related to the productivity of firms. For instance, Tang and Wang (2019) have indicated, based on Canadian manufacturing firms, that while R&D improves productivity, investment in ICT¹⁰ is among the internal factors that affect the efficiency of R&D (next to management practices, skilled workforce, firm size, firm's market power and product positioning business strategy). Therefore, R&D is a complex factor that also requires investments in activities that support R&D investments. At the same time, R&D expenditures are one of the common measures of innovation (Manso et al., 2017).

ICT has been shown to play a critical role in the success of innovations of strategic importance through the cost-effectiveness it helps to achieve in developing new business designs (Markides and Anderson, 2006). In addition, and more generally, Brynjolfsson et al. (2008) stress that IT can replicate and encourage innovations, helping firms to outpace competitors. Hall et al. (2013) confirm that R&D as well as ICT both have a strong association with innovation and productivity. Both contribute to productivity directly and indirectly through the innovation equation. They show that while R&D is more important for innovation, ICT investments are more important for productivity in the case of Italy. The correlation between the two factors is also stressed in analyses that use Indian data, suggesting that IT and R&D have significant complementary effects on labour productivity (Khanna and Sharma, 2018). Although Syverson (2011) only refers to product innovation as a factor for productivity gains, other types of innovations may also be related to production efficiency and factor saving (that lead to productivity gains). While the share of total sales that are due to innovative products is a frequently used continuous indicator for product innovation, the other types of innovations (e.g. process or organisational) can often be included as dummy variables only in quantitative analysis (Polder et al., 2010).

The three factors (innovation, ICT and R&D) are related to business cycles through the procyclicality of R&D activities (the latter is described, for instance, in Schmöller and Spitzer (2020) and also in Bielecki (2017)). In the United Kingdom, during the Great Recession the proportion of innovating firms fell by nearly a third, recovering after four to six years (unevenly dependent on exact sectors and regions) (Roper and Turner, 2020). Innovative firms also gain a growth premium of different size over the different stages of the business cycle

¹⁰ In this thesis, the concepts of ICT and IT are used interchangeably and as defined by Dewan and Kraemer (2000), four components are included: computer hardware, software, communications, and services.

(Spescha and Woerter, 2019). Based on Korea's example in more developed countries where innovation is tightly related to productivity growth, the effect of R&D investment on productivity is stronger in industries that are close to the technology frontier and during economic recessions¹¹ (Lee, 2016). Hong (2017) could even show bidirectional Granger-causality between R&D investment and economic growth for Korea's ICT industry. The particular country researched seems to be important indeed because R&D expenditures have been shown to Granger-cause GDP in Finland, France and Spain, but GDP causes R&D expenditures in Denmark (Çetin, 2013).

Simple learning by doing can among other firm-level factors have a positive effect on productivity as options for process improvement become evident through cumulative experience. Earlier studies have described the effect for aircraft assemblers (Benkard, 2000), shipbuilding in shipyards during World War II (Thornton and Thompson, 2001) and auto assemblers (Levitt et al., 2013). The more recent studies analyse learning-by-doing also for taxi drivers (d'Alessandro et al., 2019) as well as for doctors treating heart attacks (Lundborg et al., 2021). On the one hand, Da Rocha et al. (2019) show evidence in Brazil that a high level of labour turnover can negatively affect the positive relation between learning and TFP. Chiang (2005) also indicated that in addition to past output, worker turnover within firms affects learning. On the other hand, Levitt et al. (2013) found that there are complementarities between learning and managerial practices, referring to the possibility that knowledge from learning by doing at the plant is in general not retained by the plant workers. Some productivity improvement systems may quickly translate the knowledge that line workers obtain into the plant's physical and organizational capital.

Learning by doing is a form of intra-organisational learning where through learning processes organisational units change through experience of their own (Argote and Ophir, 2002). Therefore, learning by doing is related to economic crisis because if organisational learning is present, it helps explain the organisation's resilience to economic crisis (Wallo et al., 2012). The positive effect of learning by doing refers to the possibility of a negative effect that is called forgetting-by-not-doing or loss-of-learning-by-not-doing. At the individual level, according to Khalifa (2015), the unemployed during a crisis lose skills through loss-of-learning-by-not-doing and the persistence of unemployment can be modelled without the ranking of job applicants, job competition, or labour mismatch etc.

Ownership among firm-level productivity factors means the firm's decision to have foreign owners or not. The eclectic paradigm proposed by Dunning in 1976 (Dunning, 1988) offers a robust and general framework for explaining the economic rationale of international production but also relates to relevant impact issues. To start international production, enterprises must perceive the advantages

¹¹ Although in recessions expenditure on R&D decreases, Ahmad et al. (2022) show that on average, the decrease is smaller than the average increase of the expenditure during the boom phase of the business cycle.

that compensate for the costs of setting up and operating a foreign operation. Foreign Direct Investments (FDI) are therefore in theory assumed to have a positive impact on the output and productivity of firms. If for example, the advantage for foreign-owned firms lies in superior technology then some of that technological knowledge is believed to spill over to the host-country economy, and employment opportunities are also expected to improve (Blomström et al., 1997, Lipsey, 2004) Therefore, FDI can contribute to the host country's economic development in an important way, but it has also been shown that the impact of FDI can differ across countries and industries (Fillat and Woerz, 2011; Kokko, 2006). At the same time, FDI may affect the host country negatively through foreign influence or crowding out of local firms (Blomström et al., 1997).

Ownership as presented in Figure 1 of this thesis also refers to vertical and horizontal linkages. Hortaçsu and Syverson (2007) indicated, based on cement and ready-mixed concrete plants, that higher productivity firms are more likely to vertically integrate and the advantage lies in the improvement of logistics coordination, but not only is vertical integration important, non-vertical firms can experience similar high productivity if they have large local operations. Aubochon et al. (2012) analysed plant level data from manufacturing firms in Germany and found a statistically significant positive impact of industry-level outsourcing intensity on labour productivity for the years 2000 and 2005. Contradictory results based on China and other developing countries (Brazil, Ecuador etc.) refer to the negative relationship between vertical integration and labour productivity (Li et al., 2017). The authors explain such a result with poor corporate governance that enables inefficient rent-seeking by insiders.

The concept of vertical integration is closely related to the concept of outsourcing. Vertical disintegration is defined as removing a whole process and purchasing its result from a supplier. This definition coincides with outsourcing unless the process is supplied from outside only partially. Empirically, it may be impossible to differentiate between the two. (Broedner et al., 2009) Total outsourcing plays a role in the productivity paradox of outsourcing, in the short-run outsourcing has a positive relationship with productivity, in the long run the productivity growth of firms that outsource is lower than in firms that do not outsource. The lack of control over the outsourced processes for long contractual periods limits organisational innovation and affects total factor productivity growth in the long run. (Windrum et al., 2009) During a crisis, nevertheless, Kar and Dutta (2018) think that the ability to outsource might help firms survive.

1.4. Human capital and labour market flexibility at the micro level

This chapter is devoted to labour market flexibility at the micro level. Firms as well as employees make certain simultaneous decisions that influence both parties mutually as well as labour market flexibility. In Figure 3 below, labour market flexibility at the micro level is divided into decisions by workers (worker flows)

and by firms (job flows). Some other important decisions are also listed. Human capital, for example, is important for the knowledge base of firms and also for the flexibility of labour due to the amount of human capital and skills that workers bring with them when hired or take with them when leaving the firm. Workers make decisions about their level of investment in human capital, but the activities of firms affect such decisions. On the side of the firm, certain strategies may help to retain valuable workers, but firms may not have enough incentives to use these strategies until employee mobility in the firm has increased to a certain level. Labour market flexibility at the macro level sets the background and consists of institutional flexibility and wage flexibility. Institutional flexibility includes, for example, labour policy, regulations and taxes, and trade union activities. The business cycle is another factor that in the figure below affects the decisions of firms and workers, but (as described in Chapter 1.2. in this thesis) may also influence the flexibility of labour at the macro level.

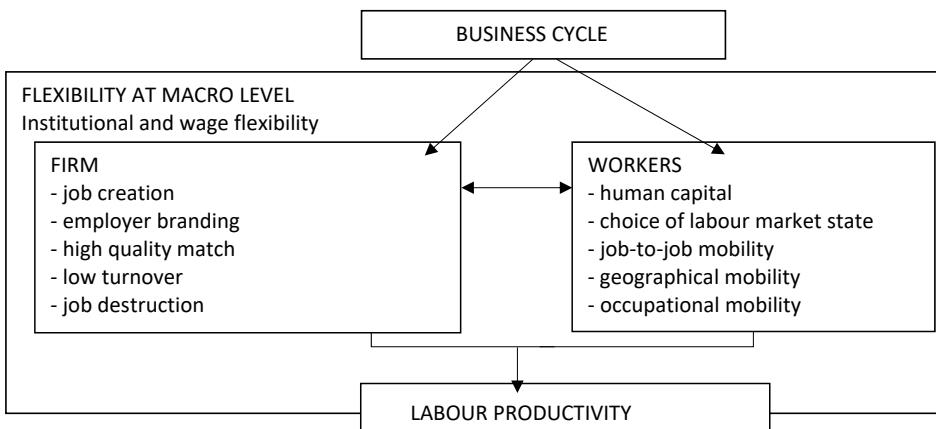


Figure 3. Decisions of firms and workers in terms of labour market flexibility at the micro level – flexibility at the macro level sets the background

Source: based on Eamets 2013, with modifications by the author.

Employees are hired in firms because of their human capital that helps to turn inputs into outputs. In the widely used human capital model (Becker, 1962; Ben-Porath, 1967; Mincer, 1958), human beings decide about the allocation of time over their life cycle maximising the present value of lifetime earnings. Earnings are collected in the market sector of the economy and depend on the person's productivity. The productivity can be increased through deliberate investments in education that help to acquire human capital. At the same time, the durability and malleability of labour skills (or market perceptions of them) is the basic presumption in human capital theory (Welch, 1975). Investments are costly, in addition to direct out-of-pocket costs, there are opportunity costs related to time that can be spent neither in the market sector nor in the household sector, where commodities are produced for the utility function. The optimal quantity of investment in human capital, therefore, varies over the life cycle. For example, the young

are more often investing in human capital than older individuals because of the longer period for returns. In such a setting, the stock of human capital depends on how individuals choose the optimal allocation of time between working and training. In an alternative setting, individuals maximise their utility by choosing between jobs with different opportunities for training and earning. In the case of general training, the productivity of an employee increases in the firm providing the training as it does also in other firms. In the case of specific training, the productivity of an employee increases more in the firm providing the training. (Becker, 1975) General training is financed by the employee while the cost and returns from specific training are shared by employees and firms (Veum, 1999). Arrow (1962) argues that learning is the product of experience and Killingsworth (1982) has used the idea to construct a “learning-by-doing” model in human capital theory, where learning takes place during market activities; therefore, time spent in market activities can also directly affect the stock of an individual’s human capital.

Over time, human capital theory has evolved to include the knowledge that much of the variation in labour earnings can be explained in terms of human capital, but the economic return from early interventions is high, and the return from later interventions is lower (Deming, 2022). This is related to the nature of learning: learning when a worker is older is more efficient and more likely to continue if a range of competencies (e.g. cognitive, social and emotional) have been mastered earlier on (Heckman, 2006). Forming foundational skills like literacy and numeracy has been researched, and it is clear how to produce such skills and their value in the labour market is understood. However, the economic value of higher-order skills is increasing and it is not yet clear what they are or how to measure and produce them. (Deming, 2022) Heckmann and Kautz (2012: 451) define soft skills as ‘personality traits, goals, motivations, and preferences that are valued in the labour market, in school, or in other domains’. Concerning the relationship between cognitive and soft skills, these authors conclude based on their literature review that ‘personality traits foster the development of cognition but not vice versa’ (page 462). More specifically, recent research on soft skills has included inter alia the analysis of teamwork and leadership skills. Edin et al. (2021) found, for example, that between 1992 and 2013, the economic return on these two skills (assessed by a psychologist) approximately doubled for Swedish men. This can be explained with technology and trade increasingly replacing cognitively demanding tasks over time even at the high end of wage distribution. Social and interpersonal skills should therefore be rewarded as they are more difficult to replace. (Deming, 2017) Sunde et al. (2021) show, based on the analysis of time preference in 76 countries, a strong correlation between patience and per capita income and the accumulation of physical capital, human capital and productivity.

The level of human capital in a firm depends on the human capital of all employees. In accordance with human capital theory, the relationship between productivity and firm in-house human capital measured in terms of education, experience, and cognitive skills, has been shown to be positive (Backman, 2014).

Additionally, the level of human capital can alter the relationship between productivity and some firm-level factors. For example, in the case of management, Bender et al. (2018) indicate that considering human capital in their calculations reduces the association between productivity and management practices by 30%–50%.¹² In the case of innovation in established firms, high-skilled employees can determine the success (and thus also failure) of innovative processes through formal and informal organisational mechanisms (Wejnert, 2002).

The individual productivity of potential recruits is not fully known to the firm when hiring a new employee. Therefore, all individuals can invest in a signal¹³ like education using his/her time and money (Spence, 1973). However, other visible signs, such as age, may have an effect if the employee is hired – firms may deem older individuals less productive. Due to the world-wide ageing of populations in developed countries, the productivity effects that might result from ageing have been thoroughly investigated on the macro as well as the micro level. At individual level, the conventional inverse U-shaped age-productivity curve is not always empirically confirmed (see e.g. Skirbekk, 2004 for an overview). The age-related differences of productivity can largely stem from the effect of age on education, physical abilities, job experience, and mental abilities (Skirbekk, 2004). The growth in average educational attainment and human capital stock (Lee and Lee, 2016), as well as the decline of physical abilities after the age of 30 years (Ilmarinen, 2001) favour the young, despite the decline in highly physically demanding jobs in the USA since 1970 (Johnson et al., 2011). The effects of job experience and mental abilities are more difficult to generalise. For job expertise, achieving expert competence (more specifically strategic and analytical competence) may take more than ten years in some fields (Skirbekk, 2008). The effect of work experience partly lies in improving tacit knowledge, professional competence, and cooperation skills to compensate for the decline in some cognitive processes (Ilmarinen, 2012). Mental abilities interfere with job experience and have complex links with age. While fluid abilities are independent of past experience, crystallised abilities on the contrary rely on accumulated knowledge¹⁴ (Skirbekk, 2004; Johnson et al., 2011). Therefore, dependent on the exact ability and different from physical abilities, some mental skills may even improve with age – like strategic thinking, consideration and language skills (Ilmarinen,

¹² However, the authors also reach the conclusion that management practice scores predict additional productivity that does not seem to be related to human capital and could be considered as „corporate culture“ (Bender et al. 2018).

¹³ This comes from signalling theory. Hiring is an investment decision made under uncertainty; therefore, observable data of the candidates ultimately determines the firm’s choice. While some data, like race or sex, cannot be changed, education may be subject to manipulation by the candidate. However, investing in education requires spending time and money and the individual does it only when there are sufficient returns (choosing signals that maximize the difference between offered wages and signalling cost) (Spence, 1973).

¹⁴ In a similar manner intelligence is divided into crystallised and fluid intelligence (Kan et al., 2013).

2012), or remain stable like procedural knowledge, verbal ability and interactive skills (Lallemand and Rycx, 2009).

Firms are responsible for job creation and job destruction and the business cycle also has an effect on this. In the standard theory of business cycles, changes in the unemployment rate result from aggregated shocks affecting all firms similarly, and therefore the theoretical value of the correlations coefficient of job creation and destruction is -1 (Arpaia and Curci, 2010). Based on US data, research has usually found a strong cyclical asymmetry of job flows over the business cycle, whereas job destruction varies much more than job creation (Stigl-bauer et al., 2003). Countries having a different institutional background affects this asymmetry. In Portugal, for example, job destruction in 2009 was unprecedented and nearly half of the total job destruction was caused by shutdowns. Inappropriate labour market institutions and severe macroeconomic imbalances made the recession exceed the resilience of the labour market. (Carneiro et al., 2014) In Germany, the unemployment rate at the same time was rather stable and subsidies to jobs were said to reduce the impact of the Great Recession on labour (Krause and Uhlig, 2012). Additionally, regional differences play a role in job creation and destruction in different phases of the business cycle. Eriksson and Hane-Weijman (2017) suggest that regions that are cohesive (i.e., with many skill-related industries) and diverse (i.e., with a high degree of unrelated variety) are more resilient. They also indicate that the resistance of regions to future shocks depends on their resistance to previous ones.

