Structural change in rural Europe: Land-use and labour behaviour

Case studies with applications to drivers of participation to agri-environmental measures and labour force transitions

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List of abbreviations

AE: Agri-Environmental
AEM: Agri-Environmental Measure
AWU: Annual Work Unit
CAP: Common Agricultural Policy
EFM: Extensification of Field Margins
EEC: European Economic Community
EC: European Commission
ECHP: The European Community Household Panel data
EU: European Union
ESU: European Size Unit
FADN: Farm Accountancy Data Network
FAO: Food and Agriculture Organization of the United Nations
FoodIMA: Food Industry Dynamics and Methodological Advances
FWU: Family Work Unit
ISEI: International Socio-Economic Index of Occupational Status
ISSP: International Social Survey Program
NEET: Neither in employment, education nor training
LFA: Less Favoured Area
LFS: Labour Force Survey
LSU: Livestock Unit
OECD: Organization for Economic Co-operation and Development
OLS: Ordinary Least Squares
PIY: Plantation In Yard
REFLEX: Research into Employment and Professional Flexibility
PRIMA: Prototypical policy Impact on Multifunctional Activities in rural municipalities
RD: Rural Development
RDP: Rural Development Programme
SAEP: Slovenian Agri-Environmental Programme
SNA: Social Network Analysis
SOEP: Socio-Economic Panel data
SGM: Standard Gross Margin
SNA: Social Network Analysis
TLM: Transitional Labour Markets
UAA: Utilized Agricultural Area
UNCED: United Nations Conference on Environment and Development.
VIF: Variance Inflation Factor

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Summary

This study addresses challenges related to structural change in rural Europe with a particular focus on the analysis of land-use decisions and labour force behaviour. The first challenge relates to a new approach to understanding rural development, as rural regions are no longer considered to be evolving separately from urban regions, but rather in a joint process. Structural changes arise in rural regions which are progressively influenced by predominant changes in urban society (UN, 2004). This perception refelcts the point of view of European society that is moving away from understanding the future rural regions which is *indifferent of urban* (Leon, 2015). This shift in perception entails a fundamental rethinking of the role of rural regions within a society that requires the fulfillment of multifunctionality. In the literature, the discourse on the multifunctionality of agriculture has focused on the process of agricultural policy reform that started in the mid 1980s (Van Huylenbrock et al., 2007). Besides the traditional functions of the agricultureal sector, agricultural production has been identified for the pivotal role it plays in society. This includes both multiple commodity and non-commodity outputs (such as environmental services, landscape amenities and cultural heritages), which are jointly produced by agriculture. The question of how to promote multifunctional agriculture in land-use decisions has been addressed by agricultural policies mainly in the form of voluntary agri-environmental measures (AEMs) implemented in EU Member States.

The second challenge relates to the borders of rural territory; the boundaries between urban and rural areas are becoming indistinct via evolved interactions. In such case, it seems relevant to describe rural territory based on geographical division by population density (methods defined by OECD, 1994; EC 2000); conceptualization of what is rural in Europe is no longer considered as wholly *independent of urban* (Perrier-Cornet and Hervieu, 2002; Leon, 2015). This approach to rural territory leads labour force behaviour analysis to take account of movements of people between the two territories and to acknowledge the influence of social risks in urban areas on the rural capital, land and labour markets. Reviewing socio-economic profiles reveals that the urban influence on the rural labour market can be seen as a reflection on the social exclusion problem (Schömann 2002), especially during periods of economic crises (Hodge et al., 2002). Urban social exclusion results in socially excluded groups such as the inactive, and long-term unemployed individuals in rural labour markets (Philip and Shucksmith 2003). Regarding the

demographic profile, it is apparent that increased out-migration of the labour force (those who seek better opportunities in urban areas) affects rural labour markets. Especially rural youth groups face difficulties in attaining a stable job after leaving school. This fact highlights the importance of understanding the rural labour force behavior from the perspective of social risks associated with economic crises and demographic trends among excluded groups.

This thesis consists of two main parts in order to address these two main challenges. The first part addresses the impact of factors influencing farmers' participation behaviour in AEMs. The number of AE programmes, as well as the share of enrolled agricultural land, differs significantly between EU Member States. Due to the large diversity of AEMs and different payment amounts in each Member State, it is hard to uniformly model AEMs across Member States. We have conducted analyses in Slovenia and Germany, respectively. The main objective in both case studies is to understand and explore the role of rural areas' specific assets on the decision making that leads to the commitment to volunteer-based AE contracts.

The second part of this thesis investigates factors influencing labour force behaviour. Particular attention is given to social risks associated with economic crises and demographic trends among excluded groups, such as the inactive population and the out-migrated youth labour force. Two case studies are provided which aim to explore the rural labour force's behavioural changes in Germany using a rural-urban comparison perspective, instead of an area-based approach. Understanding the effects of social risks has essential policy implications with regard to problems of social exclusion and the promotion of labour market development in rural areas.

Finally, both parts of this thesis investigate behaviour models, using discrete choice methods in the field of rural economics. The emphasis was put on concrete rural policy problems, and with these studies, we aim to contribute to the policy programs that address the implementation of AEMs and active labour market policies.

Keywords: Agri-environmnetal measures, rural labour behviour, discrete choice models, transitional labour market theory, youth, inactive population, Sloveina, Germany.

Zusammenfassung

Diese Studie befasst sich mit den Herausforderungen des Strukturwandels im ländlichen Raum Europas unter besonderer Berücksichtigung der Untersuchung der Entscheidung der Flächennutzung und zum Erwerbsverhalten. Die erste zentrale Herausforderung ist das Verhältnis zwischen der Entwicklung des ländlichen Raums und der urbanen Zonen, von denen man annimmt, dass diese Entwicklungen miteinander einhergehen. Der Strukturwandel vollzieht sich in ländlichen Gebieten, die zunehmend von der vorherrschenden Veränderung in der städtischen Gesellschaft beeinflusst werden (UN, 2004). Diese Wahrnehmung reflektiert den Standpunkt der europäischen Gesellschaft, die sich davon entfernt hat, die zukünftigen ländlichen Regionen zu verstehen, die indifferent zu städtischen Regionen sind. Dies zieht ein grundlegendes Umdenken der Stellung der ländlichen Regionen innerhalb der Gesellschaft nach sich, die die Verwirklichung der sogenannten „Multifunktionalität“ benötigt. Der Diskurs über die Multifunktionalität der Landwitschaft ist in der Literatur als ein Prozess der Agrarpolitikreform, der Mitte 1980er Jahre angefangen hat, betrachtet worden (Huylenbrock et al., 2007). Neben den traditionellen Funktionen des Landwirtschaftssektors spielt die landwirtschaftliche Produktion eine Schlüsselrolle in der Gesellschaft. So sind es nicht nur Waren, sondern auch Dienstleistungen (wie Umweltdienstleistungen, landwirtschaftliche Annehmlichkeiten und kulturelles Erbe), die von dem Landwirtschaftssektor bereitgestellt werden sollen. Bei der Förderung und dem Ausbau eine multifunktionale Landwirtschaft in den EU-Mitgliedstaaten, hat sich die Agrarpolitik hauptsächlich auf freiwillige Agrar-Umweltmaßnahmen (AEMs) konzentriert.

Die zweite Herausforderung bezieht sich auf die Frage, wie man ländliche Gebiete abgrenzen kann: die Grenzen zwischen städtischen und ländlichen Gebieten verschwimmen zunehmend durch die wandelnde Wechselwirkungen. In solchen Fällen muss man häufig auf geographische Einteilungen durch Bevölkerungsdichte zurückgreifen (Methoden festgelegt durch OECD, 1994; EC, 2000). Die Begriffsbildung was in Europa unter „ländlich“ zu verstehen ist, ist nicht mehr länger als völlig unabhängig von dem urbanen Begriff zu sehen. Dieses Verständnis vom ländlichen Raum führt in Untersuchungen über das Erwerbsverhalten zur Berücksichtigung der Bewegungen der Menschen zwischen zwei Gebieten sowie zur Anerkennung des Einflusses

sozialer Risiken in urbanen Gebieten auf das Kapital aus ländlichen Gebieten sowie auf die Flächen und die Arbeitsmärkte in ländlichen Gebieten. Aus der sozioökonomischen Perspektive reflektiert der Einfluss der Stadt auf den ländlichen Arbeitsmarkt das Problem der sozialen Ausgrenzung (Schömann, 2002), insbesondere während Zeiten wirtschaftlicher Krisen (Hodge et al., 2002). Dies führt zu einer sozialen Ausgrenzung von Gruppen auf dem ländlichen Arbeitsmarkt, wie zum Beispiel nicht erwerbstätigen Personen und langfristig Arbeitslosen. (Philip and Shucksmith, 2003). In Bezug auf die Demographie, ist es offensichtlich, dass die Abwanderung der Arbeitskräfte, die auf der Suche nach besseren Arbeitsmöglichkeiten in die Stadt ziehen, sich auf die ländlichen Arbeitsmärkte aus wirkt. Insbesondere die Jugendlichen auf dem Land haben Schwierigkeiten einen stabilen Job zu finden. Aus diesem Grund ist es von großer Wichtigkeit, das Erwerbsverhalten der Arbeitskräfte unter der Berücksichtigung der mit den wirtschaftlichen Krisen und demographischen Trends verbundenen sozialen Risiken in ausgegrenzten Gruppen, wie zum Beispiel nicht erwerbstätigen Personen und abgewanderten Arbeitskräften in ländlichen Gebieten, zu verstehen.

Diese Arbeit befasst sich in zwei Hauptteilen mit den beiden dargestellten Herausforderungen des Strukturwandels. Der erste Teil dieser Arbeit beschäftigt sich mit den Auswirkungen der Faktoren, die das Teilnahmeverhalten der Landwirte an den Agrar-Umweltmaßnahmen (AEMs) beeinflussen. Die Anzahl der Agrar-Umweltprogramme sowie der Anteil der landwirtschaftlichen Nutzfläche unterscheiden sich signifikant zwischen den EU-Mitgliedstaaten. Aufgrund der großen Vielfalt der AEMs und unterschiedlichen Zahlungsbeträge in jedem Mitgliedstaat ist es schwierig einheitliche AEMs in allen Mitgliedstaaten zu modellieren. Wir führen unabhängig voneinander eine Untersuchung in Slowenien und Deutschland durch. Das Hauptziel in beiden Fallstudien ist es, zu verstehen und zu erforschen, welche Rolle bestimmte Vermögenswerte in ländlichen Gebieten auf die Entscheidungsfindung spielen, die zu Agrar-Umweltverträgen auf freiwilliger Basis führen.

Der zweite Teil dieser Arbeit behandelt Faktoren, die den Wandel im Erwerbsverhalten beeinflussen. Ein besonderer Schwerpunkt liegt auf dem sozialen Risiko, verbunden mit wirtschaftlichen Krisen und demographischen Trends unter ausgegrenzten Gruppen, wie zum Beispiel die inaktive Bevölkerung und abgewanderte weibliche Arbeitskräfte. Zwei Fallstudien werden vorgestellt, die das Ziel haben, mittels einer den ländlichen und urbanen Raum vergleichenden Perspektive, den Wandel im Erwerbsverhalten in ländlichen Gebieten zu

erforschen. Somit verfolgen wir keinen territorialen Ansatzes. Das Verständnis über die Auswirkungen sozialer Risiken führt zu wesentlichen politischen Implikationen, um soziale Ausgrenzungsprobleme zu behandeln und die Entwicklung des Arbeitsmarktes in ländlichen Gebieten zu fördern.

Durch die Erörterung besonderer Herausforderungen behandeln die beiden Teile dieser Arbeit ferner, die Verwendung von diskreten Wahlverfahren und Verhaltensmodellen im Bereich der ländlichen Wirtschaft. Der Schwerpunkt wurde auf konkrete politische Probleme im ländlichen Raum gelegt und wir möchten die politischen Programme unterstützen, die die Realisierung der AEMs und der aktiven Arbeitsmarktpolitik behandeln.

Keywords: Agrar-Umweltmaßnahmen, Erwerbsverhalten der Arbeitskräfte, discrete choice-modell, Theorie der Übergangsarbeitsmärkte, Jugendlichen, inaktive Bevölkerung, Slowenien, Deutschland

1 General introduction

This thesis addresses structural change[1] in European rural areas with particular focus on the analysis of land-use decision and labour behaviour. The challenges of research on structural change in rural regions have been confronted with the new understanding of rural regions that is evolving in European society over the last decades (Larrère, 2001). The first challenge relates to the comprehension of rural development where rural regions are no longer considered to be evolving separately from urban regions; they do so jointly. Structural changes arise in rural regions which are progressively influenced by predominant change in urban society (UN, 2004).

This perception refelcts the point of view of European society that is moving away from understanding the future rural regions which is indifferent of urban (Leon, 2015). This entails a fundamental rethinking of the position of rural regions within a society that requires the fulfillment of multifunctionality. The emergence of new environmental and social demands have made this essential (Trouve et al., 2007; Perrier-Cornet and Hervieu, 2002; Leon, 2005). The concept of multifunctionality has become a part of the negotiation principles of international organizations (UNCED; 1992, FAO; 1996; WTO, 1998) and refers to the fact that "*an economic activity may have multiple outputs and, by virtue of this, may contribute to several societal objectives at once*" (OECD, 2001, pp. 11). The European Commission (EC) has indicated the importance of multifunctional agriculture for European agricultural policy with Agenda 2000. This programme mainly emphasises the role agriculture plays in the economy, the environment, and in society and provides support for maintaining agriculture and farmers' income in Europe (EC, 1997). Parallel to this, multifunctionality is used as a key concept in current research on rural and agricultural change in European Union (EU) Member States (Knickel and Renting, 2000; Ramniceanu and Ackrill, 2007; Durand and Van Huylenbroeck, 2003).

The second challenge relates to the borders of rural territory, where the boundaries between urban and rural areas are becoming indistinct via evolved interactions. It is even relevant to

[1] In this study "structural change" viewed as an evolving system that is an integrated and inter-related part of the economy (OECD 1994). The "structure" of a sector/firm includes many dimensions such as firm size, workforce and production characteristics, financing patters and linkages that include vertical/horizontal integrations (Boehlje, 1992). In the rural economy, "agricultural structure and structural change" include farms' embeddedness within and interactions with agricultural value chains, (rural) society, the (rural) economy and landscape, as well as institutions and policies (Balmann et al., 2006).

describe rural territory based on geographical division by population density (methods defined by OECD, 1994; EC, 2000); conceptualization of what is rural in Europe is no longer considered as wholly *independent of urban* (Perrier-Cornet and Hervieu, 2002; Leon, 2015). Europe therefore has territories not entirely independent from major cities; urban influence is seen to varying degrees in rural territories in terms of economic mechanisms and social or political behaviour (WB, 2000). This approach to rural territory leads economic analysis to take account of movements of goods and people between two territories and to acknowledge the influence of social risks in urban areas on the rural capital, land and labour markets. Regarding rural labour markets, these social risks could be related to economic crises (e.g. structural change in rural labour markets during a crisis period in urban locations) or demographic trends (e.g. outmigration of youth from rural areas to access more opportunities provided by the urban job market). Driven from the integrated territory based approach, to avoid or to lower social risks, Gunter Schmid (Schmid 1995; Schmid and Auer 1997) introduced the concept of the Transitional Labour Markets (TLM) as a new European employment strategy that supports institutional arrangements to cope with structural changes in Germany and with a theoretical experiment in the EU (Schmid and Gazier, 2002). In diverse disciplines the TLM theory is used as a conceptual model to examine the influence of social risks that cause structural change in the European labour market (Wilthagen, 2001; Gustafsson et al., 2002; De Koning, 2002; Auer, 2002).

Overall, these new challenges in understanding Europe's rural regions bring economic, social and policy implications that cause transformations in the choices of rural individuals. There is a scientific need to promote knowledge of rural behaviour in order to contribute to policies that are focused on sustainable rural development and prepared for significant structural changes in the agriculture system and labour force in the wider rural economy. In line with the overall trends in economics, research into the economy of rural regions has raised questions concerning established analytical tools that have been used to analyse individual choices.

Under the neoclassical economic approach, studies based on micro-economic theory analyse individuals' choice under scarcity and study behaviours based on certain generalized assumptions (Frank, 2005). All individuals are similarly rational in that their behaviour maximizes their utility and they are self-interested; they aim to maximize expected benefit achieved with a given cost or to minimize the expected cost of achieving a given benefit (McEachern, 2004). General behavioural rules are formulated without making interpersonal comparisons and any moral

judgements on choices. Over time, analytical tools based on these assumptions have been criticised by other social scientists, such as sociologists, psychologists, and political scientists. Herbert Simon (1979, 1983) was one of the leaders of this new group of social scientists who led the establishment of the field of behavioural economics (Dowling and Chin-Fan, 2007). The main contention of this group is about the ignoring (in neoclassical economics) of the uniqueness of the individual and its environment by such generalized assumptions. This approach contends that economic theory's assumptions need to be extended based on observation of the actual behaviour of individuals, and analytical tools need to describe each individual and its environment by deriving local structural relationships although not global ones.

This cumulative thesis takes the point of view that there is merit in both of these approaches. Therefore, the four empirical studies on land-use decision and labour force behaviour presented in this thesis are based on the general assumptions of neoclassical theory, but also look beyond the general behavioural assumptions proposed by behavioural economics. A body of literature regarding how people actually make decisions in real life situations is discussed through the theory of utility maximization and incorporates other aspects of behaviour other than pure rationality. In Part I, chapter 2, a behavioural study of land-use decisions considers microeconomic theory and discusses instances where profit maximization may lead to multifunctional agriculture practices, especially regarding the implementation of agri-environmental farming programmes. In chapter 3, alongside the utility function, organic farmers' decisions on land-use towards the implementation of additional agri-environmental farming measures are examined with reference to the role of social network structures. In Part II, chapters 4 and 5, two behavioural studies of rural labour force use TLM theory as a framework and analyse individuals' choices with the assumption that risk and uncertainty are approached by individuals with imperfect rationality. In the labour market, small risks with a high probability tend to be overestimated whereas big risks with a subjective low probability (e.g. a long spell of unemployment) tend to be underestimated by the majority of the individuals (Gazier and Gautie, 2009).

The major objective of this thesis is to investigate the prospects for choice and decision making in the field of rural economics by studying specific challenges. In the introductory chapter, we provide the considered challenges and research questions with a brief summary of structural change in Europe's rural regions under two separate subsections: change in land-use decisions

and labour behaviour. In the following, the review of theoretical settings on given problems and methodology is explained. In the remaining chapters of the thesis, each chapter aims to explore one of the questions posed and discusses concrete rural policy problems.

1.1 Structural change and land-use decision behaviour

Based on the consideration of rural economics literature, in the following we propose a positive concept that refers to specific characteristics of the agricultural production process and its outputs. We will present the studied problem, research questions and theoretical settings in land-use behavioural changes in agricultural production, especially within the concept of multifunctional agriculture.

1.1.1 Problem definition and research questions

Under the emerging understanding of rural development, the concept of multifunctionality of agriculture includes all goods, products and services created by farming practices (Marsden and Sonnino, 2008). The expression of "multifunctional agriculture" has entered political and academic discourse to specify the role of farming both for the economy and society (Losch, 2004). At the EU level, this view has been considered within the Agenda 2000 reforms that were published by the EC in 1997. Agenda 2000 proposes a change in the European Model of Agriculture from a pure productive agricultural model to a more balanced rural development model with more emphasis on the production of public goods, by even providing support for non-agricultural activities (Cardwell, 2004; Ramniceanu and Ackrill, 2007). Thus multifunctionality not only means a change in the support system for farmers and mechanisms to enable the remuneration of contributions to public goods, but also change in farming practices, and contractual relations between farmers and other stakeholders (Durand and Van Huylenbroeck, 2003).

The question of how to promote public goods provided by agricultural policies was addressed by agri-environmental measures (AEMs) that were implemented in a few Member States on their own initiatives in the 1980s (EC, 2005). In 1985, these AEMs were taken up by the EC (Article 19 of the Agricultural Structures Regulation), but remained optional for Member States (EC,

2005). Since 1992, on the basis of Regulation 2078/92/EEC, the implementation of agri-environmental (AE) programmes by member states has been mandatory, whereas they remain optional for farmers (EC, 2004) (see Brouwer and Lowe, 1998; Buller et al, 2000 for the details of AE programme design in Member States). In 1999, a new second pillar of Common Agricultural Policy (CAP) support introduced with an aim to promote multifunctional roles for agriculture and AE regulation was incorporated into the Rural Development regulation. AEMs were designed as farming practices that help to protect the environment and maintain the countryside. A set of AEMs were proposed by CAP and designed at a national, regional or local level by adapting to the particular farming systems and environmental conditions. The majority of AEMs in the Euroepan Union (EU) target management of grass and semi-natural forage, input management, management plans and record keeping, soil cover, soil management, buffer strips, crop management and landscape feature management (Keenleyside et al., 2011).

The nature of AEMs is voluntary and relies entirely on the willingness of farmers to participate. AEMs compensate farmers for voluntarily entering a 5 year commitment to carry out measures considered to be of benefit to the environment. Farmers receive payments that provide compensation for additional costs and income foregone as a result of applying measures in line with the stipulations of AE contracts. Different measures carry different levels of support. However, across all measures the payment is calculated on an area basis.

AEMs are co-financed by Member States and payments vary considerably from one Member State to another. Since 1992, EU expenditure for AEMs has grown rapidly. During the 2007-2013 period it reached 20 billion EUR which amounts to 22 % of the Rural Development Programme (RDP) expenditure, to be compared to 4% in 1999 (EC 1997; EC 2009; Hart and Wilson, 1998). This has increased calls for studies assessing the effectiveness of AEMs, and for the establishment of reliable indicators to assess their environmental and socioeconomic performance (Moxey et al, 1998; Brouwer and Crabtree, 1999). In this framework, understanding factors that influence farmers' motivations to participate in AEM is vital both for the evaluation of the effectiveness of AEMs as well as for the quantification of economic and ecological impacts on a regional scale. The operational objective of AEMs is indeed to encourage a high number of farmers to participate in order to reach a maximal amount of enrolled land in AE contracts (EC, 1997; Potter, 1998; Wilson and Hard, 2000). Therefore, participation is a key indicator of success (Prager and Nagel, 2008) and the basis needed to achieve balanced rural

development (Durand and Van Huylenbroeck, 2003). The aim of incentive strategies is to modify land-use decision behaviour, therefore an important question is whether this goal is actually reached (Falconer, 2000).

The first aim in this thesis is, therefore, to assess the impact of selected factors influencing EU farmers' participation in AEMs. The number of AE programmes as well as the share of enrolled agricultural land differs significantly between EU Member States. Due to the large diversity of AEMs and different payment amounts in each Member State, it is hard to uniformly model AEMs across EU Member States. In Part I, we conduct an analysis in two EU Member States, Slovenia and Germany, independently. The main objective in both case studies is to understand and explore the role of rural areas' specific assets on the decision making that leads to the commitment to voluntary AE contracts.

In chapter 2 the following first research question is investigated: "*To what extent do farm sizes contribute to decision making in connection with changing land-use towards environmental farming practices among Slovenian farmers? If we consider the role of farm sizes explicitly (as small, medium and large farms), how do farm accountancy factors influence the decision-making process of voluntary AEM scheme participation in each farm size group?*" Afterwards, chapter 3 studies the second research question: "*What is the role of social networks in the continuity of AEM participation among German organic farmers? How frequently do formal and informal information sources influence the AEM adoption process?*"

1.1.2 Theories on land-use decision behaviour towards sustainable farming practices[2]

In rural development literature, there are several theoretical frameworks that we can draw upon to study farmers' land use behaviour towards AEM participation. Diffusion of innovation theory, the social network approach, the theory of planned behaviour, contract theory and micro-economic modelling were of selected in our overview of the literature in an attempt to give a typical representation. These illustrative theories provide framework for the examples of sustainable land use behaviour, especially in EU Member States.

[2] Much of this review is based on Unay-Gailhard, I., Bojnec, S., (In Press) Sustainable behaviour in agri-environmental measure participation, Journal of Cleaner Production.

The theory of diffusion and adoption of innovation (Rogers, 1983) is one of the theories Morris and Potter (1995) primarily used for analysing United Kingdom AEM programmes. This study investigates quasi-market incentives to encourage farmers' adoption of innovations, where innovation was defined as "an idea, practice, or object perceived as new" (Rogers, 2003, p.12). The application of the theory in this context primarily answers the question of how newly implemented AEMs are adopted by farmers, and the theory highlights differences in the factors that influence adopters and non-adopters (or early and late adopters). Arguments related to the knowledge and persuasion stages of behavioural change have gained prominence by studies of Crabtree et al. (1998), Deffuant et al. (2008) and Mathijs (2003). These authors show the importance of social factors in the decision making.

The social network approach is another widely applied theory to analyse the importance of socio-informational networks of farmers (Deffuant et al., 2001; Barreiro-Hurle et al., 2010, Frondel et al., 2012). These studies attempt to explain farmers' decisions using the opinions of informal and formal information sources, including extensions, farm advisory services and mass media. Skerratt (1998) found that a farmer's likelihood of participating is influenced in principle by other farmers. In addition to the source of social networks, persuasiveness of the arguments provided by network actors provide an important incentive to AEM participation (Juntti and Potter, 2002). Frondel et al. (2012) found that utilised information measures may affect AEM participation either positively or negatively; however either way, such information allows for a more informed selection of the programme. Recently, results of Fleury et al. (2015) highlight that the intensity and quality of relationships between farmers and other local and upper level stakeholders play a vital role in AEM participation.

Beedell and Rehman (2000), Grammatikopoulou et al. (2012) and Mettepenningen et al. (2013) structure their analysis based on the *theory of planned behaviour*, which was developed from the reasoned action theory (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 2005). The theory assumes that farmers' behavioural intentions are directly related to their attitudes and allow researchers to gain insight into the perceptions of AEM participation. A flexible approach in the AEM design, from which farmers could perceive the freedom to decide on contract terms and payments (Mettepenningen et al., 2013) and farmers' perception of the control and application difficulty of the scheme (Wauters et al., 2010) are the main results. Recently, Dijk et al. (2015) demonstrated that in addition to attitude and perceived personal ability to implement AEMs,

factors such as social pressure, self-identity and facilitation by the EC have a strong positive influence on the intention of farmers to participate in the programme.

Contract theory is another applied approach that is often used to investigate contractual arrangements in the presence of asymmetric information (Moxey et al., 1999) and moral hazards (Ozanne et al., 2001). The implementation of AEMs leads to the existence of asymmetric information because implementation authorities do not have perfect information on the technological profile, which creates an informational advantage for farmers and may lead them to behave in such a way that they receive additional compensation. Furthermore, moral hazards arise from the monitoring process, which cannot detect all farmers who fail to comply with measure obligations. The findings of Polman and Slanger (2008) and Pascucci et al. (2013) identified the need to view the AEM participation decision as a typical principal-agent relationship: the authority that designs the contractual mechanisms (the principal) and the farmer (agent) who needs to provide environmental public goods.

Studies such as those performed by Vanslembrouck et al. (2002), Dupraz (2003) and Espinosa-Goded (2013) utilise micro-economic modelling theory, assuming profit maximisation and applying a utility function to analyse AEM participation behaviour. Vanslembrouck et al. (2002) find that besides the technical aspects of the environmental benefits, participation will also be influenced by the utility of the measure to the farmer himself. This is shown by the positive influence of previous participation. The results of Espinosa-Goded et al. (2013) show that there are two barriers to participation: (i) the lack of know-how related to managing a new crop, and (ii) contract transaction costs associated with information transfer, processing and administrative work.

In Part I, we review five theoretical frameworks that are seen as complementary ways of studying AEM participation behaviour. Even though they have different disciplinary roots, we use a multi-level framework that supports reflection on general behavioural assumptions. In chapter 2, our study of AEM participation behaviour among Slovenian farmers focuses specifically on the role of farm accountancy factors and behavioural assumptions that are mainly based on *micro-economic modelling theory*. Farmers' willingness to sign a voluntary AEM contract in the form of an additional payment depends on farmers' estimates of the profits forgone. In chapter 3, we study the continuity of AEM participation behaviour among German organic farmers by examining communication roles and information exchange patterns.

Therefore, behavioural assumptions are mainly based on *theory of diffusion and adoption of innovation,* for which we observe an increasing number of studies that have recognised the importance of social networks on farmers' behaviour (Conley and Udry 2001; Bandiera and Rasul 2006; Matuschke and Qaim 2009; Hartwich, Fromm, and Romero 2010).

1.2 Structural change and rural labour behaviour

Given these background insights on land-use decision behaviour and the concept of multifunctional agriculture, we now attempt to develop rural labour behaviour analsysis in Germany by using the strength of TLM theory. In the following, we introduce the studied labour market problem, research questions and then give an overview of the TLM theory.

1.2.1 Problem definition and research questions

The changing socio-economic and demographic profile of rural areas in the last decades is very similar among the majority of EU member states (Bryden and Bollman, 2000; Hoyos and Green, 2011). These changes could be summarized in terms of economic forces (e.g. declining importance of the agricultural sector, structural change in the farming industry, globalization), demographic and socio-cultural transformation (e.g. high outmigration rate from rural areas, aging rural inhabitants), and policy impacts (e.g. CAP reforms, new welfare policies). As argued by Perrier-Cornet and Hervieu (2002), it is illusory to conceptualize European rural regions without considering urban value systems. Based on these given forces, change in rural labour behaviour needs to be understood in relation to underlying changes in urban areas.

From socio-economic profiles, the urban influence on the rural labour market via institutional mechanisms can be seen as a reflection on the social exclusion problem (Shucksmith and Philip, 2000; Schömann 2002). Underlying forces of balancing supply and demand in the European labour market started to change in 1970's with the institutional break-up of the "standard employment contract" (Schmid and Gazier, 2002). Change in employment relationships gave rise to several "atypical employment relationships" through part-time work, fixed-term contracts, temp-agency work and self-employment (Schmid and Gazier, 2002). This erosion in the "standard employment contract" also brings the erosion of socio-economic cohesion. More

specifically, the change in employment relationship is reflected not only in the economic cohesion problem in the labour market but also in risks of high transition flows into unemployment and inactivity that mitigate difficulties in the process of reintegration to the labour market (Schmid and Gazier 2002). This creates high rates of socially excluded groups, such as the inactive, the long-term unemployed, individuals with low education levels, and women, on rural labour markets (Bollmann and Bryden, 1997; Philip and Shucksmith, 2003). With the global economic crisis in September 2008, the support of the pursuit of economic activity for these potentially excluded groups gained importance due to more intense effects of the crisis on these groups (Hodge et al., 2002). There is an apparent societal need of further comprehension of processes favouring the socio-economic inclusion of disadvantaged groups. Disadvantaged groups often experience a higher risk of long-term unemployment and/or an inactive spell before a new job. Besides this potential employment instability, measures to decrease labour force transition to inactivity of the labour force are needed to cope with the social exclusion problem.

Regarding the demographic profile, it is apparent that increased outmigration of the labour force (who seek better opportunities in urban areas) affects rural labour markets. Furthermore, demographic imbalances in outmigration between men and women cause a masculinisation of rural areas which has been heavily discussed since the industrial revolution (Tilly and Scott, 1989; Demossier, 2004). Youth groups face difficulties getting a stable job after leaving school especially if they lack a diploma, have an immigrant background and/or live in rural regions. Among them, high numbers of youths were removed from the labour market, either because they had been unemployed for more than a year or were inactive and did not seek a job (OECD, 2010). This highlights the importance of rethinking rural development policies as they have not been able to solve the exodus of youths, especially of women, in the EU (Hoggart, 2006; Hoggart et al., 2006). This may be the initial step to discovering and explaining the labour force characteristics of young people who remain in rural areas after leaving school.

In this thesis the second aim is therefore to investigate factors influencing labour force transitions. Particular focus is given to social risks associated with economic crises and demographic trends among excluded groups such as inactive population and out-migrated female labour force. An important question is how a new understanding of European rural areas as no longer being wholly *independent of urban* areas can be used in analyses. In order to consider

that, in Part II two case studies are provided which aim to explore the rural labour force's behavioural changes in Germany using a rural-urban comparison perspective, instead of an area-based approach. Understanding the effects of social risks has essential policy implications to address social exclusion problems and promote labour market development in rural areas.

To achieve the second aim of this thesis, chapter 4 examines a third set of research questions: "*How did the 2008 global economic crisis influence labour force transitions to inactivity in Germany? Are there differences in the impact of the crisis on rural and urban labour force transition flow? If so, what are the determining factors that caused a change in labour flow before and during the crisis period?*" Following this, chapter 5 investigates the fourth group of questions: "*What are the roles of socio-familial position, socio-economic characteristics, and interrelations with labour market institutions in the school-to-work transition in Germany? Among young people, does gender play a role in this transition flow, especially regarding rural areas?"*

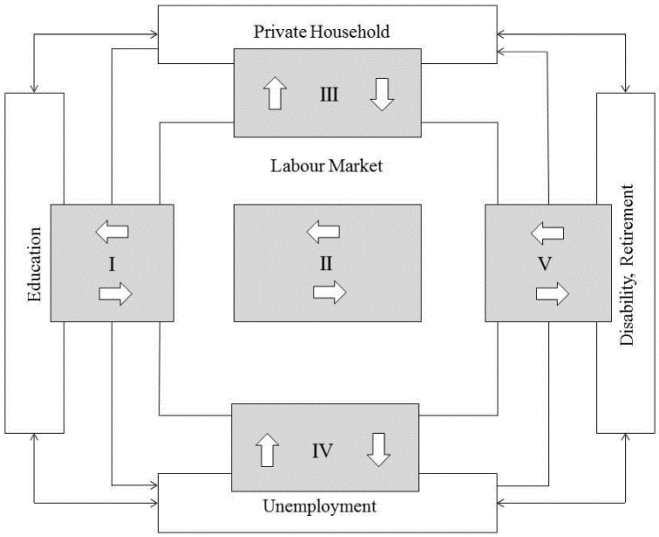
1.2.2 Understanding rural labour behaviour with the transition approach: the Transitional Labour Market (TLM) theory

Although the commonly used supply and demand paradigm in the labour market is useful when assuming full employment in the economy, changing forces on labour markets bring new challenges. Increased unemployment rates both in rural and urban regions and rising outmigration of young people from rural areas due to high unemployment rates is a major problem for many of Europe's rural regions, where many important questions are not easily addressed within the full employment paradigm. How to tackle exclusionary long term unemployment or inactivity stages? Are there any possibilities of establishing social security systems that increase both flexibility in labour force transitions and economic efficiency? Is there a labour market model of social cohesion for the case of income risks that are related to socio-economic and demographic change?

From its inception, the TLM theory has provided a framework that can be used to address these and related questions (Schmid, 1995; Schmid and Auer, 1997). More specifically, the TLM theory proposes a labour market policy to reintegrate excluded groups such as the unemployed, inactive, individuals with low education levels, and women into the labour market.

Driven by the combination of two concepts, life-course and TLM, at the beginning of the 90's Schmid (1995) proposed a new paradigm that conceptualizes both individual and institutional aspects of the labour market. Based on the concept of life-course, the individual aspects of TLM consist of 5 transition flows in the labour market where we can observe trends into and out of employment systematically. As presented in Figure 1-1, these are identified as: (I) transitions between education/training and employment; (II) transitions between part-time and full-time dependent employment, or between dependent employment and self-employment, or a combination of the two; (III) transitions between private or family based activities and paid work; (VI) transitions between unemployment and employment; and (V) transitions between periodic incapacity for work and employment, as well as flexible transitions from work into retirement.

Figure 1-1: Transitional labour markets (TLM) framework



Source: Schmid and Gazier (2002)

The *analytical framework* of TLM emphasises the dynamics of the labour market by focusing on flow analysis rather than static analysis and applying methodologies to explain factors that influence transition flow patterns. The erosion of "standard labour relationships" in the European labour market made labour force transitions between different employment statuses increase (Schmid and Gazier, 2002). TLM highlights that some of these transitions are critical in terms of

their effect on labour force participation. These are downward steps in a career or cause social exclusionary transitions into long term unemployment, poverty, inactivity (born of discouraged labour) or violent protest. TLM theory assumes that smooth transition flows that are supported by institutions help to avoid or lower the risks of social exclusion in the labour market by offering individuals the possibility to find an optimal combination between career, education and free time.

The *normative framework* of TLM looks for new institutional arrangements to cope with the discontinuity of employment. The main aim is to prevent labour force transitions from becoming pathways to social exclusion and to create *maintenance* and *integrative transitions* on the labour market. *Maintenance transitions* follow the objective to secure employed individuals' transitions in the labour market according to their shifting preferences in jobs. This allows employees continuity of employment after career breaks or an unemployment period with pension receipts (Schmid and Schoman, 2003). *Integrative transitions* specifically aim to integrate the unemployed as well as inactive individuals into the active labour force.

In this thesis, in Part II, by reviewing together theoretical, empirical and comparative studies on the European labour market, the TLM theory is seen a useful approach to analyse German rural labour force transitions. In the labour market literature, the TLM theory has been studied both on a macro (policy-oriented) and micro (mobility-oriented) level (see Reci and Bruijn, 2006 for a review of studies). Drawing from the analytical components of the TLM theory, we attempt to focus on the micro level. In chapter 4, this study investigates labour force transitions to inactivity focusing specifically on the influence of economic crises both in urban and rural regions. In chapter 5, rural labour force transitions from school-to-work is examined as to the role of gender in accessing a job without a long-term spell of unemployment. In both chapters, the framework of the TLM theory offers a comprehensive way of understanding the flows of transitions among study groups, as well as a starting point to discuss the factors that might influence those flows.

1.3 Methodological settings

Choice analysis in rural individuals' behaviour is the common objective of the four research questions given above. In Part I, including land-use decision behaviour studies, we have constructed models to explain sustainable farming practices with the help of discrete choice

models. In addition to applied choice analysis, the uses of information channels have been modeled with social network analysis (SNA). In Part II, labour behaviour studies were conducted using discrete choice models based on the Stochastic Markov Process. Of the three methods used, discrete choice analysis was the mainstay of the investigations Those analytical methodologies are briefly introduced in the following to justify why they are adequate to investigate the research questions.

1.3.1 General description of discrete choice models

In recent years many researchers have used discrete choice models as a methodological tool for empirical studies on human choice behaviour (Lancaster, 1966, McFadden, 1974). The development of estimation methods for behavioural analysis that is based on discrete choices opened up new frontiers for empirical research in economics as well as outside economics, such as in health, psychology and marketing.

Discrete choice models aim to describe, explain, and predict human choice behaviour using a set of alternatives. The term ‘discrete choice’ denotes the distinction between continuous and discrete variables from a set of alternatives. The word ‘discrete’ indicates that the choice is discrete in nature and alternatives exhibit three main characteristics (Train 1993): (i) alternatives need to be mutually exclusive, (ii) alternatives must be exhaustive, and (iii) the number of alternatives must be finite.

The theoretical grounding of discrete choice models combines several different economic theories. The two main divisions within discrete choice theory (also known as probabilistic choice theory) differ in the ways the decision rule is interpreted (Anderson et al, 1992*)*: (i) Random Decision Rule: the decision rule is assumed to be random and the utility deterministic, and (ii) Random Utility: the decision rule is assumed to be deterministic and the utility random. The random decision rule views individuals' behaviour as a probability where a change occurs according to internal and external factors. Random utility views individuals' behaviour as a probability which cannot be explained by the researcher. Economic theory is mostly concerned with the random utility decision rule, mainly based on Lancaster’s individual utility maximization problem (Lancaster, 1966) and McFadden’s random utility theory (McFadden, 1974).

From a methodological point of view, discrete choice models draw on behavioural measurement that includes two main methodological approaches: stated preference methods and revealed preference methods. Depending on the research question and study discipline, both types of methods can be applied (Manski, 1999). However, there are limitations associated with each of these approaches. Table 1-1 gives a short description of these methodological approaches with disadvantages and advantages.

Table 1-1: An overview on the stated preference and revealed preference methods

Approaches	**Revealed preference (Observed behaviour)**	**Stated preference (Expected or Hypothetical behaviour)**
Short description	Individuals' preferences are revealed through their actions in the real life. Actions are related to the value of their interest	Individuals' are asked to state their preferences from given hypothetical alternatives.
Disadvantages	• Limited to the supplying of information regarding values that have been experienced • Choice sets, attributes of choice options and individual characteristics are not controlled	• Observed preferences may not reflect actual behaviour • Absence of incentive for the respondent to provide accurate responses • Creates a high incentive for the respondent to behave strategically • Costly evaluation • Vulnerable to violation of economic decision-making
Advantages	• External validity is maximized because choices observed are real-life choices in which individuals have committed resources (money, time, etc.) • Low-cost evaluation	• Provides preferences and information that are otherwise impossible to reveal when actual choice behaviour is restricted in some way • Allows the researcher complete control over the choices offered and their attributes • Ensures sufficient variation in data

Source: Adopted from Kjær's (2005) review based on studies of Boardman et al. (2001), Garrod and Willis (1999); Hanley and Spach (1993), Hidona (2002) and Train (1993).

Despite the mentioned advantages of revealed preference modelling, the stated preference method is particularly relevant for our research questions. The main advantages of the stated

preference method is not having to rely on respondents' willingness and ability to reveal true preferences as it these preferences are is mainly based on actual behaviour. Therefore use of choice modelling could not raise questions about the respondents' answers such as "Will respondents answer honestly?" or "Are respondents answering meaningfully?" (Kjær, 2005). In the analysis, this gives higher performance on the examination of observed behaviours relative to those methods that rely on the respondents' willingness.

In discrete choice modelling the problem arises when individual choices are all identical, such as all surveyed farmers in the study regions always choosing to participate in voluntary base AEMs and never choosing not to participate in these implemented measures under the years of the study. These are called "limit cases" in the survey, and lead to a frequency ratio of either zero or infinity, for which the logarithm is undefined (Goulias and Kitamura, 1993). In the applied choice analysis literature, several methods are mainly used to approach limit cases (see Hensher et al., 2007 and Train, 2003 for the methods). The limit case is not an observed phenomenon in our case studies and thus alternative methods have been neglected.

In the following sections we discuss different model scopes in which discrete choice models can be applied to land-use decision behaviour and labour force transition studies.

1.3.2 Application of discrete choice models to investigate land-use decision behaviour issues

Logit-based discrete choice models

A number of studies on AEM participation analyse the choice problem using discrete choice models. These studies consider the adoption decision to be a dichotomous problem (participation in AEMs or not) for estimation (Cramer, 1991; Crabtree, Chalmers and Barron, 1998; Wynn, Crabtree and Potts, 2001; Vanslembrouck, Van Huylenbroeck and Verbeke, 2002; Polman and Slagen, 2008; Hurle and Goded, 2007). The illustrative articles are listed in Table 1-2.

Table 1-2: Example of land-use decision behaviour studies (on the adoption environmental farming practices) using discrete choice models

Country	Agri-environmental measure(s)	Data	Model Scope	Study year	Reference
France	Environmentally Sensitive Area	Face to face Interviews, N=580	Logit model, Ordered logit model	1991-93	Bonnieux et al. 1998
Belgium	Late mowing and Maintenance of quickset hedges	Face to face Interviews, N=245	Logit, Tobit model	1997-98	Delvaux et al. 1999
Scotland	Environmentally Sensitive Areas	SERAD	Logit model, Multinominal logit model, duration analysis	1997	Wynn et al. 2001[3]
Greece	Nitrate reduction program	FADN	Probit, Tobit model	1997	Damianos and Giannakopoulos 2002
Belgium	Extensification of field margins	Face to face Interviews, N=390	Probit model	1999	Vanslembrouck et al. 2002
Belgium and US	Flemish AESs	Farm Operators Data	Logit model, Lineer regression	2008	Mettepenningen 2013
Belgium	Late mowing, Reduced use of farm inputs	N=1638[4]	Tobit, Probit model	1995-98	Dupraz et al. 2003
Netherland	Biodiversity Conservation	E-mail Interviews N=1000	Tobit, Probit model	2000	Wossinks and Wenum 2003
Belgium	Management of arable field margins	Face to face Interviews N=36	Multivariate probit model		Mathijs 2003
Italy	All AEMs in 2000–2006 RDP.	Interviews N=139[5]	Multinomial logit models	2000-06	Defrancesco et al. 2008

Source: Author's compilation
Note: SERAD: Scottish Executive Rural Affairs Department

Since the decision to participate in AEMs can be considered as a dichotomous choice problem, limited dependent variable models can be applied for econometric estimation. In Part I of this thesis, this type of non-linear statistical model is used to relate choice probability to the explanatory factors of farm accountancy (for the Slovenian farmers case study, chapter 2) and social network attributes (for the German organic farmers case study, chapter 3). AEM

[3] Results of the duration analysis reveal that large farms are likely to join earlier than small farms. But analysis on adoption behaviour (with logit) shows that farm size is not a significant factor to join the scheme.
[4] This study is a part of the research project of "Market effects of countryside stewardship policies" (Van Huylenbroeck and Whitby, 1999). See Drake et al. (1999) for a comprehensive presentation of the survey and questionnaire
[5] This research is linked to the Project SSPE-CT-2003- 502070 'ITAES – Integrated Tools to Design and Implement Agri-Environmental Schemes' financed by the EU under the VI Framework Programme, coordinated by the Institut National de la Recherche Agronomique (INRA-ESR, Rennes), France.

participation is based on the assumption that farmers' utility maximization depends both on the production of private goods and on the provision of environmental goods and services. The application of voluntary AEMs as an additional payment depends on the farmers' estimates of forgone profits. The detailed descriptions of the utility equation of logit-based models are reported in the methodology section of each study paper provided.

Combining discrete choice modelling and social network analysis (SNA)

Stokamn (2001, p. 509) defines SNA in this way: "*Social network analysis in general studies the behaviour of the individual at the micro level, the pattern of relationships (network structure) at the macro level, and the interactions between the two. Social networks are both the cause of and the result of individual behaviour*". In a social network, entities are referred to as actors that are discrete individual, corporate, or collective social units (Wasserman and Faust, 1994). SNA allows for a number of analytical tools through the use of network and graph theories (Otte and Rousseau, 2002).