When jobs are created, filling vacancies is costly for firms. The cost to the firm of hiring has been shown to be convex and hiring additional workers increasingly expensive in the case of skilled workers in Germany (Muehlemann and Pfeifer, 2016). In 2001, from the firm's point of view, according to a survey, the cost of each manager or professional who resigned was equal to 18 months of their salary (Hay, 2002). "Hidden" costs also include the disruption to customer relations, costs related to the disruption of the work flow, and the decrease of morale for those who remain (Abbasi and Hollman, 2000). Therefore, in the labour market, there is competition for workers. In the competition for skilled workers the term "war of talent" has even been in use since the end of 1990s. Usually, two types of standard search models can be separated in the labour market. In the case of (i) a random search, wages are determined ex post in a bargaining setting (and they have no role in applications), while in (ii) a directed search, wages motivate applications and influence the probability of obtaining positions. Empirically, based on online job advertisements, explicit offers are preferred for simple jobs to save on screening costs by discouraging a large number of candidates. At the higher end of the wage distribution, differentiation between candidates is important and implicit wages also signal that the firm is open to bargaining. (Banfi and Villena-Roldán, 2019)

Next to wages, the attractiveness of the employer is important for recruiting. A whole strand of literature analyses employer brands as reputational factors that help gain competitive advantage (see Backhaus, 2016 for an overview). While some facets, like work atmosphere or career perspectives are rather universally

attractive in multiple cultural environments around the world, others like work-life comfort, task and payment attractiveness may have cross-national differences (Baum and Kabst, 2013). However, the usefulness of the employer's brand is not limited to attracting new employees, as it is an important determinant of employee engagement, and therefore also significantly impacts current employees (Bhasin et al., 2019). According to a meta-study, employee engagement¹⁵ levels influence the decisions of employees to continue working in the firm (Pandita and Ray, 2018). Employee engagement in turn is correlated with job satisfaction (Abraham, 2012). Training employees in aspects that they have and show an interest is related to the retention of talented employees (Govaerts et al., 2011). Employee retention is another independent topic in many research articles. Inter alia diminishing marginal utility has been shown for some types of rewards, and the comparison of the US and Germany has indicated that incentive plans designed for one country might have non-motivating consequences in the other (Rehu et al., 2005).

Despite everything that firms do to retain their best employees, the latter may still change jobs, occupations, and move from firm to firm. Firms can generate the involuntary mobility of workers by firing employees, but firms may have limited opportunities to influence the voluntary mobility of workers. The different types of worker mobility have different effects on worker productivity and the business cycle also plays a role. The reason for mobility in many cases is not known (as also in Studies 1, 2 and 3 in Chapter 2 of this thesis). However, even if respondents give their reasons for leaving a job, it may not reflect the true picture of involuntary and voluntary quits; partly because the anticipation of being dismissed in the near future could be registered as voluntary or involuntary quit and vague answers may be difficult to interpret (Borghans and Golsteyn, 2010). Some scientists may, therefore, decide to not use information about the voluntariness of quits (e.g. Light and McGarry, 1998). The first complete, stand-alone turnover theory was proposed by March and Simon in 1958, where the authors claim that there are two components affecting turnover: (i) the perceived desirability or undesirability of movement, and (ii) the perceived ease or difficulty of movement (Steel and Lounsbury, 2009). While the first of the components is related to voluntariness of the change, perceived ease is a component that is greatly affected by phases of the business cycle.

Search theory establishes that unemployed workers maximise their own discounted lifetime income in a market where job offers are considered random draws from a known distribution of wage offers. In such a situation, the best strategy is to choose a reservation wage before an offer is received. If the offer at least equals the reservation wage, the worker accepts it and does not leave the

¹⁵ Employee engagement is a wider concept than commitment. Bailey (2022:5) summarises definitions of engagement as 'a strategy for managing the workforce aligned with organizational objectives and aimed at giving rise to attitudinal, affective or behavioral responses on the part of the employee such as commitment, energy or performance, as well as personal wellbeing'.

new job before retirement because the cost of looking for a better job is too high. Searching for a job while working is possible in a framework where the unemployed worker chooses two reservation wages, W_X and W_Y where $W_X < W_Y$. In such a case, any job offer higher than W_X and lower than W_Y leads to looking for another job when employed (Burdett, 1978). Therefore, an on-the-job search can be incorporated into search theory. An economic crisis and a rise in unemployment theoretically affects job-to-job mobility negatively due to the chilling hypothesis. High unemployment sends a sign that jobs are scarce and there may not be a more suitable alternative to the current job or unemployment in the labour market. Resulting from lower job search activity, the mobility of labour also decreases (McDonald and Felmingham, 1999).

Job-to-job flows in general are caused by people trying to find the best job for their skill set, often higher wages are secured, experiments with different jobs and the development of new skills are included (Bosler and Petrosky-Nadeau, 2016). Theoretically, in the case of occupational mobility, low-wage earners leave and high-wage earners stay. According to the horizontal sorting hypothesis, all occupations have the same skill requirements, and over time a quality match is found and a bad match is left. Low wages are a sign of bad matches and young employees try to gather information about various careers through occupational mobility (Neal, 1999). Alvarez and Shimer (2009) assume that in each labour market there are skilled and unskilled workers. Skilled workers are paid more; therefore, they prefer to retain their human capital and do not switch occupations unless a new occupation allows them to accumulate skills. Low-skilled workers do not have such constraints for new occupations that they are willing to take even temporarily. In practice, already in 1989 it was shown that on the one hand better pay, advancement opportunities or working conditions were the reason for occupational change in the case of the majority of moves. On the other hand, some workers just lost their previous jobs. (Markey and Parks, 1989) Groes et al. (2015) also observe upward and downward switches and conclude that the probability of occupational switches depends on the position of workers in the wage distribution in their occupation. Relatively high-waged move upward in the occupational hierarchy while relatively low-waged workers move downward. The dimension of direction (upward-downward) shows whether the same set of skills is used at a higher level or lower level after a change in occupation and adds a quality dimension to the move. Robinson (2018) indicates that displaced workers, on average, move downward but looking at total mobility, the average move is in an upward direction. In respect to productivity, it is important to consider distance of occupational mobility in addition to the direction of the move. If occupations are rather similar in terms of used skills (or performed tasks), an occupational change only leads to negligible losses of specific human capital. In the United States, for example, after 2000 the distance of occupational switches of displaced workers increased although the trend had been decreasing previously.

Labour mobility may occur without any changes in the total number of jobs in the firm. To understand the extent of such moves, labour churning as an indicator is used. Job creation and job destruction are subtracted from worker flows and

the result is divided by the number of employees in the firm. In Germany, almost 50% of worker turnover is due to worker churn, not job flows (Bachmann et al., 2021); in the Netherlands, two-thirds of worker flows represent churning (Gautier and Broersma, 2001). In 1999, Cole and Rogerson indicated that the Mortensen-Pissarides matching model can account for business-cycle facts on employment, job creation, and job destruction, but only if the average duration of a non-employment spell is about 9 months or longer. The authors also claimed that there was actually a need for a more complete model of labour market flows that accounts for the reallocation of workers across existing jobs in addition to the reallocation of jobs across establishments. Such a model still does not exist. Churning as an indicator is used in Study 3 in this thesis, but its calculation is relatively less intuitive than that of labour turnover. Moreover, due to the short history of the concept of churning, it is not widely known nor frequently analysed in research papers.

Productivity effects related to labour churning are theoretically dependent on the phase of the business cycle. According to Weingarden (2020), during recessions the importance of “employer-initiated” churning increases compared to “quit-initiated” churning. At the same time higher unemployment may enable firms to increase their skill requirements (Reder, 1955). This leads to the conclusion that new recruits hired during recessions can be relatively more productive than new recruits hired in economic boom periods.

2. EMPIRICAL STUDIES

3. DISCUSSION AND CONCLUSIONS

3.1. Summary of the studies

Study 1: Age-related productivity decrease in high-waged and low-waged employees

The aim of this study is to clarify the shape of the age-productivity curve for high-waged and low-waged employees. The main contribution of Study 1 lies in including the additional dimension of high wage and low wage into the productivity decomposition developed by Ilmakunnas and Maliranta (2007, 2016). The total labour productivity growth is decomposed into productivity of hired, separated and staying employees based on changes in employment. Adding the dimension of high and low wage is motivated by the stock of human capital that theoretically diminishes with ageing. According to Killingsworth's (1982) joint model of investment and learning by doing, not only education but also accumulation of past activities plays a role in employee productivity. Considering in addition Arrow's (1962) idea that a steady increase in productivity can be induced using evolving stimulus situations as opposed to repeating situations, the different nature of high-wage jobs and low-wage jobs makes it plausible that the speed and rate of the ageing-related decrease of the stock of human capital is different in the two wage groups. Theoretically, if the age-related productivity decline is not similar for all employees, focusing on the productivity of the groups with the largest decline might yield the greatest benefits. The average wage dividing employees into high-waged and low-waged has been computed for each 2-digit level NACE industry separately for each year.

First, high-wage employees were compared with low-wage employees in general. Although in the whole sample and all the subsamples the high-wage employees were more productive based on the value of the coefficients in the decomposition, Wald tests for equality of coefficients confirmed the statistically significant difference only in the whole sample and separately for traditional services. Second, the shape of the general age-productivity curve was calculated to check whether the results of Ilmakunnas and Maliranta (2007, 2016) also apply in Estonia. Middle-aged employees were found to be statistically significantly more productive than young or old employees, but the Wald test found no difference between the productivity of older and younger employees. In manufacturing, there was no statistically significant difference between the productivity of any of the age groups, all the new recruits were on average as productive than any other new employee independent of their age.

The third result in Study 1 confirmed that the age-productivity curve had an inverse U shape in both wage groups. According to the differences in the coefficients in the most general fixed effects OLS model, the productivity was higher for high-wage employees in each age group (compared to the respective low-wage group of employees), but the Wald test only confirmed the difference in the youngest age group. However, the comparison of the coefficients of the age groups among high-wage employees indicates that there are no statistical differences

between the age groups, while a similar comparison in the low-wage group shows that middle-aged low-wage employees tend to be more productive than young or old. Thus, the age-productivity curve is steeper for low-waged employees. Young and old according to Study 1 have the same productivity in most of the cases, old are found to be less productive than young only in knowledge intensive services. This sector is also the only sector, where a statistically significant difference between the productivity of high-waged and low-waged old was found as could be expected theoretically based on the differences of the working experience of high-waged and low-waged employees.

Study 2: Occupational mobility over the business cycle

This paper focuses on occupational mobility in Estonia during three phases of the business cycle and the role of different individual characteristics related to occupational mobility. The main contribution of the study lies in adding knowledge about how the relationship between individual characteristics and occupational mobility changes with the phases of the business cycle. Only Moscarini and Vella (2008) had looked previously at occupational mobility in cyclical labour market conditions, indicating that individual worker characteristics have less importance in the choice of occupations when unemployment is high. While Moscarini and Vella studied data on men in the USA for 1979–2004 and concentrated on Census three-digit occupations, Study 2 has men as well as women in the sample and analyses occupational change at the level of ISCO one-digit occupations.¹⁶

The results of Study 2 show that the level of occupational mobility was higher during the recovery (2001–2004) and boom (2005–2007) periods and lower during the recession (2008–2010) phase of the business cycle. Compared to the turbulent times between 1989 and 1995, analysed by Campos and Dabušinskas (2009), occupational mobility decreased significantly. In 1993, compared to 1992, they recorded the highest occupational mobility of the whole sample at 10% of total employment in Estonia. During the period 2001–2010, the lowest level of occupational mobility was 3.2% in 2001, in 2010 it decreased to a similar level again, from the maximum of 4.3% it had reached in 2006. This level of occupational mobility is in line with the results for France found by Lalé (2012) for 1999–2008.

The first probit model that does not include any interaction effects from explanatory variables shows that indeed during the recovery phase gender, marital status and language skills affected the probability of changing occupation. In other phases of the business cycle the coefficients for these factors were not statistically significant. In a recession, only the wage and tenure of the employees had an effect on the likelihood of them changing occupation. An initial wage of

¹⁶ The authors wanted to be sure that occupational change involves change in the skills used at work. At the level of three or four-digit ISCO code the individual may still have mostly the same tasks as before the change in the occupational code.

10 euros higher reduced the probability of changing occupation by one percentage point *ceteris paribus*, about 8 additional years of tenure reduced it by two percentage points. The coefficient for tenure was statistically significant and negative in all phases of the business cycle; therefore, this is a factor relevant to occupational change in all situations. The negative relationship here indicates that the better the match between employee and firm the less likely an occupational change, but the economically rather small effect refers to the fact that even after quite a long tenure in one firm, occupational change can take place. (In the case of career advancement and moving up the skills ladder of the ISCO one-digit occupational code; for an employee this might be a positive change that has been long awaited.) The study also reveals that during the boom years, while the individual factors of the recovery period do not have any relationship with the employee's probability of changing occupations, there are statistically significant differences between occupational skill groups. In addition to low-skilled white-collar employees (such as in the recovery period), low-skilled blue-collar employees change occupations relatively more than high-skilled white-collar employees. Without further information on the direction of the moves, it is assumed that in boom years, most of the switches are positive, as there is an increase in voluntary moves. Therefore, this partly confirms the result of Modestino et al. (2020) that the decrease in the unemployment rate is related to the decrease in employer skill requirements and the job openings during boom years require less skills than in crisis years.

Another finding in Study 2 is related to public and private sector employees. Although the public sector dummy did not have a statistically significant relationship with the probability of changing occupations, the interactions with four occupational skill groups were negative, and according to the Wald test, these all together were also statistically significant. Therefore, the results confirm some previous research that employees in the public sector change occupation less, but it adds to this knowledge that the level of the difference between private and public firms depends on the occupational skill group. In Study 2 it is not clear if occupational change also involves changing a private sector job to a public sector job. Flows between sectors are rather common in Estonia, more often from private to public sector as public sector jobs may involve higher investment in job-specific human capital (Masso and Espenberg, 2013).

Interactions between occupational skill groups and economic sectors reveal that the effect of occupational skill group is dependent on the economic sector in all three phases of the business cycle. Such interactions improved the fit of the models, but in the recovery phase more research is needed. The interactions in boom years indicate that high-skilled blue-collar employees change occupation more than the reference group, with the exception of the construction sector. The market was booming in the construction sector in 2007 and 2008, and therefore this refers to relatively smaller occupational mobility in the sector with the quickest growth. More frequent entering the construction sector during boom years could have probably been detected. The primary sector was a specific case in the sense that for 2002–2008, employment in this sector decreased by about

7% per year (calculations based on Statistics Estonia data). This explains the main result of statistically significantly less occupational changes in the three other sectors.

Study 3: Churning and labour productivity in economic crisis, differences between foreign and domestic firms

Study 3 focuses on labour productivity at firm level, while the labour mobility indicator in this study is calculated at firm level. The flow indicator is labour churning defined as the difference between worker flows (sum of hirings and separations) and job reallocation (absolute value of the difference between hirings and separations). The aim of Study 3 is to determine the relationship between churning and labour productivity change through the whole business cycle to find out if the relationship among foreign firms is more positive than for domestic firms. Theoretically, higher unemployment during a crisis allows firms to increase their (educational) requirements for new recruits (Reder, 1955) and labour churning during an economic downturn could be related to a positive change in the labour productivity of firms. The contribution of the study mainly stems from concentrating on the three phases of the business cycle (economic boom, crisis and recovery) and analysing the relationship between labour productivity and churning separately in boom, crisis and recovery. The division of the whole sample into three periods and separating foreign firms from domestic also helps to contribute to the area of comparisons of foreign and domestic firms during economic crisis. Finally, the individual level analysis contributes to the literature that concentrates on foreign firms' advantages in the host country's labour market.

The results show that the relationship between labour productivity change and labour churning varies over the business cycle. The relationship between labour churning and labour productivity change is positive in a crisis and negative in an economic boom. However, the relationships are not fully linear in any of the phases and very high values of labour churning are less useful for the company. The increase in the relative importance of "employer-initiated" churning during a crisis may partly explain the results, although in the Estonian data the reasons for quitting are unknown. There may have been an increase in the requirements for new recruits, but this also cannot be explicitly verified with the same data. At the same time, it is possible that the reorganization of work processes has increased the labour productivity in these firms.

The main novel result in Study 3 reveals that during recessions in the services sector, foreign firms had larger productivity changes related to churning than domestic firms. This result was also visible if a sample of domestic firms more similar to that of foreign-owned firms was formed using the Propensity Score Matching technique. Foreign firms are more productive (Xu et al., 2022) and can choose employees who already earn higher wages in domestic firms (Martins, 2011). Moreover, in recessions, they may have market information, distribution

channels and international marketing skills that help them to switch markets. In the case of a credit crunch in the host country, foreign firms may obtain financing in international capital markets or receive credit from affiliated firms or the mother company. (Athukorala, 2003) Study 3 added labour churning to the list of factors that may allow foreign firms to be more resilient in a crisis and profit from it. Unexpectedly, the positive effect of labour churning is not visible in the manufacturing sector.