A number of studies on rural areas stress the important role of repeated collaboration and contact frequency between network actors to increase the innovation adoption rate (Chassagnon and Audran, 2011; Harhoff et al., 1999; Lewicki, 1996; Paruchuri, 2010). Monge et al. (2008) indicate that farmers who have highly frequent conversations on technological changes in their network are more likely to adopt new knowledge and technology relative to other farmers who do not. In the social capital literature, contact frequency in formal and informal information channels is the important variable that indicates a higher level of social capital (Beugelsdijk, 2003; Sobels et al., 2001).

In chapter 3, in addition to modelling the role of communication frequency and partners' characteristics to explain AEM adoption with discrete choice analysis, the interpersonal communication network (more specifically the relationship between contact frequency and contact importance) was examined with social network analysis. For determing the relationships between actors, a personal (self-centric) network approach was used. Personal networks are mostly used in studies on social support that refer to social relations that help to increase an individual's well-being (Wasserman and Faust, 1994). Most research is based on the reference definition of Cohen and Wills (1985), which distinguishes between four types of support: instrumental, informational, emotional and social. A quantitative, explorative analysis on

informational social support (this refers to social relations providing assistance with knowledge and information) was chosen as the appropriate basis for our case study.

The main objective of using SNA in our investigation is to examine the degree of reciprocity within the informational social support in the surveyed farmers' network. Reciprocity means that a positive action of one individual provokes a positive action towards that individual (Katz and Powell, 1955), and is mostly studied using the question of "How strong is the tendency for one actor to choose another actor, if the second actor chooses the first," (Weiligmann, 1999). Several studies have interpreted the strong tendency of reciprocity as the stability of a social system (Gouldner, 1960; Allen, 1977). The stronger the tendency of reciprocity in the social network, the stronger the social ties and cooperation in interpersonal networks (see the literature review in Chassagnon and Audran, 2011). In our case, a reciprocity analysis aims to answer the question, "*For the first actor, how strong is the importance of contact with the second actor, if the first actor has a high communication frequency with the second actor?*".

1.3.3 Application of discrete choice models in labour transition studies

A Markov process assumption in discrete choice modeling

To predict labour force dynamics is important and requires understanding patterns in labour force transitions between labour market states of employed, unemployed and inactive. In labour economics literature, discussions on labour force transitions and the right methodological tools have become increasingly popular (Flinn and Heckman, 1982; Blanchard and Diamond, 1992; Bosch and Maloney, 2010). Traditional static labour market analysis provides information on stocks of labour force in different labour market states, but cannot give evidence on the patterns in labour force transitions (e.g. which status workers have arrived from, how long they will stay in their current status or their future status). This discussion offers rich case studies through which the strengths and weaknesses of static labour market analysis are shown and flow analysis is emphasised to model labour force transitions.

Flow analysis gives a picture of the movement of labour in and out of a labour market and is used as a tool mainly by studies that focus on labour mobility and adjustment (Schettkat, 1996). In statistics, there is a set of assumptions that are potentially useful for flow analysis. One most commonly used flow analysis assumption is based on the Markov process, due to a good

approximation to random utility discrete choice models, and offers a simple flow model. Table 1-3 provides a list of exemplary studies that assume the Markov Process in labour force transition topics. At the same time, these articles cover some of the major areas of labour transition research both in and outside of Europe.

Table 1-3: Example of labour transition flow studies that used discrete choice models with Markov Process assumption

Country	Data	Model Scope	Study year	Reference
East Germany	Labour Market Monitor Survey	Markovian assumptions in duration analysis on unemployment, and Multinomial logit models	1990-1991	Bellmann et al., 1995
Germany, Britian, and Netherland	SOEP	Multinomial logit models using probability tables	1984-1996	Gustafsson et al., 2002
West Germany	SOEP	Multinomial logit models	1996-1997	Constant and Zimmerman, 2003
Czech Republic	LFS	Gender-specific multinomial logit models with Markovian assumptions	1993-1996	Lauerová and Terrell, 2002
Italy	LFS	Post-selection maximum-likelihood estimator with Markovian assumptions	1993-2003	Cappellari and Jenkins, 2004
EU member states	ECHP	Logit models under the conditional probability of flow	1994-1995	Russell et al., 2001
Netherlands	Labour supply panel data	Discrete time event history models	1980-2004	Gesthuizen and Wolbers 2010

Source: Author's compilation.
Note: SOEP: Socio-Economic Panel data; LFS: Labour Force Survey; ECHP: The European Community Household Panel data

A Markov process is a stochastic process that satisfies the Markov property used in individual or system behaviour analysis. The Markov property specifies that only the present state (t) gives any information about the future state (t+1), and knowledge of its history does not add any new information. A new generation of studies has emphasized the need to use the Markov process in flow analysis because: (i) whereas static labour market analysis allows us to observe the employment states of workers at discrete intervals, the Markovian assumption based flow analysis shows that there is a transition process in which state changes occur at random points in time (Singer and Spilerman, 1976; Fougère and Kamionka, 2003, 2008); and (ii) to convert discrete transition probabilities into continuous rates corrects the models regarding time aggregation biases (Elsby et al., 2009; Shimer, 2012).

In the discrete choice model, the labour force flows within a parametric form where the parameters are estimated from the data. The tractability of the parameter estimation that is based on probability theory is an important factor in the model selection. Due to these tractability reasons, the multinomial logit model is one of the most widely used discrete choice models with Markov process assumption in choice modeling (Blanchet et al.,2013), especially in studies on labour force choices (Gustafsson et al., 2002; Deschryvere, 2005; Lauerová and Terrell, 2002).
In Part II, studies on labour behaviour examine labour force transitions between three states (employed, unemployed and inactive) based on Markovian assumptions with multinomial logit models. The transition probabilities are expressed as a transition matrix. Based on the transition probabilities, a transition matrix is used as a tool that depicts the flow of a labour force in and out of the three states between time t and $t + 1$. We use flow analysis to examine two issues. First, the influence of the 2008 financial crisis on rural labour markets, especially labour force flow to an inactive state. Second, we focus on the gender difference in transition flow from education to employement among rural youths. The overall aim of these two studies is to develop new insights into the German rural labour market and to reflect on the factors that influence excluded groups, such as inactive or long term unemployed youths.

1.3.4 Summary of data sources

Hensher and Greene note that *"…despite great progress in developing ever more powerful and complex models that can capture many aspects of choice behaviour, it nonetheless is the case that such models are only as good as the data from which they are estimated*" (Hensher and Greene 2002, p. 24). Having highlighted the appropriateness of discrete choice modelling for our studies, in this section we provide information of the data we used for our case study estimations. In this thesis, we present studies in Germany and Slovenia which are mainly drawn from five main data sources:
1. Farm Accountancy Data Network (FADN)[6]*:* This data network consists of an annual survey carried out by the EU Member States that was launched in 1965 (Council Regulation (EEC)

[6] For detailed information concerning data access, publications and contributions: http://ec.europa.eu/agriculture/ricaprod/

No.79/65). The main aim is to monitor the income and business activities of EU agricultural holdings. In this thesis, the study in chapter 2 used the Slovenian FADN dataset (2004-2010) that was provided by the Slovenian Ministry of Agriculture and Environment.

2. Slovenian Agri-Environmental Programme (SAEP): The Slovenian AEM programme, commonly referred to as the SAEP provides implemented AEMs at the national level. This data set covers also statistics on farmers' participation during the application period of RDP. In this thesis, the study in chapter 2 uses the SAEP data from 2007-2013. This dataset was obtained during interviews with government experts from the Slovenian Ministry of Agriculture and Environment.

3. FoodIMA[7] project survey: This dataset was collected in 2008 during face-to-face interviews with Greek and German farm managers within the 6th Framework EU-funded project "EU Food Industry Dynamics and Methodological Advances" (FoodIMA). The survey provides information about technology adoption behaviour of farmers, farms, farmers' characteristics, and their relationships in their social network. For the Germany base survey, 72 crop farmers located in Central and Eastern Germany (Saxony-Anhalt, Saxony, Lower-Saxony, Brandenburg, Thuringia, and North Rhine-Westphalia) were interviewed, including organic (n = 52) and conventional (n = 20) farmers. In this thesis, the study in chapter 3 uses the German organic farmers' survey and a detailed description of the survey is reported accordingly[8].

4. *European Union Labour Force Survey (EU LFS)*[9]*:* This survey has regularly been conducted in the 28 EU Member States since 1983 (Council Regulation (EEC) No. 577/98). EU LFS is the main data source on the dynamics of EU labour markets that provide information on population, employment, working time, duration of the job, and professional status. In each Member State, national statistics institutes are responsible for selecting the sample, preparing the questionnaires, conducting direct interviews with households, and forwarding the results to Eurostat (EU statistical office) in accordance with the common coding scheme. Labour Force Survey (LFS) for Germany, France, UK and Czech Republic for years 2002-2009 were obtained during the 7th Framework EU-funded project "PRototypical policy Impact on Multifunctional Activities in

[7] Contract n° 044283, web page: http://www.eng.auth.gr/mattas/foodima.htm
[8] The analysis bases on German conventional farmers' survey are presented in Unay- Gailhard and Bavorová (2014).
[9] For detailed information concerning data access, publications and access request: http://ec.europa.eu/eurostat/web/microdata/overview

rural municipalities" (PRIMA)[10]. In this thesis, the German LFS is used in two case studies provided in Part II.

5. ***Interviews with experts***: Parallel to the analysis of datasets, two interviews with stakeholders at local and national level took place at the Slovenian Ministry of Agriculture, Forestry and Food[11]. Additionally, results of a PRIMA project workshop (16.09.2011 in Hohenberg-Krusemark, Saxony-Anhalt, Germany) provide evidence for interpretations of the German rural labour behaviour analysis in chapter 4. This workshop was realised with the participation of six experts from local administration offices (from agriculture and forestry, and employment), regional planners and elected representatives. The aim of the workshop was to exchange views on the findings of the PRIMA model, especially on the local level of employment and demographic trends[12].

[10] Grant agreement no. 212345, web page: https://prima.cemagref.fr.

[11] Interviewed experts: Alenka Ivacic from Agency for Agricultural Markets and Rural Development, Ljublijana on 17th of October 2014. Tončka Jesenko from Public Farm Advisory Service, Kopper from the Agency for Agricultural Markets and Rural Development, Ljublijana on 15th of January 2015.

[12] The results of this workshop are partly presented in Unay- Gailhard and Baqueiro-Espinosa (2015).

Part I:
Analysis on land-use decision behaviour towards agri-environmental farming practices

2 Farm size and participation in agri-environmental measures: Farm-level evidence from Slovenia

This section analyses the determinants of agri-environmental measure (AEM) participation using the Slovenian Farm Accountancy Data Network (FADN) for the 2004-2010 period. Previous papers did not show a straightforward relationship of the role of farm size in AEM participation decisions. Considering explicitly the farm size, the controversial subject of the role of farm size is investigated by conducting logit regression analyses. We examined the influence of farm-specific characteristics on farm participation in AEMs using three different farm sizes: small, medium, and large. The findings strongly suggest that with regards to the farm-utilised agricultural area (UAA), there are differences between the determinant factors of AEM participation, especially between small and large farms. This conclusion is supported by the variables that describe the farm capital per land intensity, off-farm income and type of farming as significant determinants for large farm models but not for small farm models. Furthermore, variables that describe land productivity negatively influence participation in AEMs for large farms, whereas this variable positively influences small farms. The results highlight the importance of how previously confirmed factors influencing AEM participation differ under the three different farm sizes.

Based on: Unay-Gailhard, I., Bojnec, S., 2015. Farm size and participation in agri-environmental measures: Farm-level evidence from Slovenia, Land Use Policy 46, 273–282.

2.1 Introduction

In recent years, AEMs have become important elements of rural development (RD) policy, addressing the issues of multifunctionality, biodiversity and eco-efficiency in farm and agricultural development (EC, 2005; Beltrán-Esteve1 et al., 2012). Correspondingly, there are several studies of farmers' attitudes to environmental conservation, including their AEM participation behaviour. In addition to the debate of the role of farm size on environmentally friendly farming practise, previous studies have investigated the influence of farm size on the acceptance of AEMs. However, the findings do not provide a straightforward relationship between farm size and AEM participation. Therefore, we aim to investigate the determinants of farmers' participation in AEMs, considering explicitly the role of the farm size. This study contributes to the investigation of AEM participation in Slovenia by farm-utilised agricultural area (UAA) size divisions using the Farm Accountancy Data Network (FADN) evidence at the farm level.

RD subsidies are not uniformly adopted between the EU member states. High levels of RD subsidies are observed in Slovenia, Austria, and Luxembourg, while there is a relatively low level of average RD subsidies in Denmark, Spain, Italy and Greece (EC, 2009). In Slovenia, similar to Austria and Luxembourg, RD subsidies are greater than the first pillar direct payments. Furthermore, Slovenia has the highest level of RD subsidies among member states (NMS-10) who joined the EU in 2004 and most of the old EU-15 member states, including being three to four times higher than in neighbouring Italy. This could be explained by the implementation of RD measures even before accession to the EU, by contrast with some of the other new member states, who had difficulties with their implementation of the measures, which took place only after accession to the EU. In addition, Slovenia adopted the CAP immediately upon entering the EU, while others adopted it gradually. In the meantime Slovenia paid the difference from its national budget.

The AEMs that play an essential role in the RD programme for Slovenia are significant policy tools for addressing multifunctionality in rural and agricultural development. According to the Slovenian FADN, 72% of farms participated in AEM farming practices in 2010. Slovenian farmers received the highest average AEM payment per hectare (ha) among the NMS-10 because

of a relatively high participation rate of farms in the AEM programme and relatively high support per hectare (EC, 2009).

The accession to the EU in 2004 was a watershed for structural change in Slovenian farms. Between 2005 and 2010, the total number of farms decreased, with an increase in the number of very small farms (less than 1 ha) and large farms (greater than 20 ha), but a substantial decrease in the number of medium-farms (Bojnec and Latruffe, 2013). An increase in the number of small farms could be associated with a transfer of small farms from parents to children, which is as an important issue in the Slovenian semi-subsistence farm life cycle as a social buffer providing food for home consumption and hobby farming. However, an increase in the number of large farms could be interpreted as the entry and growth of farms that are operated by younger and more educated farmers, who have increased farm size by buying and renting land, as these farmers see farming as a career opportunity.

These structural changes in the number and size of farms have produced new decision-making processes for farmers to maintain sustainable rural development. The central point on which our research focuses thus concerns the analysis of the determinants of farmers' AEM participation behaviour by considering explicitly the dimension of farm size. The main research question is whether and to what extent the farm sizes contribute to the decision making in relation to AEMs among Slovenian farmers. What are the determinants of AEM participation under the farm size categories, which are related to FADN evidence? The relationship between farm size and incentives for participation in AEMs is of particular relevance for the better understanding and design of AEMs, which is important for research and for practise due to the distributional and allocation effects of environmental regulations and payments. Our research provides deeper insights into the investigation of AEMs that may cause different environmental farming incentives for particular farm sizes.

This study examines the influence of farmland use characteristics; farm inputs, such as family labour and capital per land intensity; off-farm income; land productivity; and farm types on AEM participation behaviour. By considering structural changes in Slovenian farms, our model captures the behaviour of three different groups of farms via their sizes: small and medium farms, which are mostly family-owned and operated, and large farms, which represent the growth of larger family-owned farms, new entrances, operated farmers and a small number of commercial farms owned by private companies.

The remainder of the paper is organised into the following sections: Section 2 provides a literature review of the role of farm size in AEM participation. Section 3 describes the data source and gives descriptive evidence for the main features of AEM participation in Slovenia. Section 4 explains the methodological approach of the farm size-specific logit model. Section 5 presents the results and discusses the differences between the determinant factors of the acceptance of an AEM by the three farm size models. Finally, section 6 concludes with the summary of the results that are important for AEM policy making and recommendations for future research.

2.2 Background

Facts on land use, farm structure evolution and agri-environmental programmes in Slovenia

Slovenia is largely a mountainous country with rolling hills where the majority of agricultural land (72.5%) is situated in less favoured areas (LFA). One third of Slovenia's total land area (20,273 km^2) is agricultural land (32%) and more than half of the total land area is covered by forest (59.8%). Table 2-1 gives the detailed land use characteristics.

Table 2-1: Land use in Slovenia (2005)

Land use	Total hectare (000 ha)	Percentage (%)
Forest	1,213	59.8
Other land	166	8.2
Agricultural land	648	32.0
Fields and gardens	196	30.3
Permanent grassland and pastures	354	54.6
Perennial crops	55	8.4
Other agricultural land	43	6.7

Source: MAFF, 2007

Cattle and cow, pig and poultry breeding are economically the most important in livestock production. In 2013, agricultural holdings bred 399,349 livestock units (LSU) (SORS, 2013). Table 2-2 shows the number of animals and the agricultural holdings.

Table 2-2: Breeding animals in Slovenia (2013)

	Number of animals	**Number of agricultural holdings**
Cattle	462,066	34,087
Young cattle	139,040	29,402
Pigs	287,498	23,700
Poultry	4,858,025	36,657
Horses	2,1832	6,029
Sheep	130,657	6,243
Goats	34,542	4,022
Rabbit	96,218	8,300
Deer	97,45	505

Source: SORS, 2013a

Slovenian agriculture is spatially fragmented with mainly small parcels of land (0.6-0.7 ha) and dispersed locations. Most farms are privately owned and operated and agriculture is predominantly based on family farms. Additionally, there are also a small number of large-scale commercial farms descended from former state agricultural enterprises (Salehar et al., 2003). These farms continue as private companies and mostly rent land from the State Fund of Agricultural Land and Forests (Bojnec and Swinnen, 1997).

The average farm size, measured by the UAA, was 6.4 ha in 2010 (SORS, 2013). This shows the small size of Slovenian farms by European standards. Structural changes in Slovenian farms, with an important decline especially in the number of medium size farms (5-10 ha) following the Slovenian accession to the EU in 2004, are as seen in Table 2-3.

Table 2-3: Slovenian farm structure evolution (2003-2013)

Farm Size	Number of farms (by UAA)					Growth (%)			
	2003	**2005**	**2007**	**2010**	**2013**	**2003-2005**	**2007-2010**	**2010-2013**	**2003-2013**
> 5 ha	44,372	45,805	44,434	45,537	43,684	3.23	2.48	-4.07	-1.55
5.01-10.00 ha	20,633	19,775	19,143	17,530	17,207	-4.16	-8.43	-1.84	-16.6
> 10.01 ha	12,122	11,562	11,720	11,388	11,387	-4.62	-2.83	-0.01	-6.06

Source: SORS, 2013b

In Slovenia, AEM subsidies per hectare have been decoupled from farm size and the agri-environmental programme is based on the undertaking of three groups of enviornmental measures issued by the Slovenian Ministry of Agriculture and Environment[13]. The RDP for the 2004-2006 period consisted of 21 measures. The number of measures increased to 26 measures in the RDP for the 2007-2013 period. Table 2-4 presents the AEM measures within the three groups of payments per hectare for the 2007-2013 period.

[13] The minimum agricultural land area for AEM participation is 0.1 ha.

Table 2-4: Agri-environmental measures (AEMs) and payments per ha in Slovenia (2007-2013)

Agri-environmental measures (AEMs)	Euros/ha
Group 1: reduction of negative impacts of agriculture on the environment	
Preservation of crop rotation	91.84
Greening of arable land	172.2
Integrated crop production	197.21
Integrated fruit production	336.61
Integrated wine production	381.71
Integrated horticulture	184.91
Organic farming	from 227.55 to 578.92[14]
Group 2: preservation of natural features, biodiversity, soil fertility and traditional cultural landscape	
Mountain pastures	61.09 or 72.57 (without or with shepherd(s))
Mowing steep slopes	90.20 to 142.27 (depending on steepness)
Mowing hilly meadows	132.84
Meadow orchards	93.89
Steep vineyards	326.77 or 900 (depending on steepness)
Rearing of autochthonous and traditional domestic breeds	89.38 (per head of animal)
Production of autochthonous and traditional agricultural plant varieties	102.91
Sustainable rearing of domestic animals	84.46
Extensive grassland maintenance	48.38
Preservation of extensive karst pastures	191.40
Group 3: maintenance of protected areas	
Animal husbandry in central areas of appearance of large carnivores	29.11
Preservation of special grassland habitats	121.36
Preservation of grassland habitats of butterflies	121.36
Preservation of litter meadows	198.44
Conservation of bird habitats in humid extensive meadows in *Natura 2000* sites	83.23
Permanent green cover in water protection areas	31.57 to 184.50[15]

Source: MAFF, 2007

[14] Payments given vary according to the production technology used. Produce on the field 298.07; horticulture 551.45 (outside), 487.90 (inside); orchards 554.73, meadow orchards 237.80; vineyards 578.92, meadow vineyards 227.55 or 213.20 euros due to higher or lower stock density, respectively.

[15] Given payments is depending on the field. Produce on the field 83.64, orchards and vineyards 184.50 and meadows 31.57 euros.

The three different group payments aim at the conduction of environmentally friendly farming methods with emphasising the multifunctional role of agricultural production, maintaining the landscape and biodiversity and preserving the settlement of the Slovenian countryside with mandatory standards.

Entering AEMs is voluntary and beneficiaries can participate in one or several measures. They undertake to implement the measures for the whole duration of the commitment, which is at least five years. Beneficiaries of AEMs should meet cross compliance requirements and keep all records (i.e. crop rotation plans and records on work tasks) throughout the duration of the programme commitment and for four years after the day the last payments were made. Payments are disbursed as support for the current year. During the programme commitment period a beneficiary has to participate in a training programme of 4 hours per year. The supervision over the implementation of AEMs and monitoring of spending of the resources are carried out by the Agency of the Republic of Slovenia for Agricultural Markets and Rural Development in accordance with regulations.

Controversial subject: role of farm size in AEM participation

Since the early 1990s, with the implementation of programmes under the AEM scheme, the participation in voluntary AEMs by farmers has stimulated the interest of academic studies. These studies have mainly used theory of diffusion of innovation (Morris and Potter, 1995; Mathijs, 2003), theory of reasoned action and planned behaviour (Wauters et al., 2010; Grammatikopoulou et al., 2012; Mettepenningen et al., 2013), micro-economic modelling theory (Ozanne et al., 2001; Polman and Slangen, 2008), profit maximiser theoretical framework (Bonnieux et al., 1998; Dupraz et al., 2003), the social network approach (Deffuant et al., 2008; Unay-Gailhard et al., 2014), and contract theory (Espinosa-Goded et al., 2013).

For each of the remaining major theoretical approaches, the literature demonstrates that several factors influence the decision making behaviour towards AEM, such as attitudes and perceptions of conservation practices (Black and Reeve, 1993; Defrancesco et al., 2008; Vanslembrouck et al., 2002); financial factors (Morris and Potter, 1995; Wilson and Hart, 2000; Ducos et al., 2009; Sutherland and Darnhofer, 2012); continuance of the farm (Ingram et al., 2013); contract design (Fraser, 2011); social network actors (Warriner and Moul, 1992; Skerratt, 1998; Beedell and

Rehman, 2000; Frondel et al., 2012), and farmers' characteristics and farm structure (Crabtree et al., 1998; Wynn et al., 2001; Kristensen et al., 2001).

Among the farm structure variables, the farm size, farm type, and farm labour characteristics are important determinants of applying AEMs. The farm size is often measured by the size of the UAA and has been considered one of the most important determinants in AEM farming practices. This study contributes to the investigation of AEM participation by UAA size divisions. Furthermore, in addition to the UAA, studies have investigated the influence of farm size using measures such as the standard gross margin (SGM), European size unit (ESU), and total sales. However, previous studies did not observe a straightforward relationship between the role of farm size and farmer participation in AEMs. These mixed results regarding the impact of farm size on AEM participation in farming practices can be classified into three groups.

The first group of studies argues for a positive association between farm size and participation in AEMs. The study of Wynn et al. (2001) in Scotland demonstrated that large farms (measured as total UAA in ha) are likely to join schemes in environmentally sensitive areas earlier than are small farms. Damianos and Giannakopoulos (2002) in Greece demonstrated that farm size (in terms of ESU) positively influence both the probability of applying a nitrate reduction measure and the intensity of participation in that measure. The study of Vanslembrouck et al. (2002) analysed two types of AEMs (extensification of field margins and farm beautification) in Belgium under the assumption that the participation behaviour of farmers is not only influenced by farmer and farm characteristics but also by the characteristics of the provided AEMs. The authors found that larger farms (>75 ha) demonstrate a greater acceptance of extensification of field margins than do small (<35 ha) and medium (35-75 ha) farms, controlling for other explanatory variables. The broader investigation of Wilson and Hart (2000) with a survey of 1,000 farm households in EU-9 member states[16] and Switzerland suggests that AEM participation behaviour is influenced by farm size: farms that are larger than the regional average are often more likely to apply AEMs. In recent study in Belgium and the USA, according to the model of Mettepenningen et al. (2013), the probability of participation in AEM increases with farm size; here, the authors used a standardised farm size to correct for differences between the

[16] These EU-9 member states were Austria, Denmark, France, Germany, Greece, Portugal, Spain, Sweden, and the United Kingdom.

different types of farms. In the early years of AEM implementation, Wilson (1997) discussed this positive relationship between farm size and participation in AEMs by using eligibility criteria (i.e. small farms that lack substantial semi-natural habitats). The study of Wilson and Hart (2000) concludes that the reason for this positive relationship is that farms that are larger than the regional average have larger ecologically important habitats on their farms that are eligible for AEM payments.

The second group of studies argues that there is no significant effect of farm size on AEM participation. Dupraz et al. (2003) in Belgium showed that the participation rate in the two studied AEMs (late mowing and reduced use of farm inputs) does not significantly vary with farm size (measured as total UAA in ha). Wossink and Wenum (2003) focused on both the actual and contingent participation behaviour in biodiversity conservation by arable farms in the Netherlands. These authors considered the differences in the proportion of labour-intensive crops in large and small farms. Small farms usually grow a larger proportion of labour–intensive, high-returning crops, and so biodiversity conservation would be less attractive for these farms. However, contrary to expectations, farm size has no effect on applying biodiversity conservation measures for both actual and contingent participation behaviour typologies. Studies that used both UAA and SGM farm size measures, such as that of Defrancesco et al. (2008) for Italy and that of Polman and Slangen (2008) for the EU-6 member states[17], have concluded that farm size does not have an effect on applying AEMs in farming practices. In the study of Sattler and Nagel (2010), this non-significant effect was explained by the importance of how well the implemented AEMs fit with production on the farm.

The third group of studies claim that there is a negative association between farm size and participation in AEM. For the Flemish region in Belgium, Vanslembrouck et al. (2002) demonstrated that large farms are significantly less likely to apply farm beautification measures of plantation in yard (planting flowers) than those farms that are in the middle and lower than middle farm size categories. The authors explain the reason for this bias is that the larger farms already have realised plantation around their new buildings or their situation in more woody areas. Recently, in agreement with these authors, the study of Pascucci et al. (2013) in Italy found that small farms (<16 ESU) are more likely to participate in AEM supports. This negative

[17] These EU-6 member states were the Netherlands, Belgium, Czech Republic, Finland, France and Italy.

relationship between farm size and participation in AEM is explained by the differences between large and small farms in terms of allocating their labour time and assets to implement AEMs; small farms may have higher benefits and lower opportunity costs relative to large farms. Separate from the relationship between farm size and participation behaviour, Mann (2005) investigated the participation in meadow extensification measures in growing farms in Switzerland and found that farm growth (in terms of increased farm size) negatively affects participation in AEMs. One of the arguments for that negative relationship is given by economies of scale. Growth of farms provides greater benefits in terms of economies of scale in food production than use of environmental services such as AEMs.

Despite the fact that these previous models have incorporated farm size as an independent variable to explain AEM participation decisions, the literature has so far not provided an assessment of the models that increase predictive quality in terms of participation probability transitions at different farm sizes. Therefore, this paper aims to fill this gap in the literature and investigate the determinants of farmers' participation in AEMs, considering explicitly the role of the farm size dimensions.

2.3 Data

Slovenian Farm Accountancy Data Network (FADN)

This paper employs the Slovenian FADN survey sample for the years 2004-2010. The FADN is a European farm sample survey system that is used as an instrument for evaluating the income of agricultural holdings and the impacts of the CAP measures in EU countries (Eurostat, 2012a; 2012b). In our study, secondary farm level data of the Slovenian FADN sample of farms are investigated concerning the determinants of applying AEMs. The studied years (2004-2010) are of the Slovenian post-EU accession period with co-existence and a shift from national agricultural policies to the EU CAP.

The Slovenian FADN dataset includes farms above two ESUs (one ESU is equivalent to 1,200 euros of gross margin). All of the nominal aggregates have been deflated by statistical price indices to obtain their real values in 2004 prices over time. The total output in the land productivity ratio was deflated by the producer price index of agricultural products. The total assets were deflated by the agricultural input price index for goods and services contributing to

agricultural investment. The source of data for price deflators is the Statistical Office of the Republic of Slovenia. Table 2-5 describes the Slovenian FADN dataset used.

Table 2-5: Description of the used Slovenian FADN dataset (2004-2010)

Variables	Description	Unit
Farm size samples	Total UAA in hectares (ha)	
	Size 1, small farms: less than 5 ha	1
	Size 2, medium farms: 5-10 ha	2
	Size 3, large farms: more than 10 ha	3
Depended variable:		
Participation in agri-environmental measure (AEM)	Applied AEM by farm in the current year	0=no, 1=yes
Independent variables:		
Farmland use characteristics		
Land use		
Woodland areas	Share of woodland area on UAA of holding	Percentage
Cereals	Share of cereals on UAA of holding	Percentage
Forage crops	Share of forage crops on UAA of holding	Percentage
Tenure status		
Rented land	Rented areas as a percentage of the total UAA of holding	Percentage
Land productivity and capital per land intensity		
Land productivity	Total output to total land (Euros/ha)	Ratio
Capital per land intensity	Total assets to land (Euros/ha)	Ratio
Family labour and off-farm income		
Family labour	Unpaid family labour input (FWU) to total labour input (AWU)	Percentage
Off-farm income	Share of the off-farm income to total agricultural revenue	Ratio
Participation in rural development subsidies		
Less favoured area payments	LFA measure applied by farm in the current year	0=no, 1=yes
Other rural development (RD) payments	Other voluntary RD policy measures applied by farm in the current year	0=no, 1=yes
Farm types	Eight farm types used as a dummy variable. These are field crops, horticulture, wine, other permanent crops, milk, other grazing livestock, granivore, mixed	0=no, 1=yes
Years	Survey years 2004-2010 used as a dummy variables	0=no, 1=yes

Source: Slovenian FADN dataset
Note: Annual work unit (AWU), 1 AWU=1,800 hours of labour per year (Eurostat, 2010, p. 432).

For the purpose of the study, we investigated the determinants of AEM participation in different farm size samples. Based on the average Slovenian farm size of 6.3 ha in 2010 (Bojnec and Latruffe, 2013), we designed three subsamples to meet the concurrent objectives of providing (1) an estimate for small farms with a UAA of less than or equal to 5 ha, (2) an estimate for medium

farms with a UAA of 5 to 10 ha, and (3) an estimate for large farms with a UAA of greater than 10 ha. The categorisation into small, medium and large farms would change for other regions where the average farm size is different from that in our study area.

The Slovenian FADN dataset considers three categories of RD subsidies: AEM, less favoured area and *other RD payments*. The AEM payments cover subsidies for environmental restrictions in farming practices. The LFA payments aim to mitigate risks, such as agricultural land abandonment, desertification and forest fires. *Other RD payments* have an objective to help farmers adapt to standards, use farm advisory services, improve the quality of agricultural products, conduct training, create new areas of forest, and increase the ecological stability of forests. As a result of our aim to assess the factors that explain farm participation in AEMs, the analysis focuses on the AEM payments rather than on other categories of RD subsidies. This study was conducted in three logit regression analyses with small, medium and large farm sizes in which the decision to participate in AEMs in the current year was a dependent variable.

Descriptive statistics

Table 2-6 shows the summary statistics of the variables that were used in the empirical analysis on average during the 2004-2010 period.

Table 2-6: Descriptive statistics (2004-2010)

Variables	**Used statistics**	**Size 1: Small farms less than 5 ha**	**Size 2: Medium farms from 5-10 ha**	**Size 3: Large farms greater than 10 ha**
Farm size samples	N	N=390	N=1260	N=3605
	(%)	(7.4%)	(24 %)	(68.6%)
Farmland use characteristics				
Land use				
Share of woodland areas	Mean %	127.42	119.53	73.67
	(Std.)	(28.0)	(4.0)	(1.8)
Share of cereals	Mean %	13.60	12.62	16.41
	(Std.)	(1.2)	(0.6)	(0.4)
Share of forage crops	Mean %	40.04	69.40	75.73
	(Std.)	(1.9)	(1.0)	(0.5)
Tenure status				
Share of rented land	Mean %	15.43	14.22	42.53
	(Std.)	(1.4)	(0.5)	(0.4)
Land productivity and Capital per land intensity				
Land productivity (Euros/ha)	Mean	3592.86	2221.37	2157.96
	(Std.)	(202.0)	(73.2)	(51.1)
Capital per land intensity (Euros/ha)	Mean	26,276.68	20,736.90	14,997.28
	(Std.)	(1113.9)	(399.6)	(131.2)
Family labour and off-farm income				
% of family labour	Mean %	95.83	96.69	95.93
	(Std.)	(0.5)	(0.3)	(0.2)
Off-farm income (Euros)	Mean	672.21	1880.16	3839.26
	(Std.)	(117.9)	(150.9)	(642.4)
Participation in rural development subsidies				
AEM payments	% of yes	57.44	76.51	73.29
LFA payments	% of yes	69.49	82.46	77.25
Other RD payments	% of yes	4.62	14.44	10.37

Source: Slovenian FADN dataset

Note: mean and percentage (%) results represent the average of the 2004-2010 period. Variables represented with mean (as a %) are given with standard deviation (Std). These given Std. numbers measure the mean amount of variation from the mean as a percentage of 0 to 100. Therefore, a low standard deviation for these variables indicates that the data points tend to be very close to the mean within the percentage number.

While small farms accounting for 7.4% of the sample, this subset is composed of 23% medium and 68% large farms, confirming that the FADN sample included more viable farms that are larger than the average Slovenian farm size (6.3 ha).

Regarding the participation in RD subsidies, the share of participation in AEM is higher for medium (76%) and large farms (73%) than for small farms (57%), confirming that, on average, the share of participants in AEMs is higher for medium and large farms relative to smaller ones. Similarly, for the LFA and *other RD payments*, small farms exhibit lower percentages of participation relative to medium and large farms. In addition to the results for average calculation of the 2004-2010 period, Table 2-7 provides the share of farms that participated (%) and the average AEM subsidies (Euro/AWU) for the three farm size divisions for the selected years of 2004, 2007 and 2010.

Table 2-7: Participation in agri-environmental measures (AEMs) in Slovenia, by farm size divisions

	%	**Mean** (Euro/AWU)	**Std.**	**Min.** (Euro/AWU)	**Max.** (Euro/AWU)
Size 1: small farms					
2004	63.33	900.86	422.11	252.47	1593.08
2007	55	605.12	390.79	129.69	1471.8
2010	57.77	638.34	295.25	121.10	1310.55
Size 2: medium farms					
2004	72.27	1271.28	897.30	176.47	4131.18
2007	81.91	1247.63	788.02	111.84	3654.13
2010	75	1222.42	716.08	211.07	4333.04
Size 3: large farms					
2004	68.87	4579.02	7202.74	122.67	89,692.48
2007	77.95	4616.95	5684.33	67.66	38,070.49
2010	71.83	5216.3	6033.92	60.55	39,281.14

Source: Slovenian FADN dataset

Note: percentage (%) represents the share of AEM participants, mean numbers give the average AEM subsidies (Euro/AWU) that are received by farms.

Consistent with the results for the average during the 2004-2010 period, the share of AEM participants is higher for medium and large farms (approximately 71-81%) relative to small farms (approximately 55-63%) in the studied years (Table 2-7). For the three farm size models, the share of AEM participants slightly varies with the study years. As expected, the average amount that was received for the AEM subsidies was higher for large farms than for medium and small farms. Overall, Table 2-7 shows a dualistic structure of participation behaviour in which

the farm UAA size plays an important role, indicating the necessity of investigating decision-making in relation to AEMs by farm size.

2.4 Method: farm size-specific logit model

This study hypothesis that the differences in farm sizes lead to different costs and benefits in AEM participation and thus determinant factors in the participation decision would not be similar for small, medium and large farms. During the decision-making process, the farmer faces two options: signing an AEM contract or not.

To test our hypothesis, as a first step, three subsamples of farm sizes were pooled from the FADN dataset: small, medium, and large farms. It is assumed that in various farm size divisions AEM participation has a different impact on farmers' income by changing the output and the efforts to meet AEM requirements. We expect that in each farm size sample, the benefits of applying AE farming practices relative to farm income present farmers with a distinct decision-making process.

For the three farm size samples, choice modelling proceeds in the second stage. Regarding the literature on the applied methodology for voluntary AEM participation, studies have mainly used discrete choice models by considering the participation decision as a dichotomous problem (Crabtree et al., 1998; Wynn et al., 2001; Vanslembrouck et al., 2002; Polman and Slangen, 2008; Hurle and Goded, 2007). Following these studies, we formulated the decisions of farmers as a discrete choice model. Based on micro-economic modelling theory, equation (2.1) shows that willingness to sign a voluntary AEM contract as an additional payment depends on the farmers' estimates of the forgone profits.

$$y^* = \begin{array}{l} y = 1,\ signup\ an\ AEM\ contract \\ y = 0,\ not\ signup\ an\ AEM\ contract \end{array} \qquad (2.1)$$

During the last stage, we conducted farm size-specific logit regression analyses. The objective of logit models is to predict the effects of multiple explanatory variables, which can be numeric and/or categorical, on the outcome variable. The general logit regression model is as follows:

$$In = \left(\frac{p'}{1-p'}\right) = B_0 + B_1 x \quad (2.2)$$

This formula is stated in terms of the probability that y=1, which is referred to as p'. The probability that y=0 is $1 - p'$. The symbol of In refers to a natural logarithm and, $B_0 + B_1 x$ represents the equation for the regression line, where $B_0$is the regression constant and $B_1 x$ is the observation.

An empirical study has been conducted with logit models for small, medium and large farm size subsamples, where participation in an agri-environmental policy is a dichotomous dependent variable. We expect comparatively dissimilar dependent and independent variable associations between the three models.

Due to the missing values for the large farm UAA subsample, the number of observations for the logit analysis was reduced from 3605 to 3550. For the comparative analysis, the results from independent logit models, including coefficient estimates, with P>|z| test significance levels and standard errors are presented. The pseudo R^2 measure of goodness of fit is estimated at 0.186 for the small, 0.178 for the medium and 0.242 for the large farm subsamples. This relatively low pseudo R^2 level can be explained by the specificity of the used unbalanced panel dataset, where it is possible and rather common to have low fit numbers.

2.5 Results

Table 2-8 shows the results of the logit regression analyses. These findings strongly suggest that, regarding farm size, there are differences between the determinant factors of AEM participation, especially between small and large farms.

Table 2-8: Results of the farm size-specific logit models for participation in AEMs

	Small farms N=390		Medium farms N=1260		Large farms N=3550	
	Coef.	**Std.**	**Coef.**	**Std.**	**Coef.**	**Std.**
Farmland use characteristics						
Land use						
Share of woodland areas	.001	.001	.003**	.001	.002**	.0007
Share of cereals	-.027**	.007	-.031**	.008	-.080**	.007
Share of forage crop	-.017**	.006	-.033**	.008	-.097**	.007
Tenure status						
Share of rented land	-.004	.005	-.003	.003	.001	.002
Land productivity and capital per land intensity						
Land productivity	.009**	.004	-.002**	.000	-.006**	.000
Capital per land intensity	-.000	.009	.000	.006	-.000**	.000
Family labour and off-farm income						
% of family labour	-.0136	.0146	-.0512**	.0211	.0005	.004
% of off-farm income	.000	.000	.000**	.000	.000**	.000
Participation in rural development subsidies						
LFA payments	1.247**	.308	1.066**	.231	1.028**	.123
Other RD payments	.504	.594	.143	.271	.623**	.201
Farm types						
Field crops	17.97	815.41	.270	1.219	-.346	.431
Horticulture	16.51	815.41	-.052	1.416		
Wine	17.04	815.41	-.745	1.336	5.371**	1.400
Other permanent crops	18.13	815.41	.443	1.326		
Milk	17.45	815.41	-.596	1.214	.981**	.379
Other grazing livestock	17.37	815.41	-.209	1.210	.886**	.386
Mixed	17.65	815.41	-.116	1.201	.390	.373
Years						
2004	.696	.570	.141	.312	.024	.173
2005	.768	.490	.583**	.287	.292*	.166
2006	-.123	.461	-.720**	.243	-.692**	.154
2007	.109	.480	.730**	.289	.708**	.166
2008	.450	.461	.914**	.283	1.152**	.166
2009	.216	.458	.4912*	.28	.0729	.151
Constant	-16.239	815.412	8.15**	2.60	9.922**	.911
Prob > chi2	0.000		0.000		0.000	
Pseudo R^2	0.186		0.178		0.242	

Source: Slovenian FADN dataset

*Note: The coefficient values are given with P>|z| test significance levels of ** p<.05 and * p<0.1. In the model, the variable "granivores" and the year "2010" were used as base (reference) categories for the explanatory variable groups of farm types and years, respectively.*

For the medium and large farms, the likelihood of participation in AEMs increases with the share of existing woodland areas. Such farms are less likely to be situated in flat areas in Slovenia, where crop production is more common, and are more likely to be situated for production in limited hilly and mountain LFAs. This positive relationship between the share of woodland area and AEM participation contrasts to the relationship between the share of agricultural production (cereals and forage crops) and AEM participation that negatively affects the likelihood of participation for the three models. These results indicate that, regardless of the farm size, applying AEMs is less attractive for farms that are under agricultural land use. This negative impact may explain the fact that AEM intensity in farming practices decreases production. If we express this decrease in production as an opportunity cost (Bertoni et al., 2011), one could expect that regardless of the farm size, the opportunity cost is higher for farms in which the share of UAA is high. Our findings for the share of cereal and forage variables agree with those of Wynn et al. (2001) in Scotland and of Defrancesco et al. (2008) in Italy. In Slovenia, farms, which in a greater use of agricultural land, are mostly situated in flat areas in Central and Northeaster Slovenia. These model results highlight the important role of this type of land use.

Land productivity and capital per land intensity

The positive sign of the estimates for the land productivity variable for small farms (but negative for medium and large farms) indicates that the opportunity costs for maintaining environmental farming obligations are positively related to land productivity only for small farms. This positive effect is partly consistent with the findings of Glebe and Salhofer (2007). These authors investigated the influence of economic, environmental, and political factors on AEM participation for EU-15 countries. These results suggest that farms that are situated on relatively unproductive agricultural land tend to participate in AEMs comparatively more than farms that are located on highly productive land. The positive influence of land productivity on the small farms and the negative influence on medium and large farms can be explained by the differences in private costs (e.g. the use of request inputs that are linked to higher production costs and/or a decrease in the level of production, such as mineral fertilisers that need to be applied, or the soil fertility control that should be carried out every five years) between the three studied farm size subsamples. In our case, only the medium and large farms with a certain land productivity level fall below the threshold of profitability for scheme participation.

For the large farms, the negative and significant sign for capital per land intensity indicates that participation in AEM decreases with the increasing ratio of fixed and current assets to farmland. This result confirms the findings of Pascucci et al. (2013) in Italy. These authors indicate that a high level of capital intensity (measured as horsepower mechanisation per ha) decreases the participation behaviour of two studied RD measures: support for AE services and support for competitiveness schemes. In Slovenia, this is particularly true for large farms, which are also more commercially oriented, while the capital per land intensity is not a significant determinant for explaining the attitude towards AEM participation for either small or medium farms.

Family labour

The share of family labour has been assumed as an important variable in previous studies, to the extent that a high share of family labour was considered as a labour intensive farming process and therefore implying less willingness to apply for AEM(s). This hypothesis was partly confirmed by our estimated results indicating that probability of acceptance of an AEM decreases with the increasing share of family labour for medium farms but is not significant for small and large farms. However, it should be noted that 95% of Slovenian farms use predominantly family labour (see Table 2-6). This result demonstrates that although the share of family labour is similar for all of the studied farm sizes, the opportunity cost of AEM participation is high only for medium farms, which "are too small to be economically efficient, but they are too large to be profitable" (Bojnec and Latruffe, 2013, p. 216).The finding that the share of family labour negatively influences AEM participation behaviour for medium farms (5-10 ha) is consistent with the study of Defrancesco et al. (2008) in Northern Italy (in the Alpine area where the average farm size is 7.6 ha). Their results indicate that a high level of family labour increases the marginal probability of non-participation in the three studied AEMs; low input measures, grassland conservation in the aquifer recharge belt and grassland conservation in the Alps.

Off-farm income

The share of off-farm income positively influences the AEM participation behaviour of medium and large farms, but it is not significant for the small farms. This result is explained by the off-farm income support reducing uncertainty regarding the farmers' income, decreasing the

potential risk of income reduction and making the farmer less dependent on the market, thus positively influencing participation in voluntary conservation practices that provide subsidies. However, for small farms, even farm income gains are supported by the off-farm income, which seems to not offset the costs of shifting to environmental farming practices. Perhaps, for small farms, involvement in AEM does not decrease their income uncertainty to the same extent as medium and large farms and this could be perceived as a barrier to market entry.