3.2. Discussion

Human capital theory states that individuals acquire skills and education in order to increase their productivity and earn higher wages for that higher productivity. Therefore, the wages of workers theoretically reflect their productivity. However, this is not as straightforward in practice. If markets are not perfectly competitive, wage can be determined by other mechanisms (Cataldi et al., 2012). For example, firms can opt for deferred compensation (Lazear, 1979) to guarantee the high performance of a worker. In short, this means that young employees are paid less compared to their actual productivity level and when they are older, they are paid more. Knowing that in future they will be paid less would decrease the motivation of workers, but workers are theoretically indifferent to being paid more in the future and a constant wage if the present value of lifetime earnings remains the same. In addition, the wages of workers may be interdependent (Hamermesh, 1975), and wage increases may affect the productivity of workers whose wages did not increase. Therefore, firms may want to avoid high-wage inequality that could lead to lower effort from their workers. Next to market distortions (resulting from the rational strategies of firms) indicated by economists, sociological theories explain inequality using the relative bargaining power of agents in the labour market or collective action or discrimination (Kalleberg and Sorensen, 1979), where dominant groups allocate resources unjustly.

In general, in this thesis (Study 1) it is confirmed that the age-productivity curve of hired workers has the shape of an inverted U, and the sectoral analysis indicates that this is true in the services sector and not in manufacturing. Contrary to some previous research, the cohort of hired old employees was as productive than the cohort of young. Göbel and Zwick (2012) compared the age-productivity profiles in metal manufacturing and services sectors and found no significant differences. Study 1 in this thesis contradicts this result, as the productivity differences between age groups were visible only in the services sector. The contradiction may partly result from analysing slightly different NACE sectors and also from the fact that only the productivity of newly hired workers was included in Study 1. The hiring of older workers may be less frequent and only a certain (e.g. more productive) group of older workers may be hired. Older people with health issues may not even search for jobs. Charni (2022) decomposed the differences in employment opportunities in employment for younger and older (over 50 years old) unemployed workers and found that the lower probability of being employed

in the older age group is mainly related to unexplained differences instead of differences in characteristics. Some studies show that although managers appreciate the experience of older employees, they also estimate it to be mostly related to tenure within the firm and are thus willing to keep their older employees, but do not hire new ones (Daniel and Heywood, 2007). Another hypothesis about why not to hire new older employees is related to efficient lifetime incentive structures, and states that older workers are difficult to motivate and/or the internal labour market may become inefficient (Hutchens, 1986). Stereotypes related to productivity and age may also be important because, as shown by Van Dalen et al. (2010), it is not only employers but also employees and co-workers who believe that older employees are relatively less productive than younger ones.¹⁷

Empirically, Kampelmann and Rycx (2012) could not reject the hypothesis of a flat productivity profile for employees in some NACE sectors involving manufacturing as well as some services sectors.¹⁸ In this thesis, the high-waged low-waged distinction did not show any statistically significant difference in the productivity of employees in manufacturing, knowledge intensive services (KIS) and construction. The bargaining power of skilful employees in manufacturing may partly explain why the productivity difference is visible only in manufacturing. For example, as the metal industry is not attractive as an employer, the small number of skilful people can choose their employer and it may lead to upward pressure on wages in the sector (Masso et al., 2021b). If the pressure is stronger in the manufacturing sector, the average wages may divide the sample of employees in a manner where a larger number of rather productive employees fall into the group of low-waged employees.

If learning by doing is included in the theory, then experience on high-waged jobs (where the wage is higher than average) can be supposed to be more human-capital enhancing than routine tasks in low-waged jobs (with wages lower than average). Therefore, the decrease of productivity related to ageing may be different in these two wage groups. Our analysis indicated that the productivity was different for the hired in the youngest age group, but this could not be confirmed for the other age groups. Some similarities can be found here with the results of the study by Kampelmann et al. (2018), who indicate that in Belgium, low-educated young workers are rather overpaid compared to their productivity and firms have little incentive to hire them. The larger share of young low-educated workers was also related to firms being relatively less profitable. One of the factors that

¹⁷ The researchers analysed stereotypes in the Netherlands based on a survey of 443 employers and 898 employees conducted in 2005. Two general questions were asked and the answers do not necessarily relate to the coworkers of the survey respondents: To what extent, in your view, do the following 11 characteristics apply to workers (i) aged 50 years and older/ (ii) to workers under 35 years of age? (Van Dalen et al., 2010)

¹⁸ The analysed sectors were manufacturing, electricity, gas, steam and air conditioning supply, water supply, sewerage, waste management and remediation activities, construction, wholesale and retail trade, repair of motor vehicles and motorcycles, transportation and storage, accommodation and food service activities, information and communication, financial and insurance activities.

can affect the results for smaller groups is omitting the gender variable. The gender gap in Estonia is rather high (14.9% in 2021 according to Statistics Estonia) and if women are as productive as men but earn less, this may distort the results if only the wage dimension is considered in the analysis.

Next to the employees present in the firm, the productivity of firms (and its knowledge base) also depends on the productivity of newly hired employees and the productivity of the workers who leave the firm. Occupational mobility, the type of job mobility analysed in Study 2 in this thesis, involves a change in occupation in addition to job change, but both types of mobility (job-to-job as well as occupational mobility) depend on phases of the business cycle. In recessionary periods less jobs are created but more jobs are destroyed than during an economic boom.¹⁹ The unemployed are less likely to find a new job and the search activities of on-the-job-searchers decrease. Such processes lead to lower shares of occupational mobility during recessions. The decline in gross mobility and fewer occupational switches overall have been similarly documented for the UK in the most recent Covid-19 crisis (Carrillo-Tudela et al., 2021).

In Europe (albeit with substantial differences between countries), on average 3% of workers change their occupation per year. In Estonia, the probability of occupational change was the second highest in Europe (after Sweden) for 2011–2014 (nearly 7% at 2-digit ISCO level). (Bachmann et al., 2020) The aspect of the direction of the occupational changes was not in the focus of Study 2. However, for the USA, Robinson (2018) indicates that a large number of occupational switches may be related to human capital accumulation. In Europe, the downward transition is more likely for occupation movers compared to job movers (only a third remains in the same wage decile), and thereby occupational mobility in Europe is suggested to involve some loss of human capital (Bachmann et al., 2020). For Estonia for 1988–1995, Campos and Dabušinskas (2009) indicate that if 1-digit ISCO codes are ordered by earnings, 59% of switches were to an occupation with lower wages. For the period 2002–2009, Masso et al. (2013) show that around 60% of switches were upward on the earnings ladder nearly equally for employees who have worked abroad and who have not. Although theoretically the employees with low skills switch occupations more often, empirical results do not fit well with the theory. For example, in the case of three quarters of the Danish workforce, workers with wages higher than the average and lower than the average within an occupation have a higher probability of leaving their occupation. Those on the high end are more likely to leave for occupations where the average wages are higher and those on the lower end leave for occupations that on average pay less to their workforce (Groes et al., 2015). If the occupation is very specific, the probability that workers will change their occupation is small, not only for changes across the total labour market but also within that particular skill cluster (Geel, Backes-Gellner, 2011).

¹⁹ Job destruction and job creation are described in more detail in chapter 1.4 of this thesis.

The main focus of Study 2 is on individual characteristics of occupational movers and how they change in different phases of the business cycle. In Europe, women, older workers, medium-skilled (in contrast to high-skilled) persons and persons in full-time jobs (rather than part-time jobs) have been found to change occupation less often. Out of household characteristics, only marriage was related to lower occupational mobility (Bachmann et al., 2020) Estonian results in Study 2 in the recovery period affirm that women change occupation less often (as in Lalé, 2012), but in other phases of the cycle, gender was not statistically significant.

Empirically, the importance of tenure in occupational change has been shown a long time ago (Rytina, 1982). In some research, age has a negative effect on occupational mobility (Moscarini and Vella, 2008, Bachmann et al., 2020). Probit regressions in Study 2 include age in years and the same variable squared, but including age in three large groups could have been more informative. One of the dimensions in focus in Study 2 is the effect of occupational hierarchy and wage on the probability of changing occupations. Technically, instead of analysing the effect of education, four occupational skill levels are included in the probit analysis. In the case of a mismatch between job and education, an employee with a tertiary education may work in elementary occupations. Therefore, occupational skill level was deemed to more accurately describe the level of education that working in a certain occupation may require from an employee.

On average, educated workers should change occupations less because their occupations involve a larger amount of occupational specific investment and their career paths follow a smaller number of distinct occupations (Sicherman, 1990). Kambourov and Manovskii (2008) and Lalé (2012) nevertheless only found very little differences in the levels of mobility between individuals with different educational backgrounds. Study 2 indicates that the skill level is not important in a recession. According to Devereux (2002), the skill level of new hires rises in recessions, but low-skilled workers disproportionately experience unemployment in recessions. Therefore, in a recessionary period low-skilled could even change occupations less compared to high-skilled employees, in contrast to the general understanding, because low-skilled may not have enough vacancies available to be hired again after a layoff.

Labour mobility is among the other various reasons caused by people trying to find the best jobs and firms trying to find the best workers; therefore, both sides are looking for a good match. As a result, to a certain extent labour mobility is productivity enhancing. The excessive mobility of employees has been deemed disruptive because it is too costly for the firm and stressful for the people who churn (Ettlie, 1985).²⁰ However, the probability of increasing labour productivity through the mobility of employees is higher in a recessionary period of the business cycle because at times when unemployment is high, employers can raise their education and experience requirements for future recruits (Modestino et al.,

²⁰ Additionally, Kleinknecht et al. (2014) show the negative relationship between flexibility in labour relations and innovation in mature firms with professional R&D laboratories. Job hopping hinders long-run accumulation of knowledge. In young and small firms flexible working had no impact.

2020; Devereux, 2002). This thesis confirms that the relationship between churning and labour productivity has an inverse U shape in a crisis. Before Study 3, a positive relationship between churning and change in total factor productivity was shown by Ilmakunnas et al. (2005). A positive linear and negative squared term in (total factor) productivity regression was also present in Masso et al. (2012) for Estonia.

More productive firms may be more successful in using churning to increase labour productivity. Foreign owned firms are in general more productive than domestic firms. The current thesis indicates that the relationship between labour churning and labour productivity change is more positive in foreign firms compared to domestic firms in the services sector, but not in manufacturing. Finding a difference between foreign and domestic firms in services may be a country specific result because of all the conditions present in Estonia at that moment: (i) a large decline in GDP, (ii) flexible labour market, and (iii) rather high share of foreign owned firms.

The fact that the relationship between labour productivity and labour churning is positive during the recessionary period in both services and manufacturing sectors indicates that some factors explaining the positive relationship must be similar in the two sectors. However, the lack of productivity differences in manufacturing in Study 1 and Study 3 support each other. As age groups or two wage groups show no productivity differences in Study 1, it would be surprising to find foreign firms with a more evident positive relationship between churning and labour productivity change in a recession in Study 3. In manufacturing, the opportunities to raise labour productivity may lie in other factors than just replacing less productive employees with more productive ones. Research on productivity factors in the manufacturing sector clarifies that to a great extent the productivity in the sector is related to the machines and materials used and delays in the availability of the right material at the right time has been indicated to be the most important factor of the productivity of workers (Sreekumar et al., 2018). Hiring employees with certain qualities may not help increase productivity if the hindrances are related to machines and the availability of materials. Furthermore, the individual productivity of employees is more difficult to determine if they only perform one operation in the whole process and productivity in this thesis is only measured based on the firm's productivity. Hiring a larger share of employees with a tertiary education (result of Study 3) may be explained by opening a new line or restructuring in a way that production processes are reformed. Tertiary education may refer to rather more sophisticated production processes compared to the situation before restructuring. In such a setting, labour productivity could be increased. The relatively higher importance of age than education in services may refer to the importance of experience in services and the chance to influence productivity to a greater extent through changing the effort individually.

The main results of the studies of this thesis are indicated in Table 3 below with research tasks.

Table 3. Research tasks, hypotheses and results

Study	Tasks	Result
1	<i>Task 2.</i> To compare the productivity of high-waged hired employees and low-waged hired employees.	The two wage groups do not have a statistically significant difference in productivity in manufacturing.
1	<i>Task 3.</i> To compare the productivity of hired young, middle-aged and old employees.	In services, the age-productivity curve has an inverted U shape, but the cohort of hired old employees is statistically at least as productive as the cohort of hired young employees in all of the sectors
1	<i>Task 4.</i> To evaluate the productivity differences of high-waged employees and low-waged employees in three different age groups.	The productivity of hired young high-waged employees is higher than that of hired young low-waged employees. The age-productivity curve is flatter for high-waged employees than for low-waged employees.
2	<i>Task 5.</i> To investigate the level of occupational mobility in all phases of the business cycle.	Occupational mobility is more frequent when unemployment is low.
2	<i>Task 6.</i> To compare the occupational mobility for blue- and white-collar employees of different skill levels over the business cycle.	Occupation mobility over the business cycle depends on the occupation skill-level hierarchy. Occupational mobility is more frequent for lower position occupations in recovery and boom phases; in a recession, only the wage is important through a negative relationship with the likelihood of switching occupations.
2	<i>Task 7.</i> To evaluate the role of individual characteristics explaining the occupational mobility in three phases of the business cycle.	Match quality (proxied with tenure) is related to lower occupational mobility in all phases of the business cycle, but it is relatively more important in a crisis.
3	<i>Task 8.</i> To examine the level of churning for foreign and domestic firms in the three phases of the business cycle.	In domestic and foreign firms, churning is lower in the crisis compared to other phases of the business cycle.
3	<i>Task 9.</i> To measure and compare the relationship between productivity change in all firms and labour churning during economic crisis, boom and recovery.	The relationship between churning and labour productivity has an inverse U-shape in a crisis, boom and recovery, but in a crisis the lower levels of churning are positively related with productivity change while in a boom the relationship is negative.
3	<i>Task 10.</i> To analyse the difference of the relationship between labour churning and labour productivity in foreign and domestic firms.	In services, the positive relationship between labour churning and labour productivity change in a crisis is more evident in foreign firms than domestic firms.

Source: based on Studies 1–3.

Adding the wage dimension into the productivity decomposition led to the conclusion that the labour productivity of older cohorts is not different from the productivity of the young in the same wage group, although some studies have found that older employees are the least productive. This supports the attitude that hiring older employees should not be avoided. For example, older employees may be less prone to change jobs and productivity advantages may result from learning-by-doing and the accumulation of firm-specific human capital.

Analysis of the sectoral dimension in the productivity decomposition for high-waged and low-waged employees led to the conclusion that only in knowledge intensive services is the cohort of high-waged old workers significantly more productive than the cohort of hired low-waged old. In this sector most probably the high-waged old are involved in core knowledge related processes while low-waged ones are involved in rather simple tasks, and therefore it is the most logical sector to find the difference. Employees involved in core processes may have to build their career carefully and purposefully and gain knowledge through experience. Davenport (2005), for example, defines knowledge workers as workers with high degrees of expertise, education or experience who are involved in the creation, distribution or application of knowledge. Davenport also says that the most important processes for organisations involve knowledge work. Therefore, if knowledge work was also easily distinguishable from other types of work in other sectors, there could perhaps be more empirical proof of the joint model of investment and learning-by-doing in Study 3. The lack of difference between the productiveness of high-waged and low-waged old employees in other sectors may serve as an indication that wage differences is not actually a good indicator of the effect of learning-by-doing.

The analysis of factors related to the probability of an occupational switch in three different phases of the business cycle revealed that wage and length of tenure remain significant determinants in recessions, where the individual characteristics of employees are not related to the probability of a switch. The chaos of high job destruction may leave the impression that none of the factors are relevant for occupational switches, but longer tenure and higher wage refer to the greater resilience of more productive firms in a crisis. Tenure cannot be long if the firm has existed for a short time only. Wage as a determinant of an occupational switch indicates that from all skill groups, employees need to find new occupations as proof of the cleansing effect where less productive firms leave the market.

Adding the business cycle and ownership effects to the relationship between labour churning and labour productivity change indicated that firms in services could consider labour churning as an additional opportunity to increase labour productivity during crises if the firms have resources available. The dimension of the economic sector in labour mobility analysis indicates that the relationship between labour mobility and labour productivity is different in services and manufacturing; therefore, researchers are advised to check the results of the productivity analyses for both sectors separately before making any conclusions about the manufacturing sector.

3.3. Limitations and ideas for future research

Only cohorts of employees can be analysed using the methodology proposed by Ilmakunnas and Maliranta (2007) in Study 1. Therefore, no additional factors could be considered in the models. Furthermore, the productivity of older employees in general is not analysed, but rather the productivity of *hired* old employees. For instance, older individuals with health issues may not be hired at all or they may not be able to find a part-time job that they might prefer. It is also not actually clear in Study 2 whether young high-waged employees remain in the group of high-waged employees when they get older. It is possible that many of them prefer to become self-employed later, and maybe they do not finish their work-life in high-waged positions. An interesting extension to this analysis could analyse groups of old high-waged employees and their career paths in more detail (The panel of data used in this thesis is too short for such an analysis).