The literature on the role of off-farm income in AEM participation provides diverse results depending on the studied AEM scheme and the region. While Pascucci et al. (2013) found that off-farm activities do not lead to significant differences in AEM participation (such as afforestation and extensification), Wossink and Wenum (2003) demonstrated that off-farm income increases the likelihood of contingent participation, but there is no significant influence on actual participation. Jongeneel et al. (2008) found a positive relationship that is consistent with the results of our study. These authors investigated the participation in conservation activities in the Netherlands (the average size of arable farms is 103 ha) and found that off-farm income increases the likelihood of a decision to participate. These authors explain the results as being a consequence of the Netherlands' less labour-intensive farming methods. Based on the observation that off-farm employment is often combined with an agricultural system that uses less labour, these more extensive farms can be easily combined with farming practices that are related to nature conservation.

Participation in other RD subsidies

AEM applications are significantly influenced by participation in the other two categories of RD subsidies: LFA and *other RD payments*. The positive signs of the estimates for the LFA payment variable in all of the farm size models confirm that, regardless of farm size, applying for an LFA payment in the current year increases the likelihood of AEM participation. Our result partly corresponds with previous findings by Crabtree et al. (1998) regarding the participation behaviour of the Farm Woodland Premium scheme in Scotland. This scheme encourages tree planting on farms, and the authors found that farms in the LFAs have a greater likelihood of planting.

Participation in *other RD subsidies* (such as payments that help farmers to adapt to environmental standards, to use farm advisory services, and to improve the quality of agricultural

products) significantly positively affects the application of AEMs for large farms. However, this variable is not significant for small and medium farms. Overall, it seems that large farms that actively participate in two categories of RD subsidies (LFA and *other RD payments*) also benefit from AEM payments.

Farm types

For large farms, AEM participation is significantly influenced by farm type, especially for wine, milk and specialised livestock (e.g. sheep, goat and specialist cattle-rearing). This result demonstrates that vineyards and dairy and livestock farms (greater than 10 ha) have lower costs associated with AEM participation, which can be related to the use of less capital intensive and more environmentally friendly production technologies. However, this positive effect is not observed for small and medium farms, which could be explained by the increased opportunity cost of AEM participation in farm size-specific management. The importance of large farms with dairy and other grazing livestock is also confirmed by the number observed in the FADN sample. For example, there are few small and medium farms for dairy and other grazing livestock in comparison to the amount of large farms. Non-significant results and large standard errors for the small farm model do not allow for any conclusive comparative statements. The finding that whether a farm is a livestock farm has a significant positive impact on large farm participation in AEMs corresponds with the previous findings of Hynes and Garvey (2009) for the applications of the Irish Rural Environment Protection scheme and of Espinosa-Goded et al. (2013) for the introduction of an alternative cropping system in Northern Spain. These authors explained this positive relationship as being a result of fewer changes in farm operations compared to intensive farmers. For livestock farms, introducing an alternative cropping system that is safe for the environment is associated with a lower cost of AEM participation relative to non-livestock farms. Furthermore, these livestock farms use these introduced cereal crops as animal feed.

2.6 Conclusion

Summary of results

This study developed and tested the hypothesis that differences in the farm sizes lead to different costs and benefits for farms, playing an important role in the AEM participation decision-making

process. Within this hypothesis, we examined the influence of the characteristics of the farmland use structure, the share of family labour and off-farm income, the participation in *other RD measures* and the type of farming on farmers' participation in AEMs in Slovenia. The models of AEM participation behaviour depending on these determinants were tested separately for the three farm sizes. Thus, the main novelty and contribution of this paper is the investigation of how previously confirmed influencing factors of AEM participation differ under the three different farm size dimensions.

The results demonstrate that the influence of determinant factors that vary with farm size need to be considered when applying for RD subsidies, especially AEM(s). The predictions of the econometric logit model are consistent with the given conceptual framework, stating that land use, land productivity, capital per land intensity, family labour, off-farm income, applying for *other RD subsidies* and the type of farming have significant impacts on AEM participation. The differences between the three farm size models illustrate the findings and confirm that the factors that influence AEM participation differ with farm size.

Discussion

Derived from micro-economic modelling theory, these differences in the AEM participation decision-making process can be explained by the profit maximisation and utility function frameworks. Previous studies, such as those of Bonnieux et al. (1998), Vanslembrouck et al. (2002), Dupraz (2003) and Espinosa-Goded et al. (2010), based their participation model on the assumption that farmers' utility maximisation depends both on the production of private goods (which bring the farm income) and on the provision of environmental goods and services. The application of voluntary AEMs as an additional payment depends on the farmers' estimates of forgone profits. In our case, the effects of farm structure, land productivity, capital per land intensity, family labour, participation in *other RD payments* and farm type have varying results on AEM participation in which the farm size leads to farmer divergence for profit maximisation.

The findings of this study suggest that the previous participation in *other RD payments* increased the probability of applying for AEM only for large farms. The *other RD payments* require a complex application process relative to LFA and AEM payments and their association with large farms can be explained by the transaction cost advantage, i.e. the information cost related to completing administrative forms or following regulatory frameworks. Large farms with knowledge and experience of the paperwork required for applications related to the *other RD*

payments were the most likely able to fulfill the administrative requirements needed to comply with AEM schemes. This finding had policy implications. Transaction cost advantages on large farms could be spread also to other farm structures by the differentiated information flow from extension services to farmers. Consistently with the previous studies by Winter (1997) and Wilson and Hart (2000), the learning objectives of farms depend on the farm structure and there is a necessity that both extension services and policy implementers consider heterogeneity of farm structures. This differentiated information flow to farmers would help to minimize the extension service cost burden to small farms and encouraged their demand for extension services in complying with *other RD payment* applications.

Unlike medium and large farmers, small farms' probability of participating in AEMs is greater with increasing land productivity. This result indicates that AEMs are aimed more at highly productive small farms. It could also be that small farms favor more environmentally friendly farming practices even if they have high land productivity. From this finding we derived the second policy recommendation related to the mixed effect between land productivity and AEM participation depending on the farm size. A cost-benefit analysis of AEM participation requires a careful consideration of farm management differences between the farm sizes. Failure to identify the role of land productivity on AEM participation behaviour would lead to underestimation of the participation cost.

AEMs do not appear to attract all studied farm sizes that use the land for different types of agricultural production (i.e. production of cereal and forage crops). However, in Slovenia, there are AEMs that have been designed specifically for arable land (i.e. preservation of crop rotation, greening arable land, integrated crop, fruit, and wine production). Majority of these measures were introduced and implemented before the EU accession. Despite this longer period of AEM implementation, the economic benefits from the commitment to environmental conservation participation may still be found as a less favorable alternative among farmers than the economic profit from agricultural production.

Therefore, higher and targeted policy incentives are required among farms where the share of arable land in total agricultural land is relatively high. This policy incentive should improve the cost-benefit evaluation of the commitment to environmental conservation benefits for arable land owners. However, an open question remains whether this policy incentive can be achieved with the existing budgetary spending vis-à-vis other economic and management practices.

Our results suggest that different decision-making processes influenced by the farm size must be considered when designing AEMs following the Slovenian accession to the EU in 2004. The factors that influence AEM participation by farm size have to be judged within a wider context of structural change in agriculture and rural areas. If the average agricultural area per farm continues to grow, it is likely that the factors that influence the farmers' AEM participation decisions will adjust to structural change. This effect has not yet been studied by focusing on farm size growth and AEM participation in Slovenia. Our results for Slovenia and of Mann (2005) for Switzerland could lead to practical implications and potential structural change. The farm management factors that influence farmers' participation in environmental practices need to take into account by farm size. Policy implications are to enable regulations that would help for the potential shift to adjust AEMs to structural change in agriculture and rural areas.

While our study highlights the importance of factors on AEM participation without a distinction of any specific AEM, it would be interesting to focus on farmers' application of a specific measure. This distinction can help to predict calculated costs and benefits in the decision-making process of farmers for a specific AEM and compare that within farm sizes. In addition, the factors influencing AEM participation can focus on changing the decision-making behaviour by increasing farm size. Furthermore, the given framework may guide future research in the field by considering farm location as challenging research and policy issue.

3 Adoption of agri-environmental measures by organic farmers: the role of interpersonal communication

The purpose of this section is to investigate the impact of interpersonal communication on the adoption of agri-environmental measures (AEM) by organic farmers in Germany.The study used the logit model to predict the probability of adoption behaviour, and Social Network Analysis (SNA) was conducted to analyse the question of whether validating information about organic farming provided by interpersonal information sources is associated with communication frequency.Our findings demonstrate that being an early adopter of organic farming practices and frequent contact with young and highly educated farmers increases the probability of adoption of other AEM. However, contact frequency in interpersonal networks was found not to be a significant determinant for explaining adoption decisions. Frequently-communicating farmers in the network are more likely to attribute higher levels of importance to organic farming information received from formal actors than to information received from informal actors.If young and highly-educated farmers, who can be considered as informal opinion leaders, are approached by the extension services, then an effective diffusion of information on AEM can be expected. To support the AEM adoption, a platform should be provided by state agencies that would enable organic farmers to understand the environmental benefits achieved over the time.
This study contributes to the scientific discussion on the role of interpersonal communication on AEM adoption. A new aspect is our consideration of organic farmers adopting additional AEM. Moreover, we highlight organic farmers' validation of the importance of formal and informal information sources on organic farming.

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3.1 Introduction and Definitions

The Council of Agriculture Ministry of the EU adopted the most radical reform of the CAP in its history in June 1992 with the McSharry Plan. Overall, the reform entailed an agenda for the redirection of member states' farm policies. An important policy innovation in the new CAP was the implementation of Agri-Environmental Measures (AEM). These schemes became a key instrument of European agricultural and rural policy to reinforce environmentally friendly farming practices and the protection of the countryside. Agri-Environmental (AE) support is paid annually to farmers who volunteer to participate in AEM that extend beyond standard good farming practices and are deemed to be environmentally beneficial (Article 248(4) of the EC Treaty).

The policy will only achieve its intended environmental effect of protecting the European countryside if a critical mass of farmers decides to implement the AEM. The participation rate of farmers in voluntary AE programs, however, varies considerably within the EU; in some countries, it is rather low (European Community 2009). One reason for this may be the different levels of payment among the EU member states. Average public expenditures for organic support payments under the AEM per certified organic hectare, for example, varied between EUR 7 and EUR 314 in the EU 27 (excluding Ireland, Romania and the UK) for the period 2008 to 2009. Average public payments for organic support under AEM per certified organic hectare ranged from EUR 150 to EUR 300 in Germany, France, Greece and Italy, whereas in Belgium, the Czech Republic and Denmark, the amount was less than EUR 150 (Schmidtner et al. 2011, based on EUROSTAT data). However, as various studies on the adoption of AEM have noted (Padel, Lampkin and Foster, 1999; Morris, 2000; Falconer, 2000), high payment rates alone do not explain the adoption decision. To successfully tackle the problem of AEM implementation, the policy design must consider a plethora of farmers' behaviour drivers in adopting new measures.

In the previous studies on environmental conservation practices, adopting organic farming practices (Padel, 2001; Genius, Pantzios and Tzouvelekas, 2006), participating in landcare groups that aim to develop sustainable farming systems (Black and Reeve, 1993) and adopting AEM (Deffuant, 2001) are considered innovative activities for farmers. In the research field of innovation adoption, an increasing number of studies have recognised the importance of social

networks – and particularly the influence of interpersonal communication channels – on farmers' behaviour (Conley and Udry, 2001; Bandiera and Rasul, 2006; Matuschke and Qaim, 2009; Hartwich, Fromm, and Romero, 2010). The main studies in this area have highlighted the importance of interpersonal networks in information support.

We understand the term interpersonal communication as the "process of message transaction or transmission between people to create and sustain shared meaning" (West and Turner, 2004, 10) that occurs contemporaneously with synchronous exchange between the communicating parties. The parties interact not only at the same time but also in the same place (Leeuwis, 2004, 196). Communication can take the form of bilateral communication, group meetings, and discussions (Leeuwis, 2004, 196).

Based on the literature on communication roles and information exchange patterns, we distinguish between formal and informal communication structures (Allen, 1977). While a formal communication structure is formulated within the structure, channels and rules of an organisation, an informal communication structure works within social affiliations (Kilduff and Brass, 2001).

Compared to conventional farmers, organic farmers have more specific interpersonal network structures and evaluate information sources differently (Burton, Rigby and Young 1997; Wynen, 1990; Lloyd and Morgan, 2011). Studies show that organic farmers have the same characteristics as typical innovators, i.e., even across long distances, they have strong ties to their interpersonal networks (Rogers, 2003). Furthermore, organic farmers build relatively closed networks that are difficult for newcomers to enter (Padel, 2001).

We consider organic farmers as those farmers who are previously experienced with AEM because they already practice environmental management standards for organic agriculture. In earlier studies, previous experience is considered to be a determinant that explains adoption of additional AEM. However, these studies show ambiguous results that vary according to the region studied and the type of measure(s) previously adopted. Defrancesco et al. (2008) show that farmers' previous experience in environmental practices is a significant determinant of their participation in additional AEM. Vanslembrouck, Van Huylenbroeck, and Verbeke (2002) analyse the interest of Belgian farmers in two AEM measures: plantation in yard (PIY) and extensification of field margins (EFM). Although previous experiences have a significant influence on the participation in EFM, the results show that previous experience is not significant

factor in explaining the participation in PIY. Furthermore, Wynn, Crabtree, and Potts (2001) find previous experience to have a positive significant impact on the speed of adoption of additional AEM.

The main aim of this study is to contribute to the understanding of how interpersonal communication influences organic farmers' adoption behaviour regarding additional AEM. The presented study uses survey information on organic farmers (both AEM adopters and non-adopters) to analyse interpersonal network (formal and informal) characteristics associated with adoption behaviour. First, we use the logit model to predict the probability of adoption behaviour. Second, SNA is conducted to analyse the question of whether the validation of information about organic farming provided by interpersonal information sources is associated with communication frequency.

The paper is organised into six sections. In the following section, we develop the research framework on the role of interpersonal networks in adoption behaviour and the influence of interpersonal ties for the validation of interpersonal information. Detailed information about the studied data set is provided in the third section. Sections four and five describe the methods applied (logit model and SNA) and the results with discussion, respectively. Conclusions are drawn in the last section.

3.2 Related Literature and Hypotheses

Adoption Behaviour

AEM adoption is a complex decision-making process. Previous studies show that many factors influence adoption behaviour for environmental farming practices, including the following: the characteristics of a farm and farmers (Crabtree, Chalmers and Barron, 1998; Wynn, Crabtree, and Potts, 2001); attitudes and perceptions towards conservation practices (Black and Reeve 1993; Defrancesco et al., 2008; Vanslembrouck, Van Huylenbroeck, and Verbeke, 2002); financial factors (Morris and Potter, 1995; Wilson and Hart, 2000; Ducos, Dupraz and Bonnieux, 2009; Sutherland et al., 2012); the institutional design and requirements of policy measures (Polman and Slangen, 2008; Dupraz, Latouche, and Turpin, 2009; Fraser, 2011); and information actors (Lowe and Cox, 1990; Morris and Potter, 1995; Warriner and Moul, 1992; Skerratt, 1998).

Are Agri-Environmental Practices an Innovation?

The definition of innovation used in this research is based on the "Guidelines for Collecting and Interpreting Innovation Data" of the European Community Survey (OECD 2005, p. 46), where innovation is defined as follows: "*An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organisation or external relations. The minimum requirement for an innovation is that the product, process, marketing method or organisational method must be new to the firm*" (EU SCAR, 2012). Thus, in this study AEMs are accepted as an innovation as they are new for the farmer. Rogers (2003) distinguishes between "hardware" and "software" innovation. While "hardware" points out the necessary technology, "software" stands for information on how to use technology and how to evaluate its impact. Using this classification, Padel's (2001) study accepts organic farming as a "software" innovation where farming practices requires new management skills to achieve the regulations. According to Padel (2001), the presented study understands AEM as a "software" based innovation.

In the literature, a variety of theories are used to explain the adoption of AEM, including the theory of reasoned action, principal agent theory, contract theory, innovation adoption theory, etc. The prior literature has articulated certain concerns about using innovation adoption theory to explain the process of conversion to environmental farming practices (Pampel and Van Es, 1977; Röling, 1993). However, a number of studies disagree with these concerns and consider the adoption of environmental farming practices within the concept of innovation adoption (Black and Reeve, 1993; Deffuant, 2001; Genius, Pantzios and Tzouvelekas, 2006; Morris and Potter, 1995; Padel, 2001). While Morris and Potter (1995) use the diffusion of innovation theory to understand the farmers' willingness to participate in the Countryside Stewardship Scheme in the UK, Deffuant (2001) uses the adoption diffusion theory as a framework for understanding the role of others in the adoption of AEM. Deffuant (2001) considers the innovation adoption theory as a relevant framework for research on adopting AEM based on the definition by Valente (1995), who defines diffusion of innovation as the "spread of new ideas, opinions, or products throughout a society, thus diffusion is a communication process in which an adopter persuades those who have not yet adopted to adopt." Based on previous studies that apply theories of

innovation adoption to providing recommendations for adopting environmental practices this study uses an innovation adoption model as a framework for organic farmers' adoption of AEM.

Interpersonal Communication

The study by Ryan and Gross (1943) is generally accepted as the beginning of research on innovation diffusion in rural areas; their study describes "diffusion" as a process that aims to reduce uncertainty among potential users. According to Rogers (2003), innovation adoption begins with sharing information with potential users through two main channels: the mass media and interpersonal communication.

Academic research into interpersonal communication began in the early 1950s with Barnes (1954). The main aim of subsequent studies has been to analyse how relationships between actors influence their behaviour. The concept of the interpersonal network was broadly applied in studies on innovation diffusion. Indeed, a number of studies were published that analysed who influences whom within the community on innovation adoption (Rogers and Beal, 1958; Valente and Rogers, 1995; Nutley, Davies, and Walter, 2002; Albronda, Langen, and Huizing, 2011). Sociological research shows that other farmers' opinions and institutionalised sources are an import interpersonal source in farmers' decision making (for a literature review, see Buttel, Larson, and Gillespie, 1990).

A number of studies stress the importance of repeated collaboration and contact frequency between network actors in increasing innovativeness (Lewicki and Bunker, 1996; Harhoff et al., 1999; Paruchuri, 2010; Chassagnon and Audran, 2011). Regarding research on rural areas, Ryan and Gross (1943) find that wide social contact is positively related to farmers' innovativeness and technology adoption behaviour. More recently, Monge, Hartwich, and Halgin (2008) indicate that farmers who have frequent conversations about technological changes in their network are more likely to adopt new knowledge and technology compared to other farmers. In the adoption of agricultural conservation practices, Warriner and Moul (1992) show that connectedness (number of interpersonal sources) has a positive influence on adoption behaviour.

To clarify the importance of contact in interpersonal networks using frameworks other than the network approach, studies on social capital investigate factors that influence farmers' decisions (Morris and Potter, 1995; Potter and Gasson, 1998; Wilson and Hart, 2000). In the social capital literature, participation frequency in agricultural organisations is an important variable that

indicates a higher level of social capital (Beugelsdijk, 2003; Sobels, Curtis, and Lockie, 2001). Social capital is assumed to lower transaction costs and influence farmers' behaviour (Polman and Slangen, 2008). Research on innovation diffusion in rural areas has shown that farmers' participation in organisations is an important determining factor in the adoption of different types of innovations (Jagger and Pender, 2003). In Belgium, for example, Mathijs (2003) finds that AEM adopters consult external sources – such as professional publications or private contacts – more frequently than non-adopters and are more likely to attend association meetings. Despite these positive effects of organisational participation, the aim of organisations and the type of innovation can also influence the results. Research by Drake, Bergström, and Svedsäter (1999) finds that education gained in agricultural schools has a significant negative impact on participation in the Countryside Stewardship Scheme because these schools emphasise the production function of farming practices. In another study, Polman and Slangen (2008) find that participation in social organisations has a positive effect and participation in agricultural organisations has a negative effect on the adoption of AEM.

The aim of this article is to investigate whether contact frequency in interpersonal networks increases the innovativeness of organic farmers, which is expressed by adopting additional voluntary AEM. Within given conceptual approaches, we consider the formal (agricultural organisations and farmers' associations) and informal (other farmers) dimensions of interpersonal networks. Study observes contact frequency in two ways. First, we consider contact frequency in informal networks via communication with other farmers. Second, we consider contact frequency within formal networks as participation frequency in agricultural organisations' events. Thus, we test the following hypotheses:

H1a (informal network): The higher the communication frequency with other farmers on agricultural issues, the higher the probability of organic farmers adopting additional AEM.

H1b (formal network): The higher the participation frequency in agricultural organisations, the higher the probability of organic farmers adopting additional AEM.

Studies on the role of communication in innovation adoption suggest that after farmers become aware of new ideas and/or technologies, they next develop an attitude (whether negative or

positive) toward those ideas and technologies (Ambastha 1986; Case 1992). These attitudes are influenced by the characteristics of farmers in regular communication (informal network).

In the AEM adoption research area, the study by Defrancesco et al.(2008) shows the significant influence of neighbourhood farmers' attitudes on the adoption of AEM, not only for passive adopters (those who adopt AEM mainly for financial reasons) but also for active adopters (those who adopt AEM for both environmental protection and financial reasons).

Research on the characteristics of innovation promoters notes that innovation promoters are characterised by high status (such as education level or employment status) and important roles in innovation adoption behaviour (Kautz and Larsen, 2000; Rogers, 2003; Nutley, Davies, and Walter, 2002; Guerin, 2001). In this study, therefore, we test the following hypotheses:

H2: The higher the education of regularly communicating farmers, the higher the probability of others adopting additional AEM.

H3: The higher the innovativeness of regularly communicating farmers, the higher the probability of others adopting additional AEM.

Interpersonal ties

In adoption behaviour research, which recognises the influence of communication frequency in interpersonal networks, relational aspects of the network structure also become an integral part of understanding the relationship between communication frequency and the importance of information sources. The SNA allows the use of a number of analytical tools to measure the relational aspects of social structure. In our study, we focus on the interpersonal ties that allow information flow on AEM in the communication network.

Previous studies in rural sociology recognise the importance of social structure in information networks for farmers' innovation adoption behaviour (Van den Ban, 1970; Warriner and Mou, 1992). In particular, these studies show that farmers' adoption behaviour is affected by several structural dimensions of the interpersonal communication network. Rogers (2003) distinguishes the following three main aspects: (i) diversity of the communication network, which refers to network actors' characteristics, such as attitudes and social status; (ii) integration in the communication network, which refers to how well communication occurs with other actors in the network, and (iii) connectedness in the network, which refers to the degree to which the focal

network actor (ego) is linked to others. Interpersonal ties carry information and connect network actors.

Two types of ties are distinguished in the theoretical studies: weak ties and strong ties (Granovetter, 1973). Weak ties maintain greater variety of information flow between network actors; strong ties increase the probability of information flow. Granovetter (1973) introduces several dimensions of tie strength, such as amount of time, intimacy, intensity, and reciprocal services. Tie strength research based on Granovetter's theory uses different proxies of strength, such as communication reciprocity (Friedkin, 1980), closeness of relationships (Berger and Calabrese, 1975) or interaction frequency (Granovetter, 1973; Weiligmann, 1999; Gilbert, Karahalios, and Sandvig, 2008).