Methodologically, the high-waged and low-waged employees could have been determined using a different threshold; for example, national average wages or firm-level average wages. For the authors of the study, the national average seemed too strict as a criterion, but in the case of firm-level averages in homogenous firms, the split might take some workers of the same occupation to the other side of the threshold. If data about occupations were available, different groups could have been formed based on occupation (e.g. blue-collar vs. white-collar workers, but also other categories) without any ambiguity in the bounds of the categories. Also, instead of the decomposition, the shares of employees of different age and wage groups could have been analysed as explanatory variables in the productivity regression (as in Lee et al., 2018; Göbel and Zwick, 2012 and 2009), but this methodology was not chosen because of the lack of employee-level variables in the data.

The regular limitations of sample surveys apply for the sample in Study 2. The sample size is rather small; for example, 16,490 individuals were interviewed in 2010. The employee is only questioned a few times, although the amount of data gathered with each wave is substantial. The employees may not be truthful in their responses, and for detailed occupations it has been shown by Mellow and Sider (1983) that the employer and employee may indicate a different occupation in almost half of the cases. Based on longitudinal data, it would be interesting to analyse the probability of occupational change during the whole life of the respondents. In addition, a larger sample size could also enable differentiating between moving upward and moving downward in the occupational hierarchy. Future research could check if the results of Study 1 also apply to occupational change at the level of two- or three-digit ISCO codes.

Study 2 only analyses the individual characteristics of employees, but the used methodology does not shed light on the underlying reasons for occupational changes or their (firm-level or country-level) consequences. Further research could analyse changes in occupational structure over time and the role of occupational changes therein. Occupational change as a channel of knowledge spillovers and innovation appears to be an interesting line of research that has not been analysed yet.

The data-related limitations are the same for Studies 1 and 3. Registry data does not include the indicators that are needed for constructing more elaborate regressions or analysing a more specific topic (e.g. membership of labour unions, number of subordinates or individual assessments on labour-related topics). Dividing employees into cohorts by occupational skill groups (e.g. white- and blue-collar employees) could have given more skill-based estimates of the employees' productivity differences, but the occupation of employees has only been shown in the register of employees since 2019. The wage-related division may partly reflect how much the firm is able to pay for certain skills. Some firms in the same industry may be able to pay the same wage to blue-collar high-skilled employees that another firm could pay to white-collar low-skilled employees. Occupational information in Study 3 could have added important details to the results concerning churning. For example, analysing the churning of blue-collar employees and white-collar employees separately in different business cycle phases could show the differences for the two occupational groups. In the case of more specific data on the reasons for separations, quit-initiated churning could be differentiated from employer-initiated churning and the changes in the shares of both types of churning in different phases of the business cycle could be interesting to analyse. Dividing firms by the prevalence of two types of churning could indicate whether there are significant productivity differences between the two types of firms. To some extent, the reasons for the separations could be derived from the length of the unemployment period after the end of the work relationship. In the case of longer periods without a work relationship, it could be counted as an employer-initiated separation. However, the lack of data for individuals studying or on maternity leave would greatly complicate such derivations.

Calculations in Study 3 revealed that labour churning was positively related to labour productivity changes in a crisis and negatively related in a boom period. However, the reasons behind such a result are not fully clear based on the calculations. Qualitative surveys among managers of firms could help to better understand the mechanisms behind the changing relationship (e.g. something in line with Rowley and Purcell, 2001). Similarly, a full discussion of the differences between the services and manufacturing sectors lies beyond the scope of Study 3 and further research is needed to understand better why the analysed relationship should have a statistically significant difference between domestic and foreign firms in only one of these sectors.

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SUMMARY IN ESTONIAN

Uurimusi tööjõu mobiilsusest ja tootlikkusest

Töö aktuaalsus ja motivatsioon

Tööjõu tootlikkus näitab, kui suure osa väärtusest toob ettevõttesse inimkapital. Tööjõu tootlikkuse kasv koos töötatud tundide arvu kasvuga määrab keskmises perspektiivis arengud reaaltoodangu kasvus (*real output growth*) (Gomez-Salvador et al 2006). Kirjanduses on analüüsitud arvukalt ettevõtete tootlikkust mõjutavaid tegureid (vt näiteks Syverson, 2011). Käesolev töö keskendub tööjõu mobiilsusele, mis ettevõtte töötajate individuaalse tootlikkuse kõrval samuti mõjutab tootlikkust sõltuvalt sellest, millised töötajad liiguvad. Teadmised tööjõu rolli kohta tööjõu tootlikkuses on muutunud järjest detailsemaks tänu registritel põhinevatele mikroandmetele. On näidatud, et töötajate liikumine välisomanduses olevatest ettevõtetest suurendab tootlikkust kodumaistes ettevõtetes, kuhu vastavad töötajad palgatakse (Görg ja Strobl, 2005; Masso ja Vahter, 2019). Stoyanov ja Zubanov (2012) saavad seda tulemust üldistada ja väidavad, et tootlikkuse kasvuks piisab, kui palgata ettevõttesse töötajaid tootlikumast ettevõttest. Mõju on suurem, kui liikuvatel töötajatel on kõrgem inimkapitali tase, näiteks kui nad on juhid või kõrgema palgaga töötajad (Masso ja Vahter, 2019) või kõrgema oskuste tasemega töötajad (Stoyanov ja Zubanov, 2012). Lisaks on tööjõu mobiilsuse juures oluline liikumise aeg, sest majanduskriisi ajal võib ressurside ümberpaiknemine muutuda kiiremaks ja ressursid võivad varasemast kiiremini liikuda madala tootlikkusega ettevõtetest kõrgema tootlikkusega ettevõtetesse (Foster et al., 2016).

Tööjõu mobiilsuse aega on käesolevas töös arvesse võetud ja analüüsitakse tööjõu mobiilsust erinevates äri-tsükli faasides, kuid suhteliselt rohkem tähelepanu on seejuures pööratud majanduslanguse perioodile. Majanduslangust äri-tsükli sees ei saa vältida või selle eest kuidagi põgeneda. Lisaks näitas kõige hiljutisem Covid-19 viirusega seotud kriis, et majanduslanguse põhjused ei ole alati majandusest tulenevad ning (globaalse) kriisi puhkemist ei ole alati võimalik pikalt ette ennustada. Seetõttu on kõige mõistlikumaks strateegiaks kriisiks valmistumine veendudes, et kõik võimalused ettevõtet kriisi ajal edukalt toimima hoida, on kasutusele võetud. Tööjõu mobiilsuse olemuses majanduslanguse perioodidel aset leidvad muutused võivad mõjutada ettevõtete tootlikkust. Modestino et al. (2020) on näidanud, et majanduslanguse aegselt kõrgest töötuse tasemest lähtudes võivad ettevõtted seada kõrgemaid nõudmisi kandidaatidele nende hariduse ja oskuste taseme osas (näidatud ka Devereux, 2002). Seejuures on suhteliselt vähe kirjutatud uurimusi tööjõu tootlikkuse ja tööjõu mobiilsuse vaheliste seoste kohta majanduslanguse perioodil.

Lühidalt on järk-järgult üldisemalt üksikule liikudes käesolevas töös vaatluse all järgnevad küsimused. (i) Kuidas individuaalsed karakteristikud mõjutavad töötajate tootlikkust? (ii) Kuidas töökohti vahetavate töötajate individuaalsed karakteristikud muutuvad äri-tsükli eri faasides? (iii) Kas ettevõtted saavad kasutada majanduslanguse madalamat vabatahtliku liikumise taset ja suhteliselt

suuremat töötute inimeste hulka, et asendada kõige vähem tootlikud töötajad suhteliselt tootlikumatega?

Enne tööjõu tootlikkuse analüüsimist on oluline paremini mõista, millistel karakteristikutel võiks olla positiivne mõju töötajate individuaalsele tootlikkusele. Tulevaste töötajate tootlikkus on ettevõtete jaoks oluline tegur uusi töötajaid palgates ning kandidaate hinnates. Samas on kandidaatide tootlikkust raske määrata, enne kui nad tööle hakkavad. Seetõttu võivad ettevõtted muuhulgas kasutada ka kandidaatide silmnähtavaid ehk otseselt vaadeldavaid tunnuseid nagu koolis käidud aastad ja vanus. Vanemaid töötajaid tööturul üldiselt kõrgelt ei hinnata. Stereotüüpide põhjal peetakse neid nõrgemateks ja arvatakse, et nad on noorte töötajatega võrreldes väiksema kohanemisvõimega (Viviani et al., 2021). Inimkapitali teooria järgi pakutakse vanematele töötajatele vähem koolitusi lühema tasuvusaja tõttu ning see võib vanemaealiste inimkapitali ja tootlikkuse taset mõjutada (Skirbekk, 2004). Vanuse-tootlikkuse kõver on varasemate uuringute põhjal pööratud U kujuga (vt kirjanduse ülevaadet Skirbekk, 2004). Seega pole ettevõtted eriti motiveeritud palkama vanemaid inimesi. Mõned uuringud on siiski näidanud, et vanuse-tootlikkuse kõver võib teatud ametialade puhul olla üldisest kõverast erinev (näiteks Veen, 2008 ja Van Ours, 2009). Neid varasemaid tulemusi püütakse käesolevas töös üldistada jagades töötajad kõrgepalgalisteks ja madalalpalgalisteks.

Töötajate karakteristikud võivad ka näidata, millised töötajate grupid on teistest mobiilsemad. Käesolevas töös analüüsitakse ametialast mobiilsust töötajate mobiilsuse ühe vormina. Ametialane mobiilsus võimaldab majandussektori- või ametialaspetsiifilist inimkapitali viia ühest sektorist teise (Song et al., 2003; Masso et al., 2012) ning toetab ka innovatsiooni ettevõtetes teadmuste ülekannete kaudu (Kaiser et al., 2011). Kambourov ja Manovskii (2004) aga viitavad asjaolule, et ametialase mobiilsusega võib kaasneda ametialaspetsiifilise inimkapitali kaotamine. Seetõttu võib ametialane mobiilsus nii takistada kui lihtsustada struktuurset muutusi, mis äri-tsükli jooksul aset leiavad. Kuna erinevate individuaalsete karakteristikute roll ametialase mobiilsuse juures äri-tsükli löikes on suhteliselt alauuritud, kontrollitakse ja laiendatakse käesolevas töös Moscarini ja Vella (2008) tulemust, mille põhjal personaalsete karakteristikute roll majanduslanguse ajal väheneb.

Teoreetiliselt on tootlikumad ettevõtted enam motiveeritud ja ka võimelised kapitali ja tööjõudu ligi meelitama kui ettevõtted, kes nii tootlikud ei ole ning kes peavad seetõttu kasvatama oma tootlikkust või tegevuse lõpetama. (Barnett et al., 2014) Majanduslanguse ajal võib taoline tegurite ümberpaiknemine muutuda kiiremaks. Tööjõu ümberpaiknemise kiirust majanduses mõõdetakse tavaliselt tööjõu volavuse (*labour turnover*) abil (Cazes ja Nesporova, 2001). Eesti andmetel on uuritud töökohtade volavust (Rõm ja Viilmann, 2003) ja töötajate reallokatsiooni 2008–2009. aastate majanduslanguse ajal (Meriküll, 2011). Viimase töö autor rõhutab, et inimkapitali mõju tööjõu mobiilsusele kasvas kriisaaastatel. Seetõttu on huvitav uurida, millised protsessid majanduslanguse ajal veel aset leiavad lisaks struktuursetele muutustele. Seejuures analüüsitakse struktuurset muutuseid vaadeldes ainult töökohtade loomist ja nende kaotamist,

kuid tööjõu vahetamisvood²¹ (*labour churning*), mis on eelistatud näitaja käesolevas töös, teevad võimalikuks mitte-struktuursete põhjustega töötajate mobiilsuse analüüsimise (Cazes ja Nesporova, 2001). Tööjõu vahetamisvoogude kohta on näidatud selle positiivset seost kogutootlikkusega (Ilmakunnas ja Maliranta, 2005), aga sama seose kohta äritsükli eri faasides uuringud puuduvad.

Muutused töötajate mobiilsuse olemuses majanduslanguse perioodil võivad mõjutada ainult teatud ettevõttegrupe. Välisomanduses ettevõtted on üldjuhul tootlikumad kui kodumaised (Xu et al., 2022). Lisaks võib neil olla muid omandusest tulenevaid (näiteks finantsilisi) eeliseid kodumaiste ettevõtete ees, mida saab ära kasutada muutlikel aegadel (Varum ja Rocha, 2011). Seetõttu võivad just välisomanduses olevad ettevõtted saada rohkem kasu töötajate mobiilsusest, mille põhjused on mitte-struktuursete. Suur hulk teaduskirjandust võrdlebki välisomanduses olevaid ettevõtteid kodumaistega majanduslanguse ajal, muuhulgas näiteks ettevõtete ellujäämist (*firm survival*) (vt põhjalikku ülevaadet Wagner ja Gelübcke, 2012 uurimusest) ja tööjõu kasvu (Alvarez ja Görg, 2007). Samas pole autorile teadaolevalt selles kirjanduses võrreldud tööjõu vahetamisvoogusid majanduslanguse ajal.

Eesti on ideaalne riik, kus analüüsida tööjõu tootlikkust majanduslanguse ajal. Siirderiiginäitaja oli juba 2003. aastaks jõudnud siirdereprotsessi viimasesse staadiumisse (Rõöm, Viilmann 2003). Iseseisev Eesti riik oli siirdereprotsessidest tingitud tüüpilises kriisis 1990. aastate alguses ja 1998. aastal oli Eestis Vene kriisist põhjustatud kriis (Eamets et al., 2003). 2009. aastal langes Eesti SKP 14.1 protsenti (ühelt poolt globaalse finantskriisi tõttu, teiselt poolt ülekuumenenud majanduse tõttu) ja see kriis oli märkimisväärne majanduslanguse ulatuse tõttu. Samas oli see esimene majanduskriis iseseisvas Eestis, kus siirdereprotsessid ei olnud enam ülemäära olulised. Kriisi ajal ei kasvanud avaliku sektori kulutused ja valiti fiskaalse konsolideerimise strateegia (Raudla ja Kattel, 2011). Ka rahapoliitikat sai kasutada ainult väga vähesel määral (Varblane, 2017). See on väga erinev Covid-19-ga seotud kriisist, kus valitsuse stimuleerimispoliitika väärtuseks hinnatakse olevat kuni 4,5% Eesti riigi SKP-st (Raudla ja Douglas, 2020). Seega pidi majanduskriisiga kohanemine enamjaolt aset leidma tööturul. Kuna tööturul Balti riikides on väga paindlikud (Masso ja Krillo, 2011), siis Eesti tööturg 2008–2009. aastate majanduslanguse ajal on peaaegu eksperimentaalseks olukorraks, kus kõik tööjõu mobiilsuse protsessid, mis majanduskriisi tingimustes aset leiavad, peaksid olema vaadeldavad.

²¹ Vahetamisvood on töötajate reallokatsioon, mis toimub lisaks töökohtade voogudest tulevatele reallokatsioonidele (OECD, 2009). Vahetamisvoogudes kajastuvad nii palkamised kui töösuhete lõpetamised ja vahetamisvood on nullist suuremad, kui vaatlusalusel perioodil on ettevõttes aset leidnud mõlemad. Kui mõned töötajad lahkuvad, aga uusi töötajaid ei palgata, siis tööjõu voolavuse (*labour turnover*) näitaja on nullist suurem, kuid vahetamisvoogude näitaja väärtus on null. Kui kõik ettevõtte töötajad asendatakse, siis tööjõu voolavuse näitaja on 100%, aga vahetamisvoogude väärtus on 200%, sest viimasel juhul on kaasatud ka palkamised, kuid mõlemad näitajad on läbi jagatud töötajate arvuga. Kui ettevõttes toimub palkamisi ja töösuhete lõpetamist võrdselt, siis tööjõu voolavuse määr võrdub alati poolega ettevõtte vahetamisvoogude näitajast. Kui üks kahest numbrist (palkamine või lahkumine) kasvab, vahetamisvoogude määr väheneb.

Töö teoreetilised alused

Paljudes uurimustes analüüsitakse ühe konkreetse majandussektori keskselt tegureid, mis on just selles sektoris tootlikkuse jaoks olulised (näiteks Wagner ja Ruhe, 2018; Mandloi ja Singh, 2022). Niisamuti jagatakse neid tegureid väga erinevatel viisidel kategooriatesse. Käesolevas doktoritöös tuuakse majandussektorite üleselt välja kaks laia kategooriat tootlikkust mõjutavaid tegureid, mida on nimetanud ka Syverson (2011): (i) välised tegurid, mida ettevõtte kontrollida ei saa ja (ii) ettevõtte taseme tootlikkustegurid, mida ettevõtte saab ise kontrollida. Kõikide tegurite suhteline tähtsuse järjekord ei ole seejuures antud töö kontekstis oluline, kategooriaid ja tegurite nimekirja kasutatakse selleks, et näidata töötajate ja nende mobiilsuse positsiooni teiste tegurite hulgas.

Teadmusbaas on tootlikkustegur ettevõtte tasemel, mis sõltub ettevõtte töötajatest (täpsemalt nende oskustest ja inimkapitali tasemest). Vastavalt inimkapitali teooriale aitavad kaalutletud investeeringud haridusse indiviididel omandada oskusi ehk inimkapitali, ja seetõttu kasvatada töötaja tootlikkust, mis omakorda suurendab tema sissetulekut (Becker, 1964, 1967; Ben-Porath, 1967; Mincer, 1958).

Ettevõtted kontrollivad oma teadmusbaasi peamiselt töökohtade voogude (*job flows*) ehk töökohtade loomise ja kaotamise kaudu. Kui ettevõtetest vallandatud töötajate asemele palgatakse uusi ehk töökohtade arv ei muutu, siis ettevõtted mõjutavad teadmusbaasi töötajate voogude (*worker flows*) kaudu. Seejuures võivad ka töötajad ise töötajate voogusid algatada, kui liikumine on vabatahtlik. Ettevõtted vabatahtlikku liikumist kontrollida ei saa, kuigi oma parimate töötajate lahkumist ettevõtetest nad pigem väldiksid. Töötajad võivad liikuda tööturu-seisundite vahel (näiteks lahkuda tööturult ja muutuda mitteaktiivseks), nad võivad vahetada ametiala ja vahetada töökohta. Töökohtade vood ja töötajate vood kokku moodustavad tööturu mobiilsuse mikrotasemel (Eamets, 2013). Vabatahtlikud liikumised muudavad teadmusbaasi ainult osaliselt ettevõtte seisukohalt kontrollitavaks teguriks. Lisaks sõltuvad töökohtade voogude osas otsused suurel määral väliskeskonnast, mis muudab teadmusbaasi veelgi rohkem ettevõtteväliseks teguriks.

Töökohalt töökohale liikumise voogude (*job-to-job flows*) põhjuseks on üldjuhul inimeste soov leida parim töö vastavalt oma oskuste tasemele (Bosler ja Petrosky-Nadeau, 2016) ehk püütakse leida hea sobivus, mis on vajalik tingimus selleks, et töötaja jääks oma töökohale pikaks ajaks. Sobivus tekib tööturul kauplemise tulemusena ning sobitamisfunktsioon (*matching function*) kirjeldab sobitamisvoogude (*matching flows*) sõltuvust kahest argumendist: tööotsijad ja vabad töökohad. Takistused (*friction*), mida põhjustab näiteks ebapiisav informatsioon või teised sarnased tegurid, võetakse arvesse ilma selgelt väljendatud viiteta takistuse põhjusele. Üheks selliseks takistuseks peetakse ka madalat töötajate mobiilsust. (Petrongolo ja Pissarides, 2001)

Töökohalt töökohale liikumise teoreetilised alused on välja toodud otsimisteoorias. Traditsioonilises mudelis valivad töötud reservatsioonipalga, enne kui ettevõtte esitab neile oma pakkumise. Töökohal, kus ettevõtte pakkumises oli palk

vähemalt võrdne reservatsioonipalgaga, töötatakse mudeli põhjal kuni pensionieani. Kui mudelis valitakse kaks reservatsioonipalka ja palk ettevõtte pakkumises on väiksem, kui kahest reservatsioonipalgast kõrgem, võib töötamise ajal jätkata kulukaid töötöinguid. (Burdett, 1978)

Käesolevas doktoritöös on ettevõtte poolt kontrollitavate tootlikkustegurite seast fookuses ka omand (*ownership*). Eelkõige vaadeldakse siin asjaolu, kas ettevõtetel on välisomanikud. Multinatsioonasetel ettevõtetel on nimelt leitud olevat kolme tüüpi eeliseid: omandi (O nagu *ownership*), asukoha (L nagu *location*) ja internaliseerimisega (I nagu *internalisation*) seotud eelised (Dunning, 2001). See viib omakorda eelisteni, mis väljenduvad teiste kanalite kaudu nagu kõrgema tasemega innovatsioonid, telekommunikatsioon ja tööjõukulude vähendamine, samuti on välisomandusega ettevõtetel vähem finantsilisi piiranguid (Xu et al., 2022).

Majanduslanguse ajal sunnib vähenenud nõudlus töötajate palkamist vähendada ning töötutel on seega vähem võimalusi leida endale uus töökoht (Jackman ja Savouri, 1992). Töötajate palkamise vähenemine tähendab, et luuakse vähem uusi töökohti ja kaotatakse enam töökohti, kui majandusbuumi ajal. Olukorras, kus vabu töökohti on vähem, kasvavad informatsioonikulud ja teadlikkus kriisist vähendab töötute reservatsioonipalkasid (Faggian, 2021). Väiksema otsimisaktiivsuse tõttu väheneb ka tööjõu mobiilsus (McDonald ja Felmingham, 1999).

Kaks efekti on majanduslanguse ajal võimalikud sobitamisteoorias. Esiteks, traditsioonilise vaate põhjal võib aset leida puhastumiseefekt (*cleansing effect*), mis tähendab, et madala tootlikkusega sobivuste (*matches*) tase väheneb, kuna ettevõtetesse kandideerib suurem arv potentsiaalseid töötajaid (Schumpeter, [1943] 2003; Bachmann, 2005). Teiseks võib rikkumiseefekt (*sullyng effect*) vähendada uute sobivuste kvaliteeti, kui töötöingute arv langeb ja töötajad võtavad vastu kehvemaid pakkumisi, mida nad tavaolukorras vastu ei võtaks (kõrgem töötöingute arv seevastu võiks eeldatavalt viia paremate sobivusteni) (Barlevy, 2002). Kui majanduskriisis on ülekaalus puhastumiseefekt, siis resursid (sh tööjõud) peaks liikuma kõige tootlikumatesse ettevõtetesse, seega suurel määral välisomanduses olevatesse ettevõtetesse.

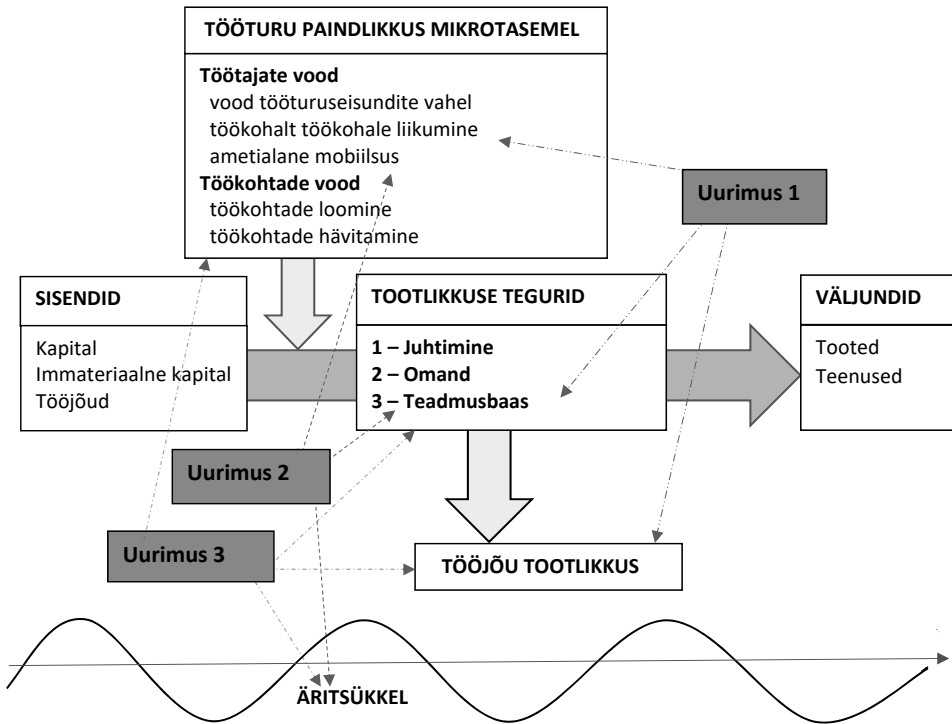
Töö eesmärk ja uurimisülesanded

Doktoritöö eesmärk on anda ülevaade tööturu paindlikkusest mikrotasemel äri-tsükli eri faasides käsitledes paindlikkust kui ühte tööjõu tootlikkuse tegurit.

Kõik kolm doktoritöös esitatud uurimust kasutavad Eesti andmeid, kus muuhulgas on andmed ka majanduskriisi aastatest 2008–2009. Seetõttu jagatakse uurimustes 2 ja 3 kõik andmed kolmeks äri-tsükli faasiks ning analüüsitakse erinevusi tulemustes. Kuigi uurimuse 1 andmetes on samuti kolm äri-tsükli faasi, siis olulisi erinevusi kolme perioodi vahel ei leitud ning vastav osa analüüsist tuli jätta publitseerimisele esitatud uurimusest välja. Töötajate ja töökohtade voogudel, mis moodustavad tööturu paindlikkuse mikrotasemel, on kõigis kolmes artiklis kõige tähtsam roll, aga eri artiklites kasutatakse erinevaid mõõdikuid. Töökohalt

töökohale liikumiste abil uuritakse töötajate tootlikkust uurimuses 1. Selle liikumise spetsiifilisem vorm, kus töökohalt töökohale liikumisega kaasneb ka ametikoha vahetamine, on vaatluse all uurimuses 2. Vahetamisvoogude näitajat, mis võtab kokku nii töötajate kui töökohtade vood, vaadeldakse uurimuses 3. Ehkki tootlikkust ei analüüsita uurimuses 2, on see olulisel kohal artiklites 1 ja 3.

Joonisel 1 on kujutatud artiklite kõige olulisemaid teemasid ettevõtte taseme tootlikkuse tegurite üldises skeemis. Ettevõtted kasutavad sisendeid (kapitali, immateriaalset kapitali ja tööjõudu) väljundite tootmiseks. Tihti kirjeldatakse seda protsessi tootlikkuse abil ehk vaadeldakse ettevõtte väljundi suhet sisenditesse. Ettevõtted saavad tootlikkust mõjutada muuhulgas ettevõtte juhtimise, omandi ja teadmusbaasi kaudu. Tootmistegurid, mis ei ole doktoritöö fookuses, on jäetud jooniselt välja. Äritsükkel on oluliseks taustateguriks, mis mõjutab kogu skeemil kujutatud süsteemi (muuhulgas näiteks väliste tootlikkust mõjutavate tegurite kaudu nagu konkurents). Äritsükkel mõjutab ka tööturu paindlikkust mikrotasemel, mis omakorda on oluline ettevõtte teadmusbaasi kujunemisel ja juhtimisel.



Joonis 1. Tootlikkuse tegurid ettevõtte tasemel

Allikas: Syverson 2011 ja Eamets 2013, autori täiendustega.

Märkus: Hallid katkendlikud jooned näitavad, millised objekte igas uurimuses vaadeldakse.

Uurimus 1 panustab **inimkapitaliteooria alasesse** kirjandusse selgitades empiirilisel, kuidas erinevused kõrgepalgaliste ja madalapalgaliste töötajate töökogemuses (ja seega erinevused õppimises tegevuse kaudu²²) võivad tekitada erinevuse nende kahe grupi töötajate vanuse-tootlikkuse kõveras. Uurimus 2 panustab **otsimis- ja sobitamisteooria alasesse** kirjandusse näidates empiirilisel, millised töötajate karakteristikud on seotud ametialase liikumisega kõigis äri-tsükli etappides, isegi majanduslanguse ajal, kui kõrge töötuse tase töötamise taseme madalale on viinud. Uurimus 3 panustab samuti **otsimis- ja sobitamisteooria alasesse** kirjandusse, aga analüüsib empiirilisel seost tööjõu vahetamisvoogude ja tööjõu tootlikkuse vahel majanduskriisi tingimustes, kus kõrge töötuse taseme tõttu on ettevõtetel võimalik seada kõrgemad nõudmised oma tulevaste kandidaatide haridusele ja kogemusele. Uurimus 3 panustab ka kirjandusse, mis on seotud Dunning'u **OLI** paradigimaga leides, et tööjõu mobiilsuse näitaja vahetamisvood võib olla miski, mida välisomanduses olevad ettevõtted saavad kasutada selleks, et majanduskriisis kodumaistest ettevõttest vastupidavamad olla.

Uurimiseesmärgi täitmiseks on püstitatud alljärgnevad uurimisülesanded:

Töö teoreetiline ja empiiriline taust (peatükk 1)

1. Anda üldine ülevaade tootlikkuse teguritest, näidata äri-tsükli mõju nendele teguritele ning määrata töötajate mobiilsuse asukoht ülejäänud tootlikkuse tegurite seas.

Uurimus 1

2. Võrrelda ettevõtetesse juurde palgatud madalapalgaliste ja kõrgepalgaliste töötajate tootlikkust erinevates majandussektorites.
3. Mõõta noorte, keskealiste ja vanemaealiste töötajate tootlikkust ja võrrelda tulemusi omavahel.
4. Hinnata kõrgepalgaliste ja madalapalgaliste töötajate tootlikkuse erinevusi kolmes erinevas vanusegrupis.

Uurimus 2

5. Uurida ametialase mobiilsuse määra kõigis äri-tsükli faasides.
6. Võrrelda erineva oskuste tasemega sinikraede ja valgekraede ametialast mobiilsust äri-tsükli erinevates faasides.
7. Hinnata indiviidi taseme karakteristikute rolli ametialases mobiilsuses kolmes äri-tsükli faasis.

Uurimus 3

8. Uurida tööjõu vahetamisvoogude määra nii välisomanduses olevates kui kodumaistes ettevõtetes kolmes äri-tsükli faasis.

²² Õppimine tegevuse kaudu ei olnud esialgu osaks inimkapitaliteooriast, aga selle lisas Killingsworth (1982).

9. Mõõta ja võrrelda seost kõikide ettevõtete tööjõu tootlikkuse muutuse ja tööjõu vahetamisvoogude vahel majanduskriisis ning buumi ja taastumise etappides.
10. Analüüsida erinevusi tööjõu tootlikkuse muutuse ja tööjõu vahetamisvoogude vahelises seoses nii välisomanduses olevates kui kodumaistes ettevõtetes.

Töö ülesehitus ja teoreetiline taust

Töö koosneb kolmest peatükist. Esimene peatükk annab empiirilise-teoreetilise ülevaate tootlikkusega seotud teguritest ning tööjõu mobiilsusest tootlikkuse tegurina. Teisest peatükist leiab kolm empiirilist uurimust ja kolmandas peatükis arutletakse uurimuste empiiriliste tulemuste üle, viidatakse töö piirangutele ja tuuakse välja ideed tulevasteks uurimusteks. Esimese peatüki ülevaatlikus osas defineeritakse esmalt tööjõu tootlikkuse ja majandustsükli mõisted, seejärel antakse lühiülevaade ettevõttevälisest ja ettevõtte taseme tootmisteguritest ning sellest, kuidas majandustsükkel neid mõjutab, lõpuks kirjeldatakse tööturu mikro-taseme paindlikkuse (töötajate vood ja töökohtade vood) kui tootmisteguri teoreetilist raamistikku.

Kõige üldisemalt defineeritakse tootlikkust võimena teisendada sisendid väljunditeks (Syverson, 2011). Tootlikkust võib mõõta multifaktorilise tootlikkuse ja kogutootlikkuse (*Total Factor Productivity* TFP) kaudu, kui kõik sisendid on kaasatud ja tootlikkust võib sellisel juhul defineerida väljundi kasvuna, mis tuleneb tehnoloogilisest muutusest, kui kõik sisendid on konstantsed (Kohli, 2004). Kui väljund seotakse ainult ühe sisendiga (näiteks kapitali või tööjõuga), on tegu osalise tootlikkuse mõõdikuga. Osalistest mõõdikutest on kõige tuntum tööjõu tootlikkus. On väidetud, et tööjõu tootlikkus on lähemalt seotud jooksva elustandardiga kui kogutootlikkus, sest viimane sõltub meelevaldsetest eeldustest (Sargent ja Rodriguez, 2001). Sharpe (2002) on selgitanud, et kuigi nime põhjal kirjeldab tööjõu tootlikkus ainult tööjõuga seotud efekte, kaasab see tegelikult kõikide tootlikkust mõjutavate tegurite efekte, kaasa arvatud kapitali akumulatsioon, tehnoloogilised muutused ja tootmise organiseerimine. Tööjõupoolse pingutuse intensiivsusel, mida tööjõu tootlikkus samuti näitab, on tavaliselt suhteliselt väike roll võrreldes ülejäänud teguritega. Pikaajaliselt saabki elatustaset kasvata ainult tööjõu tootlikkust suurendades²³ (Sharpe, 2002).