In this study, ties are considered strong when frequently-contacted interpersonal sources are validated as important information sources. In our model, we use communication frequency with other farmers and participation frequency in agricultural organisational meetings as proxies for contact frequency. The variable "validation of information sources" describes the importance of the information on AEM that is received from the interpersonal network as perceived by surveyed farmers. The measurement is consistent with Weimann (1982), who treats contact with high frequency as a strong tie if there is simultaneously high contact importance. Based on this theory, we develop and test the following hypotheses:

H4a (informal network): Farmers who communicate with other farmers with high frequency are more likely to consider other farmers as an important source of information about organic farming issues.

H4b (formal network): Farmers who participate in agricultural organisations' events with high frequency are more likely to consider formal network actors (e.g. interest groups, cooperatives and government agencies) as an important source of information about organic farming issues.

3.3 Sample Description

The dataset available for the analysis consists of 52 organic farmers located in Central and Eastern Germany (Saxony-Anhalt, Saxony, Lower-Saxony, Brandenburg, Thuringia, and North Rhine-Westphalia). The data were collected during face-to-face interviews with farm managers

participating in the EU-funded FoodIMA project in 2008. The survey provides information about adopted AEM by organic farmers, farm and farmers' characteristics and relationships in the interpersonal communication network. In the analysis, the adopted AEM were cited by organic farmers as an answer to the open question "Have you participated in other AEM? If so, what measures have you undertaken?" Single additional AEM differ between the German federal states, however all organic farmers in the study regions have access to a number of AEM they can choose from. We observe that approximately 70% (36 farmers) of the surveyed organic farmers had not adopted additional AEM by the survey year (2008). The additional AEM adopted by 16 organic farmers are listed in the Table 3-1.

Table 3-1: List of Additional Adopted AEMs by Organic Farmers, 2000-2008

Crop diversification (Fruchtartendiversifizierung)
Mulch seeding (Mulchsaat)
Nature conservation (Naturschutz)
Land cultivation adapted to market and location (Markt-undstandortangepassteLandbewirtschaftung)
Cultural landscape program (Kulturlandschaftsprogramm)
Environmental protection, forestry (Agrarumweltmaßnahmen und Waldmehrung)
Solid manure program (Festmistprogramm)
Wetland protection (Feuchtwiesenschutz)
Diversified crop rotation (VielfältigeFruchtfolgen)
Dairy cows grazing (Weidehaltung v. Milchkühen)

Source: FoodIMASurvey

The present study does not explicitly consider the requirements of adopting other AEM. The innovativeness of an organic farmer towards additional AE programmes is captured solely by the variable describing the presence or absence of adopting other AEM.The differences between additional AEM adopters and non-adopters are analysed using a t-test. The t-test results show that the means of the considered variables that characterise these two groups are significantly different from one another in three tested variables. First, organic farmers who adopted additional AEM cultivate land with significantly lower soil quality than non-adopters. Second, additional AEM adopters converted to organic farming earlier than non-adopters. Third, education levels are higher for farmers who adopted additional AEM.

Table 3-2: Characteristics of Organic Farmers (n=52), Central Germany, 2008 (two-sample t-test results)

Variables	Mean AEM Adopters (n=16/30%)	Mean Non-Adopters, (n=36/70%)	P-Value
Farmer/Farm Characteristics			
AGE	51.60	48.41	0.413
EDUCATION	15.87	16.05	0.784
FARM_SIZE	212.47	142.61	0.39
FARM_SOIL_Q	2.47	2.88	0.054*
FARM_INCOME	2.31	2.91	0.193
CONVERSION_Y	1993	1996	0.037*
Interpersonal Networks			
Informal Network			
NETWORK SIZE	7	9.73	0.526
AGE_RCF	45.14	47.5	0.272
EDUCATION_RCF	16.84	15.46	0.077*
FARM_SIZE_RCF	270.76	173.90	0.372
INNOVATIVENESS_RCF	7.071	6.96	0.861
COMMUNICATION_FREQ	50	58.08	0.256
Formal Network			
MEMBERSHIP	0.82	0.85	0.79
PARTICIPTION_FREQ	1.94	1.85	0.758

Significance levels: * = p < 0.10, ** = p< 0.05
Description of variables:
AGE: Age of surveyed farmer (years).
EDUCATION: Education of surveyed farmer (years).
FARM_SIZE: The sum of arable and grass land: Total Land (ha).
FARM_SOIL_Q: German soil value for farmland (Bodenwertzahl 1-100) (Ordinal Scale 1-5).
Low=1 for "< 25", 2 for "26-45", 3 for "46-65", 4 for "66-85" and High=5 for "> 85".
FARM_INCOME: Share of income from farm activities (Ordinal Scale 1-4).
1 for "<50 %", 2 for "=50%", 3 for "<50%" and 4 for "=100%".
CONVERSION_Y: Year of conversion to organic farming.
NETWORK_SIZE: Number of regularly contacted farmers by surveyed farmers.
AGE_RCF: Age (year) of farmers regularly contacted by surveyed farmers.
EDUC_RCF: Education (year) of farmers regularly contacted by surveyed farmers.
FARM_SIZE_RCF: Farm size (ha) of farmers regularly contacted by surveyed farmers.
INNOVATIVENESS_RCF: Innovativeness of regularly contacted farmers, this score reported by surveyed farmers (Ordinal Scale 1-10); 1 for "hardly accept an innovation" and 10 for "easily accept an innovation".
COMMUNICATION_FREQ: Communication frequency with other farmers (%); 0 for "not at all" and 100 for "very frequently".
MEMBERSHIP: Membership in agricultural organisations that are relevant for or involved in agri-environmental programmes (1=Member, 0=Non-Member).
PARTICIPTION_FREQ: Participation frequency in agricultural organisations' events (Ordinal Scale 0-4) 0 for "not at all" and 4 for "very frequently".

Source: FoodIMASurvey

3.4 Logit Model

The following section addresses the diffusion of additional AEM among organic farmers and, more specifically, the question of whether contact frequency in interpersonal networks influences the adoption behaviour of additional AEM by organic farmers.

Method

The majority of studies on AEM adoption analyse the choice problem using discrete choice models (logit or probit). These studies consider the adoption decision as a dichotomous problem (1=adopters and 0=non-adopters) for estimation (Cramer, 1991; Crabtree, Chalmers, and Barron, 1998; Wynn, Crabtree, and Potts, 2001; Vanslembrouck, Van Huylenbroeck, and Verbeke, 2002; Polman and Slagen, 2008; Hurle and Goded, 2007).

The difference between the logit and the probit model lies in the distribution function of the error term. In the logit model, errors are assumed to follow the standard logistic distribution, whereas in the probit model, errors are assumed to be based on the standard normal distribution. Having applied both models, the choice of which to use in the study is derived from the results of models' (R-squared) explanatory power (Crabtree, Chalmers, and Barron, 1998). Because the R-square is slightly lower in the probit model, the logit model is selected for the analysis. The employed dependent variable is specified as:

Yi =1 if the farmer adopts a minimum of one additional AEM by the survey date.
Yi =0 if the farmer does not adopt any additional AEM by the survey date.

The logit model used in this study is specified as:

$$Yi = \beta\, Xi + ui \qquad (3.1)$$

where β = vector of parameters, Xi = vector of independent variables, and ui = error term.

In the model, variables are divided into two main groups: the characteristics of farms and farmers and the characteristics of interpersonal networks. The characteristics of farms and farmers are used as control variables. Based on the results of previous studies on the influence of farmers' characteristics (Bonnieux, Rainelli, and Vermersch, 1998; Vanslembrouck, Van Huylenbroeck, and Verbeke, 2002), we include age and educational level as the estimation variables. For the farm characteristics, by taking into account the results of studies that investigate the importance

of farm characteristics (Wynn, Crabtree, and Potts, 2001; Polman and Slagen, 2008), variables for farm size, the share of income coming from farm activities and farm soil quality (expressed in German Agricultural Land Grades) are included. To test the influence of being an experienced adopter on the acceptance of additional AEM, the number of years of experience in organic farming is used. The characteristics of formal and informal networks are included in the interpersonal network characteristics. The influence of communication frequency with other farmers and the characteristics of farmers with whom others regularly communicate about agricultural issues are tested (age, education and innovativeness as perceived by surveyed farmers). Finally, in the formal network, the degree of attachment to agricultural organisations (farmers' associations) and participation frequency in these organisations' events is considered.
The probability of being an adopter is given by:

$$Pr\ (Yi\ = 1|\ Xi)\ =\ F\ (\beta\ Xi)\ =\ exp\ (\beta\ Xi)/\ 1 +\ exp\ (\beta\ Xi) \qquad (3.2)$$

We checked the potential problem of multi-collinearity between the explanatory variables of the mode by applying two commonly-used tests. First, using Menard's (2002) approach, we calculated the variance inflation factor (VIF) by constructing an ordinary least squares (OLS) regression with the same variables in the equation. The results show a mean VIF value of 1.49. Because the acceptable upper critical limit is 10.0 (Chatterjee and Hadi, 2006), we consider that there is no correlation among variables. Second, we checked the pair-wise correlation coefficient between explanatory variables. Within the total coefficient values of the model, the values ranged from 0.003 to 0.41. The absence of coefficient values larger than 0.5 indicates weak correlation between variables. Based on the results of these two tests, we conclude that there is no multi-collinearity problem in the model.

3.5 Results and Discussion of the Logit Model

Table 3-3 reports the results of the logit model estimation for adopters and non-adopters of additional AEM within the group of organic farmers. Due to missing values, the total number of observations decreased to 43 farmers. In the model, a likelihood ratio test is used to compare the

fit of null and alternative models, which is 18.11 with nine degrees of freedom (LR chi2 (12): 18.11). Tested predictors were treated as significant when the p-value was lower than 0.10.

Regarding the variables of farm and farmer characteristics, the farmer's age, the farm's soil quality and year of conversion to organic farming are significant in the model of adoption of additional AEM by organic farmers. A positive coefficient sign for age indicates that older organic farmers (aged 60 years and over, and 35-60 years) are more likely to adopt additional AEM than younger farmers. This result should be interpreted with caution, however, because of the low number of organic farmers over 60 years old. This finding contradicts the results of other studies on AEM adoption (Vanslembrouck, Van Huylenbroeck, and Verbeke, 2002; Wynn, Crabtree, and Potts, 2001; Bonnieux, Rainelli, and Vermersch, 1998). In these studies, age was confirmed as having a negative significant effect, indicating that younger farmers are more likely to adopt AEM. A possible explanation is that when considering organic farmers, those who are older are more experienced with AEM practices and are therefore more likely to adopt other voluntary AEM than younger and less experienced organic farmers.

Table 3-3: Results of Logit Analysis, Adoption of Additional AEM by Organic Farmers

Parameters	**Coef.**	**Std Error**	**P>|z|**
Farmer/Farm Characteristics			
AGE	.135	.080	0.093*
EDUCATION	1.756	1.300	0.177
FARM_SIZE	.001	.003	0.649
FARM_SOIL_Q	-2.11	1.244	0.090*
FARM_INCOME	-1.515	1.349	0.261
CONVERSION_Y	-.160	.096	0.095*
Interpersonal Networks			
Informal Network			
AGE_RCF	-.180	.091	0.050**
EDUCATION_RCF	.609	.337	0.071*
INNOVATIVENESS_RCF	-.038	.295	0.896
COMMUNICATION_FREQ	.018	.022	0.410
Formal Network			
MEMBERSHIP	-.722	1.643	0.660
PARTICIPATION_FREQ	.715	.588	0.224
CONSTANT	310.995	190.038	0.102

Number of Observations: 43 / LR chi2(9): 18.11/ Pseudo R2: 0.3436
Significant levels: * = p < 0.10, **=p<0.05
Used dummy variables[18]:
FARM_INCOME=0 for "=45% or <45% share of income from farm activities", FARM_INCOME=1 for "=46% or>46%".
FARM_SOIL_Q= 0 for "<45 or =45 Bodenwertzahl" (German soil value for farmland),
FARM_SOIL_Q =1 for "=46 or >46 Bodenwertzahl".
EDUCATION=0 for "<16", EDUCATION=1 for "17 or >17 years of education".

Source: FoodIMASurvey

The estimates of the year of conversion to organic farming confirm that early adopters of organic farming practices are more likely to adopt additional AEM. This result is supported by Sutherland and Darnhofer's (2012) study based on qualitative interviews with organic farmers. The study finds that organic farmers' attitudes toward environmental practices evolve over time,

[18]Additional to the given description variables in Table 3-2, here we provide three dummy variables created by the user in order to estimate the results of predictors' interactions.

and explains that this evolution is influenced by two factors: farmers' previous individual experiences and their observations of other farmers' environmental practices. The study indicates that producing food while respecting the environment by applying organic practices becomes a personal and professional challenge that creates new perceptions and priorities in rural areas.

The negative significant sign for soil quality indicates that farms located in less favourable areas have a greater likelihood of adopting additional AEM, which is similar to results from other studies on conventional farmers' conversions to organic farming practices (Sutherland and Darnhofer, 2012; Schimdtner et al., 2011). Schimdtner et al. (2011) show that farms located in less favourable areas of Germany are more likely to convert to organic farming than farms in more fertile areas. This can be explained by higher opportunity costs in fertile areas compared to less favourable areas.

A positive sign for estimates for the variable "education of farmers in regular communication" confirms that farmers who communicate regularly with more educated farmers have a greater likelihood of adopting additional AEM. Thus, H2 (the higher the education level of regularly communicating farmers, the higher the probability of others adopting additional AEM) was corroborated.

With respect to other characteristics of actors in frequent communication over informal networks, age is a significant determinant in the adoption model. The negative sign for the age variable implies that regular communication with younger actors positively influences older actors' willingness to adopt additional AEM.

The degree of innovativeness of regularly communicating farmers did not prove to be a significant variable for explaining adoption behaviour. Thus, hypothesis H3 (the higher the innovativeness of regularly communicating farmers, the higher the probability of others adopting additional AEM) was not confirmed.

Neither communication nor participation frequency in informal and formal networks explains the adoption of additional AEM by organic farmers. Thus, with respect to the relationship between adoption behaviour and interpersonal networks, hypothesis H1a (the higher the communication frequency with other farmers on agricultural issues, the higher the probability of adoption of additional AEM by organic farmers) and H1b (the higher the participation frequency in agricultural organisations, the higher the probability of other organic farmers adopting additional AEM) are not supported.

Our study found that neither communication nor participation frequency in the informal and formal networks explain the adoption of additional AEM by organic farmers. These findings for informal networks contradict the findings from studies stressing the importance of repeated collaboration and contact frequency between actors in networks that increased innovativeness (e.g. Monge, Hartwich, and Halgian, 2008; Paruchuri, 2010; Chassagnon and Audran, 2011). Our results for formal networks show that there is no significant effect of participation frequency in agricultural organisations on the adoption of AEM. This finding differs from the study conducted by Mathijs (2003) on innovation diffusion in rural areas, which shows that farmers who participate in association meetings are more likely to adopt AEM. Our results also differ from the study by Polman and Slangen (2008), who find negative effects for participation in agricultural organisations on the adoption of AEM.

3.6 Social Network Analysis (SNA)

As cited in the literature review, in some studies, communication frequency alone – without considering the perception of the importance of the information transmitted – is used to explain the influence of interpersonal relationship on innovative behaviour. To show whether such an approach is sufficient, we decided to explore whether frequently contacted information sources are validated as important sources of information on organic farming by farmers. From a policy-making perspective, it is useful to understand how organic farmers evaluate information sources on organic farming before adoption and how adoption rates might be increased among farmers, e.g. how to diffuse information more efficiently to the group by occupying the appropriate sources. Therefore, farmers who communicate infrequently are eliminated from the analysis. Interpersonal ties that illuminate the flow of information are investigated using SNA (Wasserman and Faust, 1994).

Methodologie

Generally, SNA studies the "*behaviour of the individual at the micro level, the pattern of relationships at the macro level, and the interactions between the two*" (Stokman, 2001, p. 509). Social entities in a network are referred to as actors, i.e., discrete individual, corporate, or collective social units (Wasserman and Faust, 1994). Several approaches are deployed to study relationships in interpersonal networks. Our study uses personal interviews in which each respondent (ego) reports on which interpersonal information sources (alter) it is tied to and with what intensity. The measurement of such personal networks (ego-centred networks) can be found in studies in fields as diverse as anthropology, psychology, medicine, sociology and agricultural studies (Bott, 1957; Wellmann, 1993; McCarty et al., 2001; Thuo et al., 2013). Interpersonal network characteristics based on personal interviews with organic farmers are presented in Table 3-4.

Table 3-4: Network Characteristics with Interpersonal Communication Aspect

	Interpersonal Network
Ego	Organic farmer
Alter	Interpersonal information sources (formal; informal)
Ties from Ego to Alter	Communication; Meeting participation frequency (high; low)
Input	Idea; Friendship, etc.
Ties from Alter to Ego	Validation of the importance of information sources (high; low)
Output	Evolution of ideas
Tie Strength	Contact frequency, Contact importance
Objective Variable	Exchange of information, ideas and knowledge
Medium	Oral (face-to-face) communication

Source: adoption from the studies of Beckmann, (1994) and Kobayashi and Fukuyama, (1998).

While egos represent organic farmers in the interpersonal network analysis, two alters represent interpersonal information sources of agricultural organisations (formal) and other farmers (informal). Ties from ego to alter are established via bilateral communication or group meetings in which actors share ideas and/or social relationships. In the analysis, we assume that ties from alter to ego are established as a consequence of the interaction between ego and alter. Based on the interaction experience, the ego validates the importance of shared ideas and/or gathered information.

The SNA allows us to measure the relational aspects of social structure using tie strength in the network. To measure the strength of ties, we adopted the approach developed by Weimann (1982), who defines ties between ego and alter as strong if these actors have frequent contact and the ego rates the information received as being of high importance. These two proxy variables, which determine tie strength in our study, are described as follows:

Contact frequency

To quantify the informal communication frequency of organic farmers, the survey asked the question "How often do you communicate with other farmers about agricultural issues?" To quantify their contact frequency, we asked them, "How often do you participate in the agricultural organisation's events?" For both questions, the degree of interaction frequency was ranked on a percentage scale (0 to 100%). In the contact matrix, the threshold level of having high contact frequency is constructed by translating the top half of the communication and participation frequency percentages (>50%) of farmers into 1's as *a high contact frequency* and the other half (≤50%) into 0's as a *low contact frequency*.

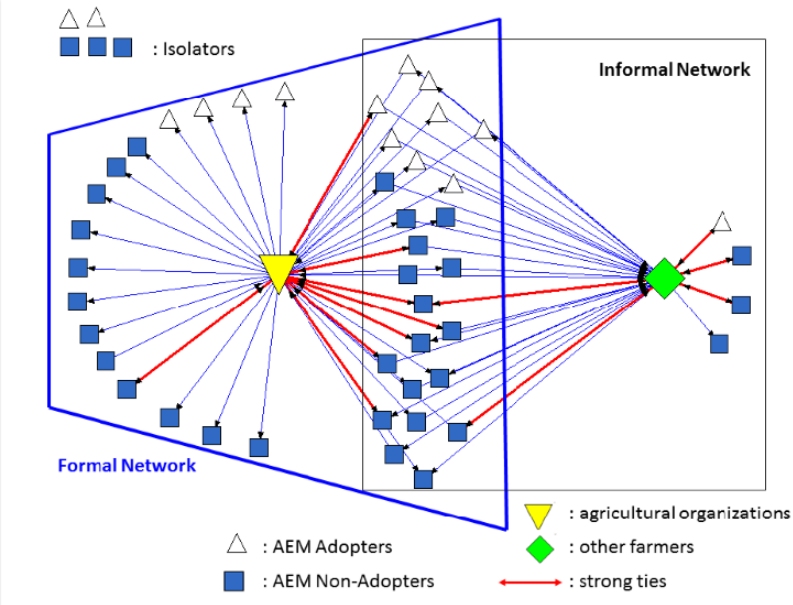
Information validation (Contact importance)

Information sources in rural areas are examined in several studies that focus on the use of information (Ortmann et al., 1993), factors that influence attitudes toward information sources (Gloy, Akridge, and Whipker, 2000), or information preferences of farmers (Pompelli et al., 1997; Schnitkey et al., 1992). In our study, the variable of information validation is measured as ranked by farmers. Farmers were asked to rate the importance of 15 information sources that may be categorised into three groups: other farmers, agricultural institutions and the media. The question asked was "*How do you rate the importance of the listed information sources on organic farming for you before adoption?*" The degree of validation of each information source was ranked on a percentage scale so that the sum of the validations is 100%. Regarding the distribution of rankings in the matrix, a high percentage of responses (more than 33%) were translated into 1, which represents *high information validation*, and a low percentage (less than 33%) into 0, which represents *low information validation*. We do not consider the importance of media (magazines, book, radio, television) in this study and consider formal and informal interpersonal communication only.

Results and Discussion of the Social Network Analysis

Figure 3-1 shows the interpersonal ties in the structure of network actors for a sample of organic farmers (n=52) in Central and Eastern Germany. Due to missing values, the total number of organic farmers decreased to 50. From the 50 organic farmers, those who communicate infrequently are eliminated from the analysis and shown as isolators (n=5). Two different symbols represent frequently communicating farmers (n=45) that distinguish among adoption behaviour; additional AEM adopters are represented by a triangle and non-adopters by a square. The network consists of 50 egos and two alters that represent organic farmers and interpersonal information sources (agricultural organisations and other farmers), respectively. The tie from ego to alter indicates farmers' high contact frequency with the tied alter. The tie from alter to ego indicates the farmer's high information validation of the alter. The right side of the network depicts ties within the informal information network and the left side of the network depicts the formal information network; strong ties are highlighted in red, and indicate that the tied organic farmers (egos) have a high level of contact frequency with the interpersonal network actor (alter) and simultaneously rate that source as having high level of importance for them as an information source.

Figure 3-1: Interpersonal Communication Network of Organic Farmers (N=50)



Source: FoodIMASurvey

The aim of SNA is to understand the relationship between contact frequency and information validation variables, regardless of the adoption decision. The determinants that are not shown in the figure are depicted in detail in Table 3-5, which shows the results of interpersonal network analysis for formal and informal networks separately. Regarding the research question, the contact matrix relationships are shown in a star network structure consisting of a central node to which all other nodes are connected. In the network, the central node provides a common connection for all nodes. Thus, the proportion of actual ties to the possible ties that are defined as connectedness is low for both the formal and informal networks. Additionally, the standard deviation between actors with respect to the number of distributed ties is low, which indicates that the population in both the formal and informal networks represents a homogeneous group because there is low variance in terms of their connectedness within the network.

The interpersonal network consists of 83 ties that represent both high contact frequency (ties from ego to alter) and high information validation (ties from alter to ego), which breaks down to 49 formal and 34 informal ties. This finding indicates that formal ties are more important in information exchange than informal ties. In this informal network, the alter of other farmers is an actor that mostly provides information to farmers who also have support from formal network ties.