Äritsükli defineeris esimest korda 1927. aastal Mitchell ning definitsiooni parandasid Burns ja Mitchell aastal 1946 (lk 3). Seda definitsiooni peetakse klassikaliseks ning kasutatakse kirjanduses tihti:

²³ Tegelikult sõltub elatustase palgade ja tööjõu tootlikkuse omavahelisest suhtest. Palgad, mis kasvavad kiiremini, kui tööjõu tootlikkus, viivad madalama kapitali investeerimise tasemeni ja aeglasem tehnoloogiline areng põhjustab selle, et tööjõu tootlikkus (nagu ka palgad) väheneb pikema perioodi lõikes. (Tamašauskienė ja Stankaitytė, 2013)

Äritsükliid on kõikumine, mida leitakse nende rahvuste agregeeritud majandustegevuses, mis organiseerivad oma töö peamiselt äriettevõtetes: tsükkel koosneb kasvust, mis leiab aset ligikaudu samal ajal paljudes majandussektorites ja millele järgnevad sarnaselt üldised langused, vähenemised ning taasaktiveerumised, mis omakorda ühinevad järgmise tsükli kasvufaasiks; see muutuste järgnevus on korduv, aga mitte perioodiline; äritsükliite kestvus varieerub enam kui ühest aastast kümne kuni kaheteistkümne aastani; neid ei saa jagada sarnase iseloomuga lühemateks tsükliiteks, millele oleks neile sarnane ulatus.

Majandustsükli määramise muudab keeruliseks see, et vaadeldakse mitmeid erinevaid näitajaid, mis kõiguvad erineva kiirusega ja võivad teatud ajahetkedel olla diametraalselt erinevas pöördepunktis (Gabisch ja Lorenz, 1989). Näiteks Ameerika Ühendriikide äritsükliid määrab komitee, mis kasutab otsustamisel kolme kriteeriumi (i) sügavus (langusfaas peab sisaldama olulist majandustegevuse vähenemist) (ii) ulatus (langusfaas peab levima mitmetes sektorites üle majanduse) (iii) kestus (langus peab kestma rohkem kui mõne kuu) (Business Cycle Dating, 2021).

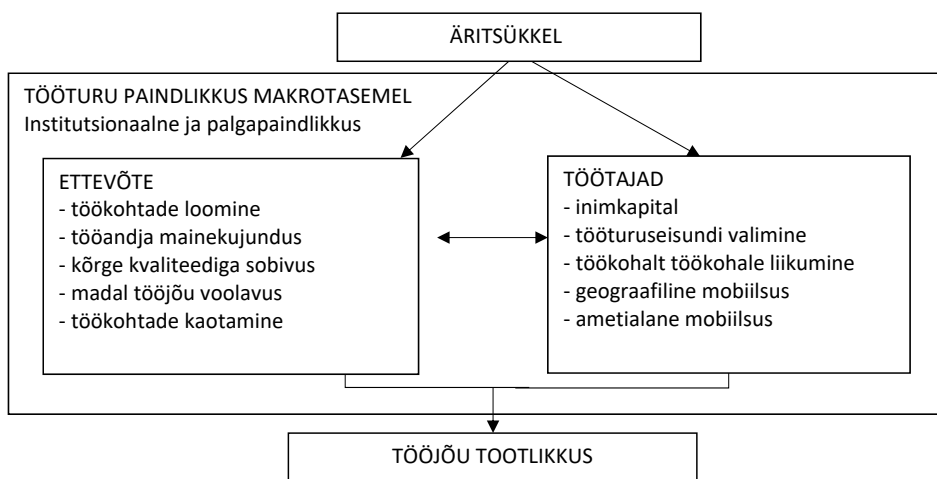
Ettevõttevälised tootlikkuse tegurid on tegurid, mida ettevõtte reeglina ei saa mõjutada oma tootlikkuse muutmise eesmärgil. Töös antakse lühiülevaade ülekande-efektidest (*spillover effect*), sest uurimuses 3 on kasutatud välisomanduses olevate ettevõtete võrdlemist kodumaistega ning suur osa ülekande-efektide kirjandusest uuribki ülekande-efekte välisomandusega ettevõtetelt kodumaistele. Konkurents ettevõttevälise tootlikkuse tegurina on käesoleva doktoritöö jaoks oluline majandustsükli konteksti tõttu, sest Escríbano ja Stucchi (2014) tõlgendavad majanduslangust kui eksogeenset konkurentsi kasvu, mis põhjustab nõudluse langust ja kasvatab likvideerimise ohtu.

Üldiselt on institutsioonid formaliseeritud reeglid, mida saab kolmanda osapoole abil jõustada (Streeck ja Thelen, 2005:10) ja poliitikad on samuti institutsioonid, kuna nad määravad seaduslikke reegleid, mida kolmas osapool viib ellu ja vajadusel ka jõustab (Streeck ja Thelen, 2005). Tööturuinstitutsioonid on osaks tööturu paindlikkusest makrotasemel ning loovad seetõttu keskkonna tööturu paindlikkuseks mikrotasemel. Näiteks poliitikad, mis suurendavad tööturu paindlikkust, vähendavad eeldatavalt ka töötust (Bernal-Verdugo et al., 2012). Andmed, mida on kasutatud peatükis 2 esitatud kolmes uuringus, on kõik ühest riigist, Eestist, seetõttu ei ole institutsioonide ja regulatsioonide mõju töös pikemalt ja põhjalikumalt analüüsitud.

Ettevõttesiseste tootlikkuse tegurite seas antakse ülevaade juhtimisest, omandist ja teadmusbaasist. Kuigi juhtimine on neist kõige kitsam mõiste ja otseselt doktoritöö empiiriliste uuringute fookusest väljas, on lühike kokkuvõtte siiski asjakohane, kuna juhtimisega seotud eelised võivad osaliselt moodustada omandiga seotud eelise, mis ettevõttel peab OLI paradigma järgi olemas olema, et ta saaks edukalt võõras riigis teiste ettevõtetega konkureerida (Driffield et al., 2021). Teadmusbaasi puhul kirjeldatakse doktoritöös enne töötajate ja nende liikumise põhjalikumalt käsitlemist lühidalt ka teisi aspekte nagu õppimine tegevuse kaudu (*learning by doing*), mittemateriaalne kapital nagu infotehnoloogia, teadus ja arendus ning innovatsioon. Omand ettevõttesisese tootmistegurina on ühelt poolt

seotud välisomandusega, aga teiselt poolt võib tähendada ka ettevõtte struktuuri puudutavaid otsuseid (näiteks valikut alltöövõtu ja vertikaalse integratsiooni ja horisontaalse integratsiooni vahel).

Teadmusbaas moodustub peamiselt ettevõttes töötavatest inimestest. Ettevõtted nagu ka töötajad teevad teatud kindlaid otsuseid samaaegselt, mis mõjutavad vastasosapoolt, aga samal ajal ka tööturu paindlikkust mikrotasemel. Joonisel 2 on näidatud otsused, mida teevad töötajad (töötajate vood) ning otsused, mida teevad ettevõtted (töökohtade vood). Lisaks on välja toodud teisi olulisi otsuseid. Näiteks inimkapital on oluline teadmusbasi mõjutaja, aga ka oluline tegur tööturu paindlikkuse juures inimkapitali ja oskuste tõttu, mida töötajad enesega kaasa toovad ettevõttesse tulles ning ära viivad ettevõtetest lahkudes. Töötajad otsustavad, milline on nende inimkapitali tase, aga neis otsustes mängib rolli ka ettevõtete tegevus. Ettevõtte poolel võiksid teatud strateegiad aidata väärtuslikke töötajaid ettevõttes hoida, aga ettevõtetel ei pruugi olla piisavalt ajendeid, et kasutada neid strateegiaid, kuni töötajate voolavus ettevõttes on kasvanud teatud piirini. Tööturu paindlikkus makrotasemel (ehk institutsionaalne ja palgapaindlikkus) määrab ära üldised tingimused mikrotaseme paindlikkuseks. Äritsükkel mõjutab ühelt poolt töötajate ja ettevõtete otsuseid, kuid teiselt poolt võib mõjutada ka tööturu paindlikkust makrotasemel.



Joonis 2. Ettevõtete ja töötajate otsused, mis moodustavad tööturu paindlikkuse mikrotasemel. Tausta määravad institutsionaalne ja palgapaindlikkus ehk tööturu paindlikkuse näitajad makrotasemel.

Allikas: Eamets 2013 põhjal, autori täiendustega.

Töötajaid palgatakse ettevõttesse nende inimkapitali pärast. Investeeringud inimkapitali, mis aitavad indiviidil tõsta ettevõtetelt inimkapitali eest tasuks saadud sissetulekut, on kulukad. Lisaks otsestele kuludele, on kaudeks kuluks ka aeg, mil ei saa õppimise pärast töötada. Optimaalne inimkapitali investeerimine varieerub seega elutsükli jooksul. Noored investeerivad oma inimkapitali rohkem,

kui vanemad inimesed, sest nende investeringu tasuvusaeg on pikem. Sellises raamistikus sõltub iga indiviidi inimkapitali tase sellest, kuidas inimene enda jaoks optimaalselt jagab aja töötamise ja õppimise vahel. Arrow (1962) kinnitab, et õppimine tuleneb ka kogemustest ja Killingsworth (1982) on kasutanud seda ideed, et välja töötada „õppimine tegevuse kaudu” inimkapitali teooria mudel, kus õppimine leiab aset ka töötades ja aeg, mis töötamisele kulub, võib samuti otseselt mõjutada indiviidi inimkapitali taset.

Inimkapitali tase ettevõttes sõltub kõikide töötajate inimkapitali tasemest. Kooskõlas inimkapitali teooriaga on leitud, et seos tootlikkuse ja ettevõttesisese inimkapitali vahel on positiivne, kui inimkapitali mõõdetakse hariduse, kogemuse ja kognitiivsete oskuste abil (Backman, 2014). Lisaks sellele võib inimkapital mõjutada tootlikkuse ja seda mõjutavate tegurite vahelisi seoseid ettevõtte tasemel. Näiteks juhtimise puhul näitavad Bender et al. (2018), et kui nende arvutustesse kaasata inimkapital, siis tootlikkuse ja juhtimispraktikate vaheline seos väheneb 30%–50%.²⁴ Innovatsiooni puhul on näidatud, et kõrgema oskuste tasemega töötajad võivad määrata, kas innovatsioon on edukas või mitte (formaalsete ja mitteformaalsete organisatsiooniliste protsesside kaudu) (Wejnert, 2002).

Uute töötajate individuaalne tootlikkus ei ole ettevõttele palkamise hetkel täiesti selge. Seetõttu võivad inimesed oma aega ja raha kasutades investeerida haridusse, et saata ettevõtetele signaale oma tootlikkuse kohta (Spence, 1973). Ka teised visuaalsed märgid, nagu vanus, võivad mõjutada uue töötaja palkamist ning ettevõtteid võivad hinnata vanemate kandidaatide tootlikkust madalamaks. Ülemaailmse arenenud maade rahvastiku vananemise tõttu on tootlikkuse efekte, mis vananemisest tulenevad, põhjalikult uuritud nii mikro- kui makrotasemel. Individuaalselt on konventsionaalne vanuse-tootlikkuse kõver pööratud U kujuga, kuid empiirilisel ei ole see iga kord kinnitust leidnud (vt ülevaadet näiteks Skirbekk, 2004). Vanusega seotud erinevused tootlikkuses võivad suurel määral tuleneda haridusest, füüsilisest võimekusest, töökogemusest ja vaimsest võimekusest (Skirbekk, 2004). Üldiselt keskmise haridustaseme ja inimkapitali taseme kasv (Lee ja Lee, 2016) ning füüsilise võimekuse vähenemine pärast 30 eluaastaid (Ilmarinen, 2001) seavad tootlikkuse mõttes paremasse olukorda nooremad töötajad, hoolimata sellest, et füüsiliselt väga nõudlike töökohtade arv on Ameerika ühendriikides langenud alates 1970. aastatest (Johnson et al., 2011). Töökogemuse ja vaimse võimekuse mõju on keerulisem üldistada, sest nad segunevad töökogemusega ja seosed vanusega on kompleksed. Töökogemuse efekt tulenebki osaliselt vaiketeadmiste, ametialase kompetentsi ja koostööoskuste arenemisest, mis kompenseerivad langust mõningates kognitiivsetes protsessides (Ilmarinen, 2012).

Ettevõtteid vastutavad töökohtade loomise ja kaotamise eest tööturul ja äri-tsükkel mõjutab seda. Standardses äri-tsükli teoorias on töötuse määra muutuste põhjuseks agregeeritud šokid, mis mõjutavad kõiki ettevõtteid sarnaselt, ja seetõttu

²⁴ Samas jõuavad autorid ka järeldusele, et juhtimispraktikate skoorid ennustavad lisanduvat tootlikkust, mis ei ole seotud inimkapitaliga ja mida võiks pidada „korporatiivkultuuriks“ (Bender et al. 2018).

on teoreetiline korrelatsioonikoefitsient töökohtade loomise ja kaotamise vahel väärtusega -1 (Arpaia ja Curci, 2010). Ameerika Ühendriikide andmete põhjal tehtud uurimused on tavaliselt leidnud tugeva tsüklilise asümmeetria töökohtade voogudes üle äritsükli, kusjuures töökohtade kaotamine varieerub palju rohkem kui töökohtade loomine (Stiglbauer et al., 2003).

Töökohtade loomisel puhul on töötaja leidmine ettevõtete jaoks kulukas ja tööturul on konkurents töötajate pärast. Oskustöötajate puhul kasutatakse isegi terminit „talendisõda”. Tavaliselt eristatakse kahte tüüpi otsimismudeleid tööturul. Kui (i) juhusliku otsimise (*random search*) puhul on palgad määratud läbivõtmise käigus (ja tööotsijate avalduste esitamist palgad ei mõjuta), siis (ii) juhitud otsimise (*directed search*) korral palgad motiveerivad avaldust esitama ja mõjutavad töökoha saamist. Empiirilisel on näidatud internetis avaldatud töökuulutuste põhjal, et selgeid pakkumisi eelistatakse lihtsamate tööde puhul, et hoida kokku avalduste läbi vaatamise pealt. Palganumber hoiab ära nende kandidaatide kandideerimise, kes soovisid saada kõrgemat palka. Kõrgemate palkade puhul on kandidaatide eristamine oluline ja palganumbri puudumine kuulutusest näitab, et ettevõtte on avatud läbivõtmisele. (Banfi ja Villena-Roldán, 2019)

Palkade kõrval on värbamise juures oluline ka ettevõtte atraktiivsus. Terves hulgas teaduskirjanduses analüüsitakse tööandja brändi (*employer brands*) kui reputatsioonitegurit, mis aitab saavutada konkurentsieelist teiste värbajate ees (vt ülevaadet näiteks Backhaus, 2016). Seejuures on tööandja bränd lisaks uute töötajate ligi meelitamisele oluline ka töötajate kaasamisel (*employee engagement*) ning mõjutab seetõttu ka juba ettevõttes töötavaid inimesi (Bhasin et al., 2019). Samas töötajad liiguvad siiski, hoolimata ettevõtete tegevusest, nad vahetavad töökohti, ametiala ja liiguvad ettevõttest ettevõttesse. Ettevõtted saavad kontrollida ja ise tekitada sunnitud mobiilsust (*involuntary mobility*), kui nad vallandavad töötajaid, kuid ettevõtted saavad ainult teatud piirini mõjutada vabatahtlikku mobiilsust (*voluntary mobility*). Mõlemal mobiilsuse liigil on erinev mõju tööjõu tootlikkusele ettevõtetes ning äritsükli etappidel on samuti selle mõju juures oma roll. Enamasti ei ole mobiilsuse põhjus uurijatele teada (nagu ka uurimustes 1, 2 ja 3 käesoleva töö peatükis 2), sest ankeetides ei ole vastavat küsimust või registrites vastavat märget. Sageli on isegi siis, kui ankeedis on küsimus töölt lahkumise vabatahtlikkuse kohta olemas, keeruline eristada ning defineerida vabatahtlikku ja sunnitud töölt lahkumist, kuna raske on interpreteerida valikut „muu“. Lisaks võib inimene lahkuda oma töökohast, sest kardab, et ta peagi niikuinii vallandatakse, mis võiks liigituda nii vabatahtlikuks kui sunnitud mobiilsuseks (Borghans & Golsteyn, 2010).

Otsimisteooria põhjal töötud maksimeerivad oma diskonteeritud eluaegset tulu turul, kus tööpakkumisi võib pidada juhuslikuks valikuks teada oleva jaotusega palgapakkumistest. Sellises olukorras on parimaks strateegiaks valida reservatsioonipalk, enne kui ükski pakkumine on teada. Kui konkreetne palgapakkumine on vähemalt võrdne reservatsioonipalgaga, siis töötaja võtab pakkumise vastu ja ei lahku uuel töökohalt enne pensioniea saabumist, sest uue töökoha otsimise kulud on liiga kõrged. Uue töökoha otsimine töötamise ajal on võimalik raamistikus, kus töötü valib kaks reservatsioonipalka W_X ja W_Y , nii et

$W_X < W_Y$. Sellisel juhul iga tööpakkumine, milles palk on kõrgem kui W_X ja madalam kui W_Y , viib olukorrani, kus pakkumine võetakse vastu, aga töötamise ajal jätkatakse uue töö otsimist, kuni uuel töökohal on võimalik teenida palka, mis on vähemalt võrdne reservatsioonipalgaga W_Y . (Burdett, 1978) Seega saab töötamise ajal töö otsimise ära seletada otsimisteooriaga. Majanduskriis ja töötuse kasv mõjutavad teoreetiliselt töökohalt töökohale liikumist negatiivselt jahtumishüpoteesist (*chilling hypothesis*) lähtuvalt. Kõrge töötuse tase saadab signaali, et töökohti on vähe ja tõenäoliselt pole piisavalt sobivaid alternatiive praegusele töökohale või töötusele. Madalama otsimisaktiivsuse tõttu väheneb ka tööjõu mobiilsus. (McDonald ja Felmingham, 1999)

Töökohalt töökohale liikumise põhjustavad üldiselt inimesed, kes püüavad leida parimat töökohta vastavalt oma oskuste tasemele, sageli kaasneb liikumisega kõrgem palk, eksperimenteeritakse erinevate töökohtadega ja arendatakse erinevaid oskusi (Bosler ja Petrosky-Nadeau, 2016). Teoreetiliselt lahkuvad ametialase mobiilsuse puhul oma töökohalt madala palgaga töötajad ja kõrgema palgaga töötajad jäävad oma töökohale. Vastavalt horisontaalse sorteerimise hüpoteesile, on kõikidel ametialadel oskustele samad kriteeriumid, aja jooksul leitakse kvaliteetne sobivus (*quality match*) ning viletsa sobivuse korral lahkutakse töökohalt. Madalad palgad on märk halvast sobivusest ja noored töötajad püüavad koguda infot erinevate karjäärivõimaluste kohta ametialase mobiilsuse kaudu. Alvarez ja Shimer (2009) oletavad, et igal tööturul on oskustöötajad ja oskusteta töötajad. Oskustöötajatele makstakse rohkem, seetõttu eelistavad nad säilitada oma inimkapitali ja ei vaheta ametiala seni, kuni uus ametiala võimaldab neil oskusi juurde saada ehk oskusi akumuloida. Madala oskuste taseme korral ei ole töötajatel selliseid piiranguid ning nad on uuel ametialal nõus töötama ka ajutiselt. Praktikast näidati juba 1989. aastal, et ühelt poolt parem palk, edutamise võimalused või töötamisvõimalused olid ametialase liikumise põhjuseks enamikul juhtudel. Samas mõned töötajad kaotasid lihtsalt oma töö senise tööandja juures. (Markey ja Parks, 1989) Groes et al. (2015) on uurinud ametialadel üles ja alla liikumist ja järeldavad, et ametialade vahetamine sõltub töötajate positsioonist tema ametiala palgajaoosuses. Suhteliselt kõrgepalgalisel liiguvad ülespoole ametialade hierarhias ja suhteliselt madala palgaga töötajad liiguvad allapoole. Suuna dimensioon (allapoole-ülespoole) näitab, kas oskuseid kasutatakse kõrgemal või madalamal tasemel pärast ametiala vahetamist ja see on muutuse kvaliteeti näitav mõõde. Robinson (2018) on näidanud, et vallandatud töötajad liiguvad keskmiselt allapoole, aga ametialasel mobiilsusel tervikuna on keskmine suund ülespoole.

Töötajate võivad võivad olla nullist suuremad ka siis, kui töökohtade koguarv ettevõttes ei muutu. Et aru saada töötajate voogude ulatusest, kasutatakse tööjõu vahetamisvoogude näitajat. Töökohtade loomine ja töökohtade kaotamine lahutatakse töötajate voogudest ja jagatakse tulemus ettevõtte keskmise töötajate arvuga. Saksamaal tuleneb peaaegu 50% töötajate voolavusest vahetamisvoogudest, mitte töökohtade voogudest (Bachmann et al., 2021); Hollandis on kaks kolmandikku töötajate voogudest vahetamisvoog (Gautier ja Broersma, 2001). Vahetamisvoogude mõju tootlikkusele sõltub teoreetiliselt äritsükli faasidest.

Weingarden (2020) on näidanud, et majanduslanguse ajal tööandja algatatud vahetamisvood (*employer-initiated*) kasvavad võrreldes töötaja algatatud (*quit-initiated*) vahetamisvoogudega. Samal ajal võib kõrgema töötuse taseme tingimustes ettevõtetal olla võimalik tõsta oskuste kriteeriume värbamistel (Reder, 1955). See viib järelduseni, et uued töötajad, kes palgatakse majanduslanguse ajal, võivad olla suhteliselt tootlikumad, kui uued töötajad, keda värvatakse majandusbuumi tingimustes.

Uurimismetoodika ja andmed

Doktoritöö kolmes uurimuses on kasutatud kahte erinevat andmeallikat ning mitmeid erinevaid meetodeid uurimisküsimustele vastamiseks. Kõik andmed on teisesed andmed ja kogutud Eesti Statistikaametis. Uurimustes 1 ja 3 on kasutatud registriandmetel põhinevat töötajate ja tööandjate ühendatud andmete andmebaasi. Uurimus 2 kasutab küsitlusandmeid ehk Eesti tööjõu-uuringut. Tabelis 1 on andmed ja meetodid välja toodud koos uurimisülesannetega.

Tabel 1. Töös kasutatud uurimismeetodid ja andmed.

Uurimus	Uurimis- ülesanded	Meetod	Andmed
1	Ülesanded 2–4	Tööjõu tootlikkuse dekomponeerimine, regressioonianalüüs (tavaline vähimruutude meetod) ettevõtte ja aasta efektidega	Eesti tööandjate – töötajate ühendatud andmed 2006–2014
2	Ülesanded 5–7	Kirjeldav analüüs Binaarne regressioon interaktsioonidega ja ilma	Eesti tööjõu-uuring 2001–2010
3	Ülesanded 8–10	Kirjeldav analüüs Regressioonianalüüs (tavaline vähimruutude meetod) ettevõtte ja aasta fikseeritud efektidega, tõenäosusliku sobitamise meetod	Eesti tööandjate – töötajate ühendatud andmed 2006–2013

Allikas: autori koostatud uurimuste 1–3 põhjal.

Uurimustes 1 ja 3 kasutatud ühendatud andmete puhul on töötajate info pärit Eesti Maksu- ja Tolliameti Töötamise registrist, kus leidub palgainfo ja palga maksja kood kõikide töötajate kohta, kellega tööandjad on sõlminud töölepingu. Info ettevõtete kohta on pärit Eesti Äriregistrist. Registris on küll riigi omanduses olevad ettevõtted, aga valitsusasutused ja kasumit mittetaotlevaid organisatioone registrist ei leia. Taustinfo töötajate kohta on võetud 2011. aasta rahvaloendusest. Ettevõtete kohta on mõne näitaja osas lisainfot võetud Eesti

ettevõtjate statistilisest profiilist 2006–2013. Nii uurimuses 1 kui 3 on kasutatud töötajate jaanuarikuiseid palkasid ja mitme töökoha korral on analüüsi kaastatud ainult kõrgeima palgaga töökoht.

Uurimuses 2 kasutatud Eesti tööjõu-uuring on stratifitseeritud valimit kasutav süstemaatiline üle-eestiline uuring, kus küsitlusele vastavad püsivalt Eestis elavad inimesed vanuses 15–74. Tänu stratifitseerimisele on esindatud eri grupid populatsioonis (Pettai ja Lelumees, 2013). Tööjõu-uuringut on Eestis kvartaalselt läbi viidud alates aastast 2000. Küsitakse nii staatuse kohta tööturul, töökoha kohta, kui see olemas on, viimase või praeguse tööandja infot, samuti töötuse või mitteaktiivsuse põhjuseid. Ainukeseks puuduseks on suhteliselt väike valimi suurus. Uurimuses 2 kasutatakse andmeid aastatest 2001 kuni 2010 ehk 64 300 vaatlust, mis jagatakse kolmeks äritsükli etapiks. Andmete põhjal hinnatakse uurimuses 2 tõenäosust, et töötaja vahetab ametiala binaarse sõltuva muutuja abil. Osadesse mudelitesse on lisatud interaktsioonid. Koguvõlmi kolmeks jagamisega uuritakse, kas karakteristikud, mis on seotud ametiala vahetamisega, muutuvad sõltuvalt äritsükli erinevatest faasidest.

Uurimuses 1 on kasutatud dekompositsiooni meetodit, mille on välja pakunud Ilmakunnas ja Maliranta (2007). Meetodit korratakse kolm korda: esiteks võrreldakse madala ja kõrge palgaga töötajate tootlikkust, siis uuritakse, kas Ilmakunnas ja Maliranta (2007) tulemus vanusegruppide kohta kehtib ka Eestis. Lõpuks on kahe muutuja põhjal konstrueeritud vanuse-tootlikkuse kõverad kõrgepalgalistele ja madalpalgalistele töötajatele. Lisaks on töötajad jagatud aasta jooksul juurde palgatud, lahkuvateks ja ettevõttesse jäänud töötajateks ning nende gruppide osakaalude põhjal on leitud suhteline tootlikkus juurde palgatud töötajatele ning lahkunud töötajatele. Kuigi Ilmakunnas ja Maliranta (2007) on kasutanud instrument-muutujaid, siis Eesti andmetega ei olnud seda võimalik teha ja kasutatakse seetõttu tavalist vähimruutude meetodit ettevõtte taseme fikseeritud efektidega. Uurimuses 3 kasutatakse vähimruutude meetodit ettevõtte või aasta fikseeritud efektidega, et uurida seoseid tööjõu tootlikkuse muutumise ja tööjõu vahetamisvoogude vahel. Täiendava robustsuse analüüsina on kasutatud tõenäosusliku sobitamise meetodit, mis aitas minimeerida erinevusi kodumaiste ja välisomanduses olevate ettevõtete vahel. Ükski töös kasutatud meetoditest ei võimalda analüüsida kausaalsust, seega kõik järeldused põhinevad muutujatevaheliste seoste analüüsil.

Kokkuvõtte töö põhitulemustest

Inimkapitaliteooria põhjal omandavad inimesed oskusi ja haridust selleks, et kasvatada oma tootlikkust ja teenida kõrgema tootlikkuse eest kõrgemat palka. Seetõttu teoreetiliselt töötajate palgad peegeldavad nende tootlikkust. Praktikas pole see siiski alati nii. Kui tööturg ei ole täiusliku konkurentsiga turg, siis palkasid võivad määrata teised mehhanismid (Cataldi et al., 2012). Näiteks võivad ettevõtted kasutada edasilükatud kompensatsiooni (*deferred compensation*) (Lazear, 1979). Lühidalt tähendab see seda, et noortele makstakse vähem võrreldes nende

tegeliku tootlikkuse tasemega ja kui nad on vanemad, siis makstakse neile rohkem. Teadmine, et tulevikus makstakse neile väiksemat palka, vähendaks töötajate motivatsiooni, aga teoreetiliselt pole töötajal vahet, kas talle makstakse rohkem tulevikus või ta saab pidevalt konstantset palka, juhul kui kogu elu jooksul teenitud palga olevikuväärtus jääb samaks. Muuhulgas võivad töötajate palgad üksteisest sõltuda (Hamermesh, 1975) ja palgatõusud võivad mõjutada nende töötajate tootlikkust, kelle palk ei tõusnud. Ettevõtetel on sellest lähtudes motivatsioon vältida kõrgetest palkadest tulenevat ebavõrdsust, mis võiks vähendada osade töötajate panust. Nende majanduslike põhjenduste kõrval on sotsioloogid väitnud, et ebavõrdsus tuleneb sellest, et valitsevad grupid jagavad ressursse ebaõiglaseks (Kalleberg ja Sorensen, 1979).

Üldiselt on käesolevas doktoritöös (uurimus 1) empiiriliselt kinnitatud, et vanuse-tootlikkuse kõver on pööratud U kujuline juurde palgatud töötajate puhul ja analüüs sektorite lõikes näitas, et see kehtib teenuste aga mitte tööstussektoris. Vastupidiselt mõnedele varasematele uurimustele oli vanemaealiste kohort statistiliselt vähemalt sama tootlik kui noorte kohort. Göbel ja Zwick (2012) võrdsesid vanuse-tootlikkuse profiile metallitööstuses ja teenuste sektoris ja ei leidnud olulisi erinevusi. Uurimus 1 käesolevas töös näitab vastupidist tulemust, kuna tootlikkuse erinevused vanusegruppide vahel ilmnesid ainult teenuste sektoris. Vastuolu võib osaliselt tuleneda veidi erinevate NACE sektorite analüüsimisest ja võib-olla ka sellest, et uurimuses 1 analüüsiti vaid juurde palgatud töötajate tootlikkust. Vanemaealisi palgatakse vähem ja need, kellel on tervisprobleemidest tulenevalt väiksem tootlikkus, ei otsi võib-olla üldse tööd. Charni (2022) dekomponeeris erinevusi töölesaamisvõimalustes noortele ja vanadele töötajatele (üle 50-aastastele) ja leidis, et madalam tõenäosus palgatud saada vanemas vanusegrupis on peamiselt seotud selgitamata erinevustega mitte karakteristikute erinevusega. Mõned uuringud näitavad, et kuigi juhid hindavad vanemate töötajate kogemust, leivad nad, et kogemus on seotud ettevõttes töötamise staažiga ning seetõttu on nad nõus oma vanemaid töötajaid tööl hoidma, aga mitte uusi palkama (Daniel ja Heywood, 2007).

Empiiriliselt ei saanud Kampelmann ja Rycx (2012) ümber lükata hüpoteesi, et kõikide töötajate tootlikkus on sama mõnedes NACE sektorites (mis hõlmasid tööstussektorit ja mõnda teenuste sektori haru). Käesolevas töös ei näidanud töötajate madalapalgalisteks ja kõrgepalgalisteks jaotamine statistiliselt olulist tootlikkuse erinevust tööstussektoris, teadmusmahukate teenuste sektoris ja ehitussektoris. Osaliselt võib tööstussektoris läbirääkimisvõimekus selgitada, miks tootlikkuse erinevust selles sektoris ei leitud. Näiteks metallitööstuse tööandjad ei ole töötajate jaoks väga atraktiivsed, väike arv oskustega töötajaid saab seega valida oma tööandja ja see võib viia palkade survele ülespoole (Masso et al., 2021b). Kui surve on tööstuses tugevam, siis keskmised palgad võivad jagada töötajate valimi sellisel moel, et suhteliselt suurem arv tootlikke töötajaid jäävad madalapalgaliste töötajate gruppi.

Kui lisada teooriasse õppimine kogemuse kaudu, siis kogemus, mis saadakse kõrgepalgalistel töökohtadel töötades, võib eeldatavalt tõsta inikapitali taset suhteliselt rohkem, kui rutiinsed tööülesanded madalapalgalistel ametikohtadel.

Seetõttu vanusega seotud tootlikkuse langus võib olla kahes palgagrupis erinev. Käesolevas doktoritöös selgus, et juurde palgatud noorte tootlikkus oli kahes palgagrupis statistiliselt oluliselt erinev, kuid teiste vanusegruppide puhul polnud erinevus statistiliselt oluline. Mõneti kinnitab see Kampelmann et al. (2018) tulemust, mille põhjal Belgias madala haridusega noored on suhteliselt üle makstud võrreldes nende tootlikkusega ja ettevõtteid ei soovi neid eriti palgata. Suurem osakaal noori madala haridusega töötajaid oli samuti seotud ettevõtte suhteliselt väiksema kasumlikkusega.