The sum of egos gives the total number of organic farmers connected to the formal and informal interpersonal networks separately. While 82% of actors are connected to formal networks, 58% of actors are connected to an informal network. One explanation for the greater number of actors being connected in the formal network is the high number of ties (68%) from alter to ego. These ties represent high information validation by farmers and are provided by the agricultural organisations' alter.

Table 3-5: Interpersonal Network Analysis Organic Farmers, Central and Eastern Germany

Characteristics	Formal Network	Informal Network
Connectedness	0.019	0.013
Std deviation	0.137	0.115
Sum of egos	41(82%)	29(58%)
Sum of ties	49	34
Ego to alter *(high contact frequency)*	15(30%)	20(40%)
Alter to ego *(high information validation)*	34(68%)	14(21%)
Sum of strong ties	8	5
Proportion of Strong ties (to the ties from ego to alter) *(Sum of strong ties / ties from ego to alter)*	0.53	0.25

Source: FoodIMASurvey
Note: Percentages within the parentheses show the proportion of related actors to the total number of whole network level egos that represent organic farmer.

Interpersonal network analysis shows that the sum of strong ties is 8 for the formal and 5 for the informal network. This implies that, while in the formal network, 19% (8/41) of frequent participants in agricultural organisations indicated that information coming from these organisations was important for them; in the informal network, 17% (5/29) of organic farmers who communicate frequently with other farmers indicated that these farmers are an important source of information for them.

We hypothesised that farmer A is more likely to give importance to the information coming from source B if farmer A has previously cited B as a source that he contacts frequently. To measure whether the tendency of a tie from A to B is reciprocated by a tie from B to A, we used tie-based reciprocity analysis to calculate the proportion of strong ties among all connected ties from ego to alter. As a result (Table 3-5), we found that the proportion of strong ties is higher (0.53) in the formal network relative to the informal network (0.25). This indicates that 53% of farmers who participate in agricultural organisations frequently report agricultural organisations, research institutes and extension agents as sources of information about organic farming issues that are highly important for them prior to the adoption decision.

A binomial probability test was used to test the statement, "At least 50% of ties from ego to alters are reciprocal" for the two interpersonal networks. Although hypothesis H4b (farmers who participate in agricultural organisations' events with high frequency are more likely to consider formal network actors as an important source of information on organic farming issues) was confirmed for the formal network, hypothesis H4a (farmers who communicate with other

farmers with high frequency are more likely to consider other farmers as an important source of information on organic farming issues) was not confirmed for the informal network, at a significance level of $p < 0.05$.

Previous studies that considered conventional farmers' decision-making on adopting AEM found that interpersonal networks such as friends and colleagues are the most important sources of information (Retter, Stahr, and Boland, 2002; Drake, Bergström, and Svedsäter, 1999). Our results indicate that other farmers are indeed a frequent source of information, but that the information gained from them is in general not valued, relative to formal sources, as highly important for adoption of AEM with extensive requirements such as organic farming.

Regarding formal information sources, the survey conducted in Germany by Prager and Nagel (2008) shows that farmers contact agricultural organisations when they are seeking information on the application, scheme requirement, and responsibility issues associated with AEM. We assume that because they provide this type of information, agricultural organisations are evaluated as an important source of information by the farmers in our study. Thus, formal information exchange must be considered as having a substantial capacity to influence the managerial decisions of frequent participants. This applies in particular to AEM with extensive requirements such as organic farming.

In line with the social network studies (Granovetter, 1973; Lin, 1999), we argue that it is important for organic farmers to maintain ties with actors attached to both informal and formal networks to obtain new ideas and relevant information. Formal networks allow organic farmers to enter other networks in which they can obtain different types of information than in informal networks. Such interactions can help organic farmers to keep their informal networks open to new entrants.

3.7 Conclusions and Implications

We use the logit model to predict the influence of interpersonal contact frequency on adoption behaviour, and use the social network model to explain the relationship between contact frequency and information validation in farmers' interpersonal networks. While the logit model analysis examines which interpersonal communication network factors influence the adoption

decision, SNA considers validation of the importance of the information that is transmitted by interpersonal communication.

Considering the results from both the logit model and SNA, practical implications are derived for using informal and formal information networks to distribute information effectively to increase AEM adoption.

The result of the logit model shows that being an early adopter of organic farming positively influences the adoption of additional AEM. Further, the study by Sutherland and Darnhofer (2012) highlights the importance of having previous experience with environmental practices on the continuity of good farming practices. These authors suggest that formal agencies should provide feedback to farmers on environmental gains that have been achieved by adopting environmental farming practices.

Our results are in line with this suggestion and imply that a platform should be provided that would enable organic farmers to recognize the environmental benefits that they achieved by adopting environmental farming practises. Using this platform farmers could exchange their own information on the environmental benefits they received after adopting AEM. Frequently communicating with young and highly educated farmers who can be considered as informal opinion leaders promotes AEM adoption. If these farmers are approached by extension services, an effective diffusion of given information in the region can be expected. Moreover, it is useful for extension services to create discussion groups among organic farmers that include opinion leaders. Similar groups were already established to improve farm businesses and farm profitability, e.g. in Ireland, New Zealand and the UK (ADAS, 2008; Boyle, 2012). In Germany, discussion groups established by state agencies do not exist. Establishing such groups could be useful, especially for small and less profitable farms that are less able to pay for extension services.

Even though frequent participation in an agricultural organisation was not found to explain adoption of other AEM, the results of SNA show that organic farmers who participate in agricultural organisations' events with high frequency are more likely to consider formal network actors as an important source of information on organic farming issues. Thus, distributing information through formal information channels in combination with using informal channels should be considered as having a substantial capacity to influence the diffusion of AEM practices.

The research presented here might be extended in at least two directions. First, the current study does not focus on any one type of AEM adopted by organic farmers. That is, we included all accepted AEM without distinguishing between their requirements. We also limited our analysis to formal and informal interpersonal networks and excluded the influence of media on adoption behaviour. Considering the role of media in the adoption process might further refine our understanding of the role of information behaviour in this process.

Part II:
Analysis on rural labour behaviour with transition approach

4 Economic crisis and labour force transition to inactivity: a comparative study in German rural and urban areas

This section analyses the determinants of labour force transition to inactivity in the German labour market. Using German Labour Force Survey (LFS) data the influence on the transition flow to inactivity of factors such as age, education, marital status, sex and registration with the public employment service are examined. We present estimates of degree of urbanisation-specific multinominal logit models to analyse the determinants of individuals' transition probabilities in rural and urban areas. By comparing the influence of the factors that affect transition to inactivity before (2002-07) and during (2008-09) the global economic crisis, this paper contributes to the general understanding of transitional labour markets (TLM) flow dynamics during the crisis period. The findings suggest that during the crisis period education level and marital status have had different impacts in rural and urban regions on the transition to inactivity. While these two factors influenced the transition to inactivity before the crisis, their effect has been stronger during it. Additionally the results suggest that the interaction of individuals with institutional settings (e.g. registration with the public employment service) have to be taken into account when designing active labour market policy measures, especially during crisis periods. Knowledge about the influence of these factors on the transition to inactivity, and their different effects in rural and urban areas, provides important information for designing policies aiming to reduce the transition to inactivity during crisis periods.

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4.1 Introduction

As a consequence of the global economic crisis in Sep- tember 2008, the German economy declined by 6.7 per cent in GDP between the beginning of 2008 and the first quarter of 2009 (Bogedan et al., 2010). However, average unemployment rates showed a 5 per cent rise in 2009, which was the lowest in Europe (BA, 2009). While studies exist that explain the reasons for this modest increase in unemployment (Faik, 2012) and the stabilising effect of short-time work contracts that avoid fluctuation in the labour market (Crimmann et al., 2012), not much is known about the labour market in terms of transition to the undesired state of inactivity.

The study of Baqueiro-Espinosa and Unay-Gailhard (2011) on economic inactivity in Germany during the 2008-09 global economic crisis showed that in rural areas in 2008, relative to the average of previous years (2002-07), the flow to inactivity from unemployment increased by 3 per cent for the age group 25-54 and by 9 per cent for the age group 55-64. In the sec- ond year of crisis, 2009, this increase was much larger: 19 per cent for the age group 15-24. Similar patterns are observed for urban areas, but with lower percentages. Regardless of crisis periods, the work of Gomes (2012) on the transition prob- abilities between economic statuses in UK labour market in 1993-2010 found that every quarter, on average 11 per cent of the unemployed moved into inactivity but still wanted a job while only 6 per cent moved into inactivity and did not want a job[19]. An increase in the probability of flow to inactivity from unemployment can be explained by the discouraged individuals and disguised unemployment (Seeborg and DeBoer, 1989; Copus et al., 2006). These two categories are considered within the concept of hidden unemployment[20]. More generally these individuals are the persons on the margin of the labour force, defined as marginal attachment (Jones-Stephen and Riddell, 1995) by indicating that they want work but are not engaging in job search for individual or economic reasons.

Increases in flow to inactivity from unemployed and employed status provide information on the tendency of marginal attachment during crisis periods. A particularly important issue involves

[19] Barham (2002), using the UK LFS, reported that "*the number of inactive individuals has grown double the number of unemployed in 1984 to five times the number in 2001*" (p.1).

[20] Components of hidden unemployment are considered differently in the literature. In our study variables of inactive status of individuals are derived from the German LFS, which involved the above mentioned two components of hidden unemployment: discouraged individuals and disguised unemployment.

the understanding of factors that affect transition to inactivity during an economic crisis. Flows out of the labour market within an inactive status allow the variation in unemployment during economic crisis periods to be explained (Davis et al., 2006).

In this paper we focus on the impact of the crisis on rural and urban labour force transition in Germany, and we aim to answer the following questions: (a) how has the global economic crisis influenced labour force transition to inactivity in Germany; (b) are there differences in the impact of the crisis on rural and urban labour force transition; and (c) if so, what are the determining factors that cause a change in labour flow before and during the crisis period?

The research focuses on the spatial division of rural and urban regions in Germany by estimating a degree of urbanisation-specific multinominal logit model (MLM). The MLM is used to examine how various factors (e.g. human capital and interaction of individuals with institutional settings) influence the labour force transition flows to inactivity from unemployed and employed status in rural and urban regions. We thus conduct a comparative analysis that highlights the differences between urban and rural areas during two economic periods: before (2002-07) and during (2008-09) the crisis. The results show how factors such as age, gender, marital status, education and registration with the public employment service influence the transition probabilities of individuals to an economically inactive status.

Several studies exist that analyse transition probabilities in the labour market in developing countries (Haltiwanger and Vodopivec, 2002; Tasci and Tansel, 2005; Blunch and Sulla, 2014) as well as developed countries (Marston, 1976; Bellman et al., 1995; Faik, 2012; Gomes, 2012) both before and during the crisis. While most of these studies focus on gender differences by using gender-specific MLM, there is, to the best of our knowledge, no study that analyses the labour force transition probabilities regarding differences in the degree of urbanisation. This study thereby contributes to the rural studies literature by looking at labour force flows by degree of urbanisation during the 2008-09 global economic crisis. This work also complements previous literature on TLM flow dynamics by focusing on factors influencing transition to inactivity, rather than unem- ployment, in crisis periods.

4.2 Transitional labour markets: theory and determining factors in transition flows

Previous studies on transitional labour markets (TLM) (e.g. Marston, 1976; Schmid, 1995; Kruppe, 2002) have distinguished transition flows as follows: transition between employment status; transitions between unemployment and employment; transition between education and employment; and transition between employment and retirement. In our study, by considering Marston's approach (Marston, 1976), we distinguish between individuals in the transition matrix that flow between jobs, unemployment and inactivity.

Inactive individuals are defined as those who are neither classified as employed nor as unemployed. As reflected in the LFS, examples of inactive individuals include those who are not seeking employment, discouraged workers that believe there is no work available, individuals looking after children, and incapacitated adults (Eurostat, 2006). Some studies (Blanchard and Diamond, 1990; Gomes, 2012) have disaggregated inactivity into two subgroups: inactive individuals that want a job and those do not want a job. However, these subgroups are not available in the German LFS used by us. By considering the findings of Joyce et al. (2003) that show the subgroups of inactivity have the same transition probability to employment status as the unemployed, our research uses inactivity without any subgroup distinction.

TLM studies provide two main emphases for the notion of reducing the extent of social exclusion (being in the out-of-labour force or inactive) in labour markets. Firstly, existing analyses emphasise individuals both from the labour market (employed, unemployed) and out of the labour market (inactive). Secondly, there is an emphasis on regulating activities in the whole transition matrix (training, part-time work, informal work, childcare etc.) including both within and outside of the labour market (Detzel and Rubery, 2002).

With regards to the previous findings of TLM studies, a number of hypotheses on the role of human capital and institutional settings on the labour force transition can be derived. These findings highlight the high sensibility of the youth age group to financial and economic crises across different countries (ILO, 2010; Scarpetta et al., 2010). Choudhry et al. (2012) found that the impact of the 2007-08 economic crisis on the unemployment rate of young people is highly significant for high income countries. According to Blunch and Sulla (2014), in Serbia during the 2008-09 crisis there was a significant age effect in the labour force transition to inactivity from unemployment and employment status. They found that being in the age group 35-44 positively

influenced the transition to inactivity from unemployment status; the effect seems higher than for individuals in the 25-34 and 45-54 age groups.

The probability of transition to inactivity decreased with increasing level of education. Regardless of economic crises, in EU Member States for the period 1997-2007 Eichhorst et al. (2010) concluded that the high level of education positively contributed to the probability of transition from non-employment (unemployment and inactivity) to employment. According to Lauerová and Terrell (2002), education is important in explaining flows to employment status from unemployment and out-of-labour force in all studied post-communist labour markets such as Bulgaria, Czech Republic, Germany, Hungary, Poland and Slovakia. The less educated individuals are more likely to be laid off or quit and less likely to find a job. Moreover, Gomes (2012) found that in the UK in the period 1993-2010 individuals educated to a high level faced fewer fluctuations in transition probabilities between the three economic statuses (employed, unemployed and inactivity) than the less educated individuals.

Gender and marital status are other important factors highlighted in the labour force transition literature (Bellman et al., 1995; Tasci and Tansel, 2005; Blunch and Sulla, 2014). Estimation of transition probabilities by Blunch and Sulla (2014) showed that, relative to males, females were disadvantaged in the Serbian labour market in terms of flow from unemployment and inactivity status during the first year of the economic crisis. Tasci and Tansel (2005) found that in the Turkish labour market during the 2001 economic crisis there was a higher probability of single men and women losing a job. Additionally, while marriage increases the likelihood of transition to employment from inactivity for males, marriage reduces the likelihood of finding a job from inactivity status for females.

Regarding the role of institutional settings on the labour force transition during economic recessions, some studies also refer to the public employment service as an influencing factor (e.g. Curti, 1998). Caseworkers in the public employment service are responsible for implementing countries' active labour market policies and for helping the registered unemployed individuals they are expected to counsel. Depending on the country regulations, the public employment service provides vocational training and offers temporary employment possibilities and job search programmes to registered unemployed individuals.

In Germany, during the economic stagnation year of 2002 the government enacted several regulations in order to reform the labour market including the public employment service, the unemployment benefit system and active labour market policy. This labour market reform (Hartz Reform) aimed to activate unemployed job seekers that attached to public employment offices within a strict regime during the job search process. Studies on the effectiveness of the demanding requirements of the reforms (such as mandatory participation in activation programmes and reducing unemployment benefit duration) highlight the influence of the implemented regulations on the labour market. Achatz and Trappmann (2009) show that within less than one year, 14 per cent of unemployment benefit recipients had left benefit rolls and half of those took up full or part-time jobs. Regarding the effects of activation policies on older age unemployed individuals, Nivorozhkin et al. (2013) found that while monitoring standard job search requirements is an effective method of activating unemployed people; this regulation has little effect on older workers, leading to increased exit rates from unemployment.

Different than effectiveness studies, Eichhorst et al. (2010) discuss whether an increasingly inclusive labour market is associated with a reduction in job quality (measured by contract type). They conclude that it depends on the study country: there are two trends in post-industrial labour markets; one towards more precarious employment for the recently non-employed (unemployment and inactivity) in Belgium, Czech Republic, France and Italy and another towards more permanent employment in Denmark, Hungary, Spain and the UK. These findings lead us to assume that being registered with the public employment service has a positive influence on transition to employment for working age group individuals and a negative effect on transition to inactivity from employed and unemployed status[21].

TLM studies focusing on periods of economic crisis rarely investigate the spatial division of urban-rural regional differences. A few exceptions (e.g. Tasci and Tansel, 2005; Blunch and Sulla, 2014) show that transition to unemployment and inactivity probability differs between urban and rural areas during crisis periods. Blunch and Sulla (2014) found that urban areas were

[21] As used in the study of Bellman et al. (1995), variables such as amount of unemployment benefit and income of the individual would be ideal for the labour force transition model. However these variables are not available in the used study survey. The findings of Blunch and Sulla (2011) show that unemployment benefit negatively influenced the probability to transition out of unemployment to inactivity during the 2008-09 crisis in Serbia. Similarly, in the eastern German labour market in 1991, the results of Bellman et al. (1995) suggest that increases in monthly benefit income would lower the probability of labour force exit of individuals.

influenced more than rural areas both in terms of transition flow to unemployment and inactivity status. Additionally, findings by Tasci and Tansel (2005) suggest that individuals who live in urban areas are more likely to transition out of employed status compared to those who live in rural areas.

In this study, we take these findings as a starting point and investigate how factors such as age, education, gender, marital status and registration with the public employment service influence the transition flow to inactivity by estimating a degree of urbanisation-specific model in Germany both before (2002-07) and during (2008-09) the economic crisis period.

4.3 Methodology

A number of studies on labour force transition analyse transition possibilities by using multinomial logit models (MLM) (Bellman et al., 1995; Gustafsson et al., 2002; Lauerová and Terrell, 2002; Tasci and Tansel, 2005; Blunch and Sulla, 2014). These studies consider the transition flow as a polytomous problem. The transition of the individuals from one labour force status to another has been investigated as a stochastic process within the concept of the Markov Process. An individual can have three statuses, which we denote as 'e' for employment, 'u' for unemployment and 'i' for inactivity. Each year an individual can transition from one status to another with the following probabilities:

$$\begin{array}{lll} i \rightarrow e,\ P = Pie & i \rightarrow u,\ P = Piu & i \rightarrow i,\ P = Pii \\ e \rightarrow e,\ P = Pee & e \rightarrow u,\ P = Peu & e \rightarrow i,\ P = Pei \\ u \rightarrow e,\ P = Pue & u \rightarrow u,\ P = Puu & u \rightarrow i,\ P = Pui \end{array} \qquad (4.1)$$

Pie, for example, denotes the transition probability of an individual from inactive to employed status. Corresponding to the given nine labour force transition possibilities between former (previous) year (f) and current year (c), matrix M could be shown as:

$$M = (mfc) \qquad (4.2)$$

where mfc is the probability of transition ef, uf and if making the transition ec, uc and ic. Finally, we assign the transition matrix M as follows within nine independent transition probabilities:

$$M = \begin{bmatrix} Pie & Piu & Pii \\ Pee & Peu & Pei \\ Pue & Puu & Pui \end{bmatrix} \quad (4.3)$$

By taking the approach proposed by Marston (1976), in our study the transition from state f to c is defined as the ratio of the number of individuals in state f at time t who are in state c at time t+1, to the stock of individuals in the original state f at time t.

We analyse transitions in both rural and urban areas in Germany. The aim of using urbanisation-specific MLM is to test whether rural inhabitants have different levels of transition probabilities in the labour market than urban individuals. The model results also help us to identify significant factors (such as age, education, gender, marital status and registration with public employment offices) that affect individuals' transitions in the labour market both before and during the economic crisis. The applied MLM considers three choices of economic status: employed, unemployed and inactive, where the values of status Sn have no natural order:

$$Sn \in \{1, 2, ...J\} \quad (4.4)$$

and the probability that an individual n chooses alternative economic status j is:

$$P_{nj} = \frac{e^{x'_n \beta_j}}{\sum_{i=1}^{J} e^{x'_n \beta_i}} \quad (4.5)$$

Since the coefficients of MLM do not have a straightforward interpretation (Greene, 1993; Cameron and Triverdi, 2009), studies on labour force transition usually report marginal effects and interpret the results using the average marginal effects of the estimated MLM model (Tasci and Tansel, 2005; Blunch and Sulla, 2014). The marginal, or partial, effect measures the effect on the conditional mean of y of a change in one of the regressors Xk (Cameron and Triverdi, 2009).

We provide the estimates of marginal effects in this study. Of the six constructed transition possibilities, the focus of our paper is the two transition flows to inactivity status: the transition from unemployment to inactivity (Pui) and transition from employment to inactivity (Pei). For Pei, the study investigated 358,196 transitions, 107,905 for rural and 250,291 for urban areas. Additionally, for Pui, the total number of transitions is 47,670, 13,894 for rural and 33,776 for urban areas.

The data used in this study come from the annual German LFS that was obtained from the EC, Eurostat and EU for the years 2002-2009. These data divide the working age population (15 years and above) into three labour force groups persons in employment, unemployed persons and inactive persons. The possibility of transition flows were mainly derived using yearly data at the country level, which is the average of quarterly surveys. By not taking into account individuals living in peri-urban (intermediate) areas, a comparative analysis considering individuals living in rural and urban areas was performed. This allowed us to determine if the probabilities derived from rural areas differed significantly from urban areas.

4.4 Results

Tables 4-1 and 4-2 show the results of the average marginal effect of the MLM for rural and urban areas, respectively, within the two study periods. Interpretations of the results are given by order of the following considered variables: age, education, marital status[22], education and being registered at a public employment office. We discuss each variable as a significant determining factor explaining the transition to inactivity.

[22] During the calibration process, single individuals were merged with the marital status of individuals equal to widowed and divorced or legally separated.