Ettevõttes olevate töötajate tootlikkuse kõrval sõltub ettevõtte tootlikkus ka sellest, missuguse tootlikkusega töötajad juurde palgatakse ning millise tootlikkusega töötajad ettevõttest ära lähevad. Ametialane mobiilsus, mobiilsuse tüüp, mida vaadeldakse uurimuses 2 käesolevas doktoritöös, hõlmab ametiala vahetamist lisaks töö vahetamisele, aga mõlemat tüüpi mobiilsused sõltuvad äri-tsükli faasidest. Majanduslanguse ajal luuakse teiste tsükli faasidega võrreldes vähem töökohti, aga kaotatakse rohkem töökohti. Töötud leiavad väiksema tõenäosusega töökoha ja juba töötavate inimeste otsimisaktiivsus langeb. Sellised protsessid viivad muuhulgas suhteliselt madalama ametialase mobiilsuseni majanduslanguse faasis (näidatud ka uurimuses 2). Sama on leitud Ühendkuningriigis Covid-19 kriisi kohta (Carrillo-Tudela et al., 2021).

Euroopas vahetavad aasta jooksul keskmiselt 3% töötajatest oma ametiala. Eesti oli ametialase mobiilsuse tõenäosuse poolest aastatel 2011–2014 Euroopas Rootsi järel teisel kohal (ligi 7% ISCO 2 numbri tasemel) (Bachmann et al., 2020). Kuigi muutuse suund ametialases hierarhias ei olnud uurimuse 2 fookuses, on USA kohta näidatud (Robinson, 2018), et suur osa ametialastest muutustest on seotud inimkapitali kuhjumisega ehk akumulatsiooniga. Euroopas on alla poole liikumine tõenäolisem, sest ainult kolmandik ametiala vahetanutest jääb samasse palgadesiili ja seetõttu võib Euroopas ametialane mobiilsus kaasa tuua mõningast inimkapitali kadu (Bachmann et al., 2020). Eesti kohta on aastate 1988–1995 andmetes näidatud, et kui reastada ISCO ühe numbriga koodid sissetulekute alusel, siis 59% muutustest toimus ametialale, kus on madalamad palgad (Campos ja Dabušinskas, 2009). Aastate 2002–2009 kohta on Masso et al. (2013) toonud välja, et 60% muutustest olid ülespoole, kui ametialad olid reastatud palkade järgi, ning see osakaal oli peaaegu võrdne töötajatele, kes olid töötanud välismaal ja kes ei olnud töötanud välismaal.

Peamiselt on uurimuses 2 pööratud tähelepanu ametiala vahetanud töötajate individuaalsetele karakteristikutele ja kuidas need muutuvad sõltuvalt äri-tsükli faasidest. Euroopas naised, vanemacalised töötajad ja keskmise oskuste tasemega (võrreldes kõrge oskuste tasemega töötajatega) töötajad ning täiskoormusega töötajad (enam kui osakoormusega töötajad) ja samuti abielus inimesed vahetavad ametiala vähem (Bachmann et al., 2020). Tulemused Eesti kohta uurimuses 2 majanduse taastumise perioodil kinnitavad, et naised vahetavad ametikohta vähem kui mehed (niisamuti nagu on näidanud Lalé, 2012), aga teistes äri-tsükli faasides ei olnud sugu statistiliselt oluline tegur ametiala vahetamise tõenäosuse arvutamisel.

Empiiriliselt on näidatud tööstaaži olulist rolli ametialase mobiilsuse juures juba pikka aega tagasi (Rytina, 1982). Mõnedes uurimustes on välja toodud, et vanusel on negatiivne seos ametialase mobiilsusega. (Moscarini ja Vella, 2008, Bachmann et al., 2020). Probit-mudelid käesoleva doktoritöö uurimuses 2 kaasavad vanuse aastates ja sama muutuja ruudu, kuid kolme suure vanusgrupi analüüsimine oleks võinud olla informatiivsem. Selgitavate muutujate hulgas uurimuses 2 on ametialane hierarhia ja palk. Hariduse muutuja asemel on uurimuse arvutustesse kaasatud neli ametialade oskuste taset. Kui haridus ei vasta töökohal nõutud tasemele, siis kõrgharidusega inimene võib töötada ka lihttööliseks. See tähendab, et tema tootlikkus on lihttöölise oma, mitte kõrgharidusega töötajatele vastav. Seetõttu näitab ametialane oskuste tase täpsemalt, millist haridustaset töökoht nõuab. Üldiselt peaksid haritumad töötajad vahetama ametiala vähem, sest nende ametid hõlmavad suuremat ametialaspetsiifilist investeeringut ja nende karjääriteed koosnevad väiksemal arvul erinevatest ametialadest (Sicherman, 1990). Kambourov ja Manovskii (2008) leidsid siiski ainult väikesi erinevusi erineva haridusega inimeste ametialase mobiilsuse tasemes. Uurimus 2 käesolevas töös näitas, et majanduslanguse ajal ei ole haridustase (mõõdetuna ametialade oskuste taseme kaudu) statistiliselt olulisel määral seotud tõenäosusega vahetada ametiala.

Töötajate vood on muuhulgas põhjustatud inimeste soovist leida parimat tööd oma oskuste tasemele vastavalt ja ettevõtte otsivad samal ajal võimalikult häid töötajaid ning mõlemad osapooled püüavad saavutada parimat sobivust. Seega on teatud piirini tööjõu mobiilsus tootlikkust kasvatavat. Ülemäärast töötajate mobiilsust peetakse liiga kulukaks ettevõtte jaoks ning liiga stressirohkeks inimestele, kes liiguvad (Ettlie, 1985). Samas on tõenäosus kasvata tööjõu tootlikkust töötajate mobiilsuse kaudu suurem majanduslanguse ajal, kui töötuse määr on kõrge ja töötajatel on teoreetiline võimalus tõsta oma nõudmisi kandidaatide hariduse ja töökogemuse osas (Modestino et al., 2020; Devereux, 2002). Käesolev töö kinnitab, et seos tööjõu vahetamisvoogude ja tööjõu tootlikkuse vahel on pööratud U kujuga kriisi ajal. Enne uurimuse 3 valmimist oli positiivset seost nende kahe muutuja vahel näidanud Ilmakunnas et al. (2005). Positiivne lineaarne vahetamisvoogude muutuja ja selle negatiivne ruutliige olid tootlikkuse (TFP) võrrandis samuti näidatud artiklis Masso et al. (2012) poolt Eesti andmetes.

Tootlikumad ettevõtted võivad olla edukamad tööjõu tootlikkuse tõstmisel vahetamisvoogude abil. Välisomandusega ettevõtted on üldjuhul tootlikumad kui kodumaised. Käesolev töö näitab, et teenuste sektoris on seos tööjõu vahetamisvoogude ja tööjõu tootlikkuse muutumise vahel positiivsem välisomandusega ettevõtetes võrreldes kodumaiste ettevõtetega, aga sama ei saa öelda tööstussektori kohta. Erinevuse leidmine teenuste sektoris võib olla osaliselt riigispetsiifiline tulemus sõltuvalt kõigist sobivatest tingimustest, mis olid Eestis sellel hetkel olemas: (i) suur SKP langus, (ii) paindlik tööturg, ja (iii) üsna kõrge välisomanduses olevate ettevõtete osakaal.

Nii teenuste kui tööstussektoris on tööjõu tootlikkuse ja tööjõu vahetamisvoogude seos positiivne majanduslanguse ajal ja seega on seda seost mõjutavad faktorid osaliselt kahes sektoris sarnased. Samas erinevuste puudumine

tootlikkuses tööstussektoris nii uurimustes 1 kui ka 3 on teineteist toetavad tulemused. Kuna vanusegruppide ega palgagruppide vahel ei olnud tootlikkuses erinevusi uurimuses 1, oleks üllatav leida, et välisomanduses ettevõtetel on positiivsem seos tööjõu vahetamisvoogude ja tööjõu tootlikkuse muutumise vahel uurimuses 3. See viitab asjaolule, et tööstussektoris paistavad võimalused tõsta töötajate tootlikkust olevat peidetud muudesse teguritesse kui väiksema tootlikkusega töötajate asendamisesse suurema tootlikkusega töötajatega. Tootlikkuse tegurite analüüs tööstussektoris on näidanud, et seal on suurel määral tootlikkus seotud masinatega ja materjalidega ning viivitused õige materjali kättesaadavuses õigel ajal on leitud olema kõige olulisem töötajate tootlikkuse tegur (Sreekumar et al., 2018). Suurem osakaal kõrgharidusega töötajaid on positiivselt seotud tööjõu tootlikkuse muutusega tööstussektoris (tulemus uurimuses 3). Seda võib seletada uue tootmisliini avamisega, kus kasutatakse ka keerulisemaid tootmisprotsesse võrreldes olukorraga enne restruktureerimist. Niisugustes tingimustes võib tööjõu tootlikkus kasvada. Suhteliselt olulisem tegur on vanus teenuste sektoris, mis võib viidata kogemuse tähtsusele teenuste puhul ja võimalusele mõjutada tootlikkust suuremal määral individuaalse panustamise muutmise kaudu.

Peamised uurimuste tulemused on näidatud tabelis 2 koos vastavate uurimisülesannetega.

Tabel 2. Uurimisülesanded ja tulemused.

Uurimus	Uurimisülesanded	Tulemused
1	2. Võrrelda ettevõtetesse juurde palgatud madalapalgaliste ja kõrgepalgaliste töötajate tootlikkust erinevates majandussektorites.	Kaks palgagruppi ei näita statistiliselt olulist erinevust tootlikkuses tööstussektoris.
1	3. Mõõta noorte, keskealiste ja vanemaealiste töötajate tootlikkust ja võrrelda tulemusi omavahel.	Teenuste sektoris on vanuse-tootlikkuse kõver pööratud U kujuga, aga juurde palgatud vanemaealiste töötajate kohort on igas sektoris statistiliselt vähemalt sama tootlik kui juurde palgatud noorte töötajate kohort kõigis sektorites.
1	4. Hinnata kõrgepalgaliste ja madalapalgaliste töötajate tootlikkuse erinevusi kolmes erinevas vanusegrupis.	Juurde palgatud kõrgepalgaliste noorte töötajate tootlikkus on kõrgem kui madalapalgalistel juurde palgatud noortel. Vanuse-tootlikkuse kõver on laugem kõrgepalgalistel võrreldes madalapalgaliste vanuse-tootlikkuse kõveraga.

Uurimus	Uurimisülesanded	Tulemused
2	5. Uurida ametialase mobiilsuse määra kõigis äritsükli faasides.	Ametialast mobiilsust esineb sagedamini madala töötuse määra tingimustes.
2	6. Võrrelda erineva oskuste tasemega sinikraede ja valgekraede ametialast mobiilsust äritsükli faaside lõikes.	Ametialane mobiilsus äritsükli eri faasides sõltub ametialade oskustel põhinevast hierarhiast. Ametialast mobiilsust on rohkem madalama taseme ametialadel majanduse taastumise ja majandusbuumi faasis. Majanduslanguse faasis ainult palk on oluline ja negatiivselt seotud tõenäosusega ametiala vahetada.
2	7. Hinnata indiviidi taseme karakteristikute rolli ametialases mobiilsuses kolmes äritsükli faasis.	Kõrgem sobivuse kvaliteet (möödetuna tööstaaži pikkusega) on seotud madalama ametialase mobiilsusega kõigis äritsükli faasides, aga ta on suhteliselt olulisem majanduskriisi ajal.
3	8. Uurida tööjõu vahetamisvoogude määra nii välismanduses olevates kui kodumaistes ettevõtetes kolmes äritsükli faasis.	Nii kodumaistes kui välismanduses olevates ettevõtetes on tööjõu vahetamisvoogude tase madalam majanduslanguse ajal kui äritsükli teistes faasides.
3	9. Mõõta ja võrrelda seost kõikide ettevõtete tööjõu tootlikkuse muutuse ja tööjõu vahetamisvoogude vahel majanduskriisis ning buumi ja taastumise etappides.	Seos tööjõu vahetamismäära ja tööjõu tootlikkuse muutuse vahel on pööratud U kujuga nii majanduskriisis, buumis kui ka majanduse taastumise etapis, aga kriisi ajal on madalamad vahetamismäära tasemed positiivselt seotud tootlikkuse muutusega ning majandusbuumi ajal on nendevaheline seos negatiivne.
3	10. Analüüsida erinevusi tööjõu tootlikkuse muutuse ja tööjõu vahetamisvoogude vahelises seoses nii välismanduses olevates kui kodumaistes ettevõtetes.	Teenuste sektoris positiivne seos tööjõu vahetamisvoogude ja tööjõu tootlikkuse muutuse vahel on majanduskriisi ajal tugevam välismandusega ettevõtetes võrreldes kodumaistega.

Allikas: autori koostatud uurimuste 1–3 põhjal.

Töö piirangud ja soovitusel tulevasteks uuringuteks

Ainult töötajate kohorte oli võimalik analüüsida Ilmakunnase ja Maliranta (2007) meetodiga uurimuses 1. Seega ei saanud lisada mudelitesse rohkem tegureid. Muuhulgas on analüüsitud ainult juurde palgatud vanemaealiste töötajate tootlikkust. Võib ju olla, et tervisprobleemidega ja seetõttu väiksema tootlikkusega vanemad inimesed ei olegi palgatute hulgas ja võib-olla pole tööturul pakkuda osalise koormusega töökohti, mida nad täiskoormusega töötamisele eelistaksid. Lisaks ei ole selge, kas noored kõrgepalgalised töötajad jäävad kõrgepalgaliste gruppi ka siis, kui nad on saanud vanemaks. Võib-olla eelistavad paljud neist hakata füüsilisest isikust ettevõtjaks ning nende töötamine ei kajastuks enam töötamise registris. Huvitavaks täienduseks oleks uurimusele 1, kui analüüsitakse vanemaealisi kõrgepalgalisi töötajaid ja nende karjääriteed detailsemalt. Andmete paneel, mida uurimuses 1 kasutati, on selleks veel liiga lühike, kuid tulevikus oleks seda võimalik teha ka Eesti registriandmete põhjal.

Uurimuse 2 puhul on olulisimaks piiranguks väike vaatluste arv, kuna tegemist on küsitlusuuringu andmetega. Töötajaid küsitletakse ainult mõnes kvartalis ja longituudseid andmeid töötajate kohta ei ole, kuigi igas laines on iga inimese kohta kogutud väga palju infot, mida saabki ainult küsitlusega koguda ning registriandmetest ei leia. Küsitlusuuringus ei pruugi inimesed ka alati tõtt rääkida. Mellow ja Sider (1983) on näidanud, et tööandja ja töötaja võivad nimetada töötaja ametialaks erinevat nimetust pea pooltel juhtudel. Longituudsete andmetega võiks analüüsida töötajate tõenäosust vahetada ametiala kogu elu jooksul. Suurema valimi korral saaks analüüsida üles- ja allapoole liikumist ametialade hierarhias. Tulevased uuringud võiksid ka kontrollida, kas uurimuse 2 tulemused jäävad samaks, kui ISCO ühe numbri koodide asemel kasutatakse kahe või kolme numbriga ISCO koodi ametialade defineerimiseks. Kuna uurimus 2 vaatlleb ainult seost individuaalsete karakteristikute ja ametiala vahetamise vahel, siis tulevikus saaks uurida ametialaste muutuste põhjuseid või ametiala vahetamise tagajärgi ettevõtete tasandil.

Andmetega seotud piirangud on samad uurimustel 1 ja 3. Registriandmed ei sisalda näitajaid, mida oleks vaja spetsiifilisemate teemade uurimiseks (nagu näiteks ametiühingutesse kuulumine vms). Uurimuses 1 oleks ametialade info võimaldanud töötajaid jagada gruppidesse oskuste taseme järgi (näiteks valge- ja sinikraedeks) ja hinnangud tootlikkusele oleks sellisel juhul suuremal määral peegeldanud töökohal kasutatavaid oskusi. Ametialane info töötajate kohta võinuks aidata uurimuses 3 täpsustada vajalikke detaile töötajate vahetamisvoogude kohta. Võinuks analüüsida ka sinikraede ja valgekraede vahetamisvoogusid eraldi ja uurida, mis juhtub nendega majanduskriisi ajal. Tulemuste tõlgendamisel uurimuses 3 oleksid kasuks tulnud andmed selle kohta, kas töökohast lahkumise algatas töötaja või ettevõtte.

Arvutused uurimuses 3 näitasid, et tööjõu vahetamisvood on positiivselt seotud tööjõu tootlikkuse muutumisega majanduskriisi ajal ning sellega negatiivselt seotud majandusbuumi ajal. Seejuures ei ole selge, millised on sellisele tulemusele jõudmise põhjused. Kvalitatiivsed uuringud, kus intervjueritakse ettevõtete

juhte, võiksid aidata paremini aru saad mehhanismidest, mis selle muutuva suhte taga on (näiteks midagi sellist, nagu on kirjutanud Rowley ja Purcell 2001). Nii-samuti ei ole täpselt selge, miks tulemused välismanduses olevate ettevõtete kohta peaksid olema erinevad teenuste ning tööstuse sektorites, ning seda võiksid uuringud tulevikus täpsustada.

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