Table 4-1: Multinominal logit model, RURAL AREAS. Labour force transitions (average marginal effects)

	Before the crisis (2002-2007)						During the crisis (2008-2009)					
	Peu	**Pei**	**Pue**	**Pui**	**Pie**	**Piu**	**Peu**	**Pei**	**Pue**	**Pui**	**Pie**	**Piu**
AGE (years)												
25-54	0.004*	0.001	-0.012	-0.022	-0.100**	-0.024**	-0.003	0.003	0.093	0.063	-0.244**	-0.037
	(0.002)	(0.003)	(0.023)	(0.022)	(.016)	(0.009)	(0.011)	(0.014)	(0.121)	(0.127)	(0.076)	(0.050)
55-64	0.007**	0.035**	-0.178**	0.152**	-0.269**	-0.045**	-0.007	0.036**	-0.094	0.281**	-0.401**	-0.049
	(0.002)	(0.003)	(0.024)	(0.022)	(0.019)	(0.010)	(0.012)	(0.014)	(0.127)	(0.130)	(0.080)	(0.052)
SEX												
Male	0.007**	-0.007**	0.012*	-0.034**	-0.038**	0.008**	0.006**	-0.011**	0.073**	-0.057*	-0.005	-0.001
	(0.001)	(0.001)	(0.006)	(0.006)	(0.008)	(0.003)	(0.003)	(0.004)	(0.032)	(0.031)	(0.034)	(0.016)
MARITAL STATUS												
Single	0.001	0.004**	0.006	0.005	0.051**	-0.013**	0.002	0.007*	0.043	-0.029	0.047	-0.012
	(0.001)	(0.001)	(0.006)	(0.006)	(0.006)	(0.003)	(0.003)	(0.004)	(0.035)	(0.032)	(0.032)	(0.015)
EDUCATION												
Medium	0.002	-0.002*	0.043**	-0.043**	0.076**	0.005	0.004	0.003	0.005	-0.036	0.108**	-0.004
	(0.001)	(0.001)	(0.008)	(0.007)	(0.007)	(0.003)	(0.004)	(0.006)	(0.042)	(0.039)	(0.036)	(0.017)
High	-0.004**	-0.008	0.028**	-0.042**	0.107**	0.011**	0.005	-0.008	0.134**	-0.128*	0.178**	0.002
	(0.001)	(0.002)	(0.012)	(0.011)	(0.009)	(0.005)	(0.007)	(0.007)	(0.063)	(0.066)	(0.046)	(0.027)
REGISTER (PES)	0.089**	0.034**	-0.388**	-0.200**	0.031**	0.138**	0.082**	0.027**	-0.387**	-0.180**	0.002	0.145**
	(0.001)	(0.001)	(0.006)	(0.006)	(0.012)	(0.003)	(0.003)	(0.004)	(0.026)	(0.031)	(0.042)	(0.014)
# of obs.	101946		13242		15671		5959		652		792	5959
LR chi2(14)	25485.480		8100.340		5160.180		931.650		267.760		177.550	931.650
Prob > chi2	0.000		0.000		0.000		0.000		0.000		0.000	0.000
Pseudo R2	0.501		0.325		0.276		0.384		0.195		0.170	0.384

Source: Own calculation from German LFS.

*Note: PES: Public Employment Service. Parentheses are standard errors of average marginal effects. Significant levels: * = p < 0.10, ** = p< 0.05. The focus of the study is to investigate on two transition flows to inactivity status; transition from employment to inactivity (Pei) and the transition from unemployment to inactivity (Pui), as presented in grey coloured columns.*

Table 4-2: Multinominal logit model, URBAN AREAS. Labour force transitions (average marginal effects)

	Before the crisis (2002-2007)						During the crisis (2008-2009)					
	Peu	**Pei**	**Pue**	**Pui**	**Pie**	**Piu**	**Peu**	**Pei**	**Pue**	**Pui**	**Pie**	**Piu**
AGE (years)												
25-54	0.003	-0.003	0.027*	0.024	-0.046**	-0.011**	0.007	-0.003	-0.014	0.008	-0.099**	-0.051**
	(0.002)	(0.003)	(0.014)	(0.018)	(0.010)	(0.005)	(0.007)	(0.009)	(0.053)	(0.073)	(0.038)	(0.023)
55-64	0.004*	0.037**	-0.151**	0.192**	-0.206**	-0.034**	0.010	0.028**	-0.176**	0.196**	-0.334**	-0.096**
	(0.002)	(0.003)	(0.015)	(0.018)	(0.012)	(0.006)	(0.007)	(0.009)	(0.056)	(0.074)	(0.044)	(0.025)
SEX												
Male	0.006**	-0.011**	0.002	-0.038**	0.014**	0.013**	0.006**	-0.008**	0.014	-0.079**	0.034**	-0.005
	(0.000)	(0.001)	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.016)	(0.018)	(0.016)	(0.009)
MARITAL STATUS												
Single	0.000	0.001	0.023**	-0.003	0.041**	-0.007**	0.005**	-0.001	0.045**	-0.008	0.044**	-0.012**
	(0.001)	(0.001)	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.017)	(0.020)	(0.015)	(0.008)
EDUCATION												
Medium	0.000	-0.002*	0.048**	-0.061**	0.059**	0.004**	-0.002	-0.001	0.032*	-0.025	0.068**	0.016*
	(0.001)	(0.001)	(0.004)	(0.005)	(0.004)	(0.002)	(0.002)	(0.003)	(0.018)	(0.020)	(0.015)	(0.009)
High	-0.006**	-0.011**	0.070**	-0.093**	0.104**	0.009**	-0.007**	-0.010**	0.051*	-0.080**	0.106**	0.039**
	(0.001)	(0.001)	(0.006)	(0.007)	(0.005)	(0.003)	(0.003)	(0.004)	(0.027)	(0.033)	(0.018)	(0.011)
REGISTER (PES)	0.094**	0.042**	-0.334**	-0.246**	0.020**	0.145**	0.084**	0.043**	-0.377**	-0.213**	-0.020	0.159**
	(0.000)	(0.001)	(0.003)	(0.004)	(0.006)	(0.001)	(0.002)	(0.002)	(0.013)	(0.024)	(0.020)	(0.007)
# of obs.	230819		31643		41320		19472		2133		3002	
LR chi2(14)	56357.1		17660.820		12688.460		3429.920		864.300		752.680	
Prob > chi2	0.000		0.000		0.000		0.000		0.000		0.000	
Pseudo R2	0.454		0.290		0.266		0.385		0.192		0.193	

Source: Own calculation from German LFS

*Note: PES: Public Employment Service. Parentheses are standard errors of average marginal effects. Significant levels: * = p < 0.10, ** = p< 0.05. The focus of the study is to investigate on two transition flows to inactivity status; transition from employment to inactivity (Pei) and the transition from unemployment to inactivity (Pui), as presented in grey coloured column.*

Determinants of transition to inactivity from unemployment – Pui

Age: For individuals living in rural areas, the marginal effect of age has a statistically significant and positive effect on the transition to inactivity from unemployment. We also observe significant and positive marginal effects for individuals living in urban areas. Considering the two different study periods (pre- and post-crisis), we observe that both in rural and urban areas, for the older age group (55-64), the positive coefficient of the marginal effects on the transition from being unemployed to inactivity has increased slightly. Relative to urban areas, the statistically significant and positive marginal effects for the older age group during the crisis increased more in rural areas (0.152 to 0.281). Additionally, we find that during the crisis period, the probability of transition (Pui) increased more in rural areas relative to urban areas.

Sex: For individuals living in both types of study area (rural and urban), the marginal effect of being male on the transition to inactivity from unemployment is significant and negative. During the crisis of 2008-09, the marginal effect of being male (on the Pui) was higher in both rural and urban areas compared to the previous economic period. Regarding the differences in the marginal effect of being male in rural and urban areas, we find that during the crisis, for males living in urban areas, the probability of transition (Pui) decreases more than for males living in rural areas. Findings show that the parameter of being male is important for explaining the transition flow to inactivity from being unemployed for both rural and urban areas during the crisis period.

Marital status: For individuals in both the rural and urban areas, the marginal effects of being single on the transition to inactivity from unemployment are found to be non-significant.

Registration at a public employment office: Examining the marginal effect on transition to inactivity from unemployment (Pui) for registered individuals at a public employment office (receives benefit), the estimated coefficients are statistically significant and negative. This result holds for both rural and urban areas and in both study periods. For individuals registered in both rural and urban areas, the marginal effect on the transition to inactivity decreased during the crisis period (e.g. -0.24 to -0.21 for urban areas).

Education level: The estimated marginal effects of higher education (bachelor's, master's degree or doctorate) on the transition to inactivity from unemployment are statistically significant and negative for individuals in both rural and urban areas. This result holds both before and during the crisis, and implies that regardless of degree of urbanisation and the economic conjuncture of

the country, highly educated individuals are less likely to go to inactive from unemployed status compared to less educated individuals. Relative to before the crisis, for more educated individuals, the marginal effect on the transition to inactivity from unemployment, Pui, has increased strongly (-0.042 to -0.128 for rural areas) during the crisis. For highly educated individuals living in variously urbanised locations, the marginal effect of transition to inactivity are strongly negative for times of crisis. However, regarding the marginal effects on transition to inactivity, we could not observe a similar trend for individuals with medium levels of education.

Determinants of transition to inactivity from employment –Pei

Age: Similar to transition to inactivity from unemployed (Pui), for individuals living in both rural and urban areas, the marginal effect of being an older worker on the transition to inactivity from employment (Pei) is statistically significant and positive. In that transition flow (Pei), older age group (55-64) individuals are more likely to become inactive compared to those who belong to younger age groups. Regarding the study periods (before and during a crisis), for the older age group (55-64) in rural areas, the positive coefficient number of marginal effects on transition from employed to inactivity remained stable. Additionally, in urban areas, for the same age group, the positive marginal effects on transition flow (Pei) changed very slightly. With regard to age as a determinant for transition to inactivity from employed status (Pei), the older age group (55-64) variable has a similar positive coefficient of marginal effects on transition in both study areas (rural and urban) and study periods (before and during crisis).

Sex: As we observed for the results of transition from unemployed to inactivity (Pui), males who live in rural or urban areas are less likely to become inactive than females[23]. The marginal effects of being male on the transition to inactivity from employment are statistically significant and negative in both rural and urban areas. Examining the coefficient number of marginal effect for both transition probabilities (Pei and Pui), for Pei, coefficient numbers are low (e.g. 0.007 or 0.008), while for Pui, coefficient numbers are higher (e.g. 0.079 or 0.055). For males in both urban and rural areas, the negative marginal effect on the transition from being employed to being inactive (Pei) changed very slightly during the crisis. Regardless of economic conjuncture,

[23] In German LFS female with a job and on maternity leave considered as in employment.

being male has an identical marginal effect on the transition from being employed to being inactive.

Marital status: Regarding the effect of the two considered marital statuses (single and married) on transition, being single is not found to have a statistically significant influence on the transition flow to inactivity (Pei) in urban areas, while the marginal effect on the transition to inactivity is significant and positive for rural areas (0.004 pre-crisis and 0.007 post-crisis).

Education level: Average marginal effect results for education levels show different results regarding the two degree of urbanisation models. While higher education (bachelor's, master's degree or doctorate) is not found to influence the transition flow to inactivity (Pei) for individuals living in rural areas, a marginal effect of transition to inactivity is statistically significant and negative for those living urban areas. Moreover, for highly educated individuals in urban areas, the marginal effect on transition to inactivity is statistically significant and negative. Regarding the crisis period, we observe that for highly educated individuals living in urban areas, the likelihood of becoming inactive after being employed has a similar coefficient (-0.01) before and during the crisis. The obtained equal marginal effects for highly educated individuals before and during a crisis suggest that an adverse economic situation did not increase the likelihood of becoming inactive after being employed.

4.5 Conclusions

The results suggest that, in urban and rural areas, education level and marital status both influenced the transition to inactivity during the crisis (2008-09), though by varying degrees. For urban areas, highly educated individuals (bachelor's, master's or doctorate degree) were less likely to flow to inactivity from being employed and unemployed compared to medium (second stage of secondary and post-secondary education) and lower educated individuals during the crisis period. However, the study results did not find the same trend for rural areas. During a period of crisis in rural areas, highly educated individuals are less likely to flow to inactivity from being unemployed, and education levels were not found to have a statistically significant impact on transition to inactivity from being employed, as was the case in urban areas. Although broadly consistent with the results of Gomes (2012), where it appears that highly educated individuals are significantly less likely to flow to inactivity from unemployment than the less

educated individuals, our findings suggest that a higher education effect is observed only for individuals living in urban areas.

Another important difference between urban and rural areas during a crisis period was observed with regard to the effect of marital status on the probability of becoming inactive. Our study results suggesting that single individuals in rural areas were more likely to become inactive compare to married individuals in the crisis period. However, for the same variable, we did not observe the similar effect in urban areas. During times of crisis in urban areas, marital status did not show a statistically significant impact on the transition to inactivity from employed status as in rural areas. Hence, the negative effect of being single on the transition to inactivity was only observed in rural areas during the crisis, but this effect was not statistically significant in urban areas.

We used the years 2002-07 as a proxy for labour market conditions before the crisis. Regarding probabilities of transitioning to inactivity from being unemployed and employed in this period, similar to the crisis period, it is found that for both urban and rural areas there is a significant difference for two factors: education level and marital status. While these factors similarly influence the transition to inactivity before the crisis, their effect was observed to be stronger during times of crisis. These results imply that, in rural areas, unmarried individuals are more likely to transition to inactivity compared to urban areas. Additionally, this effect increases during periods of crisis. Policy makers could concentrate on decreasing the inactivity rates in rural areas by working on focus groups of individuals who are single. The findings for both urban and rural areas before the crisis imply that medium level educated individuals are less likely to transition to inactivity. However, during the crisis, these individuals lost this advantage in rural and urban areas. Indeed, Eichhorst et al. (2010) show that while high level education is a significant factor for explaining the transition into permanent contract from non-employment (unemployment and inactivity), medium level education is not. Therefore, regardless of degree of urbanisation, this medium level educated group may be considered a special target group by policy makers during periods of crisis.

In addition to the comparative analysis of urban and rural areas before and during a crisis period, for transition to inactivity, study found that decision to flow to inactivity has a much greater impact on the older age group (55-64) relative to prime age group individuals (25-54). This confirming that being close to the end of working age (official retirement age is 65) influences

positively the transition flow to inactivity. According to the theoretical model, this difference can be explained by the different nature of these age groups such as observed early retirement trend for the older age group in Germany (OECD 2009). In Germany where promoting employment for the older age group is a serious alternative for the expected large gap in the labour supply for 2020 (Höhn et al., 2008), the participation rate of older age group (only men) is 63 per cent in 2008 (OECD, 2009). Overall, average retirement age is still significantly earlier than 65 years. While this paper did not go into the details of the destinations of transition flows, Kruppe (2002) shows that there is a considerably higher transition from unemployment to 'passive' status (around 20 per cent including retired and inactivity) in Germany relative to other studied EU Member States. While 6 per cent of individuals leaving unemployment enter education or apprenticeship, 11 per cent of individuals leave unemployment for retirement reasons after a period of unemployment.

We also observe that for older age group individuals, a positive effect on transition to inactivity from unemployment increased during the crisis for both rural and urban areas. This implies that although the older age group is more likely to flow to inactivity, the crisis increases this probability for that age group. Regarding political and practical implications, keeping older age individuals in the labour market may be a successful active labour market policy during a crisis period.

For males, a negative effect on transition to inactivity from unemployment decreasing during the crisis was observed for both study areas. This implies that in both study areas, for males, the probability of being inactive decreases relative to females during times of crisis. Regarding the registration variable that indicates individuals who registered to public employment services (receive a pension or not), flow to inactivity from unemployed still has a negative effect with very slight decreasing numbers during the crisis. Therefore, we could conclude that even if registration could not contribute to the flow to inactivity as before the crisis period, it does not decrease its effect, and influences individuals to leave the labour market during periods of crisis. Our overall results suggest that beside human capital aspects, interaction of individuals with institutional settings have to be taken into account when designing active labour market policy measures during crisis periods.

5 Job access after leaving education: A comparative analysis of young women and men in rural Germany

Rural labour markets for youth are an interesting research area for labour force transition studies because gender differences begin to appear with the out-migration that leads to a shortage of young women in Europe. While existing studies provide insight into this migration flow, little is known about the young women and men who remain in the labour force in rural areas. The aim of this study is to provide insight into the determinants of job access after leaving education in Germany among the young population aged 15-29 based on the LFS of 2002-09. First, an empirical analysis of student to employment flow in rural areas with respect to social position (degree discipline, age, and socio-professional category) has been conducted. Second, gender-specific multinomial logit models are used to estimate the determinants of access to a first job without a long term unemployment spell. The results suggest that there are substantive differences in student to employment flow between female and male samples for the variables urbanisation degree of residence and marital status. Contrary to our expectations, living in rural areas does not suggest a significant negative effect in accessing a job within a year. In line with previous studies, being married has a negative influence on female graduates but is positive for their male counterparts.

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5.1 Introduction

Young adults beginning their careers are typically in a turbulent and uncertain period: first jobs generally entail a long transition period, and these positions are typically unstable and short term. Therefore, at the beginning of their working lives, graduates transitioning from education to employment often experience difficulties finding adequate employment within a short time. Data from EU member states indicate that one year after leaving school, a high percentage of young people experience difficulties obtaining a job, especially in Greece, Poland, and Italy, where only 50% of youths obtain employment within one year (Quintini, Martin, and Martin, 2007). In the economically successful European countries, such as the Netherlands and Switzerland, approximately 20% of young persons did not have a job one year after completing their education. In Germany, we observe that the expected length of the school-to-work transition is above the EU average (29.4 months in 2000 and 39.2 in 2005) (Quintini, Martin, and Martin, 2007). For the EU-27 countries, the average length of this transition period was 6.5 months in 2009, but the duration varied considerably by country and level of education (Eurostat 2012).

Young people at the beginning of their careers generally face three challenges when entering the labour market: (i) they lack job-specific work experience, meaning that many new workers have difficulty accessing their first jobs; (ii) their employment status is uncertain; and (iii) they generally need to work and study to acquire work experience (Caroleo and Pastore, 2007; Lauerová and Terrel, 2002). Studies exploring the dynamics of youth transitions from unemployment to employment highlight the importance of personal characteristics, such as gender, age, parental status and education, and the individual's past economic characteristics, such as previous work experience and the duration of unemployment after leaving school (Russell and O'Connell, 2001; Garrouste and Rodrigues, 2013).

Nevertheless, substantial regional differences are observed with respect to the degree of urbanisation. Youths' risk of unemployment after leaving school and accessing a job within one year (without enduring months of unemployment) differ considerably between urban and rural areas. Previous research on disadvantages in rural areas (Shucksmith, 2012; Philip and Shucksmith, 2003) has identified social exclusion problems in rural Europe, focusing on relational issues such as individual detachment from labour markets, low participation rates and social isolation. Labour markets represent an important determinant of the inequality and

exclusion that tend to limit employment options for younger, older and female workers (Shucksmith, 2004). The challenges faced by young people in rural labour markets include limited job offers with potential for career advancement; relatively abundant low-skilled jobs (De Hoyos and Green, 2011); limited opportunities to develop broad work experience (Lindsay, McCracken, and McQuaid, 2003); accessibility factors, including mobility and commuting issues (Hodge et al., 2002); and spatial concentration of jobs in non-rural regions (Schindegger and Krajasits, 1997).

Migration studies have primarily analysed youths' access to jobs after leaving education in rural labour markets. Research on this subject has addressed the migration of young graduates from rural regions to begin their careers in urban areas (Jamieson, 2000; Rérat, 2014). While most studies provide insight into the factors influencing migration flows, very little is known about the labour force characteristics of young people who remain in rural areas. Therefore, rural labour markets represent an interesting area of research in labour force transition studies. As studies demonstrate that sex-selective migration has induced shortage of young women in parts of rural Europe, which may culminate in a "masculinisation of the rural population", gender differences in the labour market are of particular interest (EU, 2008).

Studies on the youth labour force transition in Germany show that economic conditions (Stevens, 2009), institutional constraints (e.g. the vocational specificity of the educational system), and employment protection legislation (Franz et al., 1997; Margolis, Simonnet, and Vilhuber, 2002; Gangl, 2003; Schmelzer, 2011) play important roles in early careers. Although these findings are persistent, in the majority of Organization for Economic Co-operation and Development (OECD) countries, access to one's first permanent job is strongly influenced by the length and quality of the transition from student to employed status (OECD, 2011). Further, youth unemployment and labour market outcomes can have "scarring effects": long term unemployment in searching for one's first job has a long term impact on one's future career (Arulampalam, Gregg, and Gregory, (2001).

According to the above-mentioned findings and within the broad perspective of the TLM concept and life course theory, this study argues that graduates' job access differs by socio-familial position, socio-economic characteristics and relationships with labour market institutions. The aim of this study is to provide insight into the determinants of job access after leaving education in the German rural labour market among the population aged 15-29 based on

the LFS of 2002-09. We provide two types of evidence. First, an empirical analysis of the student to employment flow in rural areas with respect to social positions (discipline, age, and socio-professional category) has been conducted. Second, gender-specific multinomial logit model is used to estimate the determinants of access to a first time job without a long term unemployment spell.

This study is organised into six sections. The following section establishes the study's framework by outlining the TLM approach and the life course perspective. The third section discusses the features of the LFS and presents the methodology. The fourth and the fifth sections present the results of the empirical analysis and the gender-specific multinomial logit estimates, respectively. The final section discusses the findings and provides concluding remarks.

5.2 Theoretical discussion

The transitional labour markets (TLM) approach and life course concept

This study has two theoretical bases: the TLM approach and the concept of the life course. While the TLM approach has been used to analyse the determinants of labour market transitions, the time dimension of life course theory has been used as a sociological framework to examine the entering of a labour market after leaving education. The TLM approach lays the groundwork and provides the conceptual openness to link labour market transitions within life course theory (Brzinsky-Fay, 2010; Anxo, 2007). Based on situational analysis (Popper, 1972), the TLM focuses on actors' choices among different economic statuses in the labour market. According to Popper's (1972) principle of rationality, situational analysis predicts that actors respond "adequately" or "appropriately" to their situation based on their historical and institutional context (Popper, 1994). Additionally, the TLM approach focuses on the political dimension and provides a framework for a policy-oriented analysis of labour markets (Schmid and Schömann, 2004; Schmid, 2008), including the investigation of the institutional determinants (such as regulations that protect both employers and employees) of interrelations among various working statuses.

Life course theory examines the transitions between the constituent parts of a life (Heinz and Marshall, 2003), and interrelations are examined among individuals, institutions and society. Social contracts established in society are defined by social institutions such as families,

education, labour markets or retirement (Kohli, 2007), which are vital to the development of one's life. In recent studies, the pattern of transition from youth to adulthood has become institutionalised through several transitions, such as entering the labour market, leaving education, leaving home, gaining financial independence and starting a family (Hammer, 2006). In a study based on the life course, Buchmann (1989, 43) states, the "*Life course consists of institutionalised sequences of events, positions and roles which shape the individual's progression in time and space*". We define a set of labour market statuses (i.e. employed, unemployed and inactive) and examine the roles of socio-familial position, socio-economic characteristics and interrelations with labour market institutions in the student to employment flow as an important life sequence of events among youths.

Socio-familial position

Gender: Research into young people and differences in labour force behaviour often show a gender dimension. A recent study conducted by Jacob, Kleinert, and Kühhirt (2013) examines trends in the school-to-work transitions of young men and women with lower and higher secondary education in West Germany for 1984-2005 period. The authors found that women access their first job faster than men. They argue that this pattern results from deteriorating employment prospects within unskilled occupations, especially for unskilled men. Dorsett and Lucchin (2014) show that gender is a strong predictor of future labour market trajectories among groups of young people who are similar with regard to their experiences beyond school leaving age in the United Kingdom (UK). In Germany, young males are more likely than young females to work below their skill level (OECD, 2010). Dietrich (2012) found that during the economic recession, the male youth unemployment rate increased more than the female rate in most EU member states. In Germany, the female youth unemployment rate decreased more than the male rate during the 2007-2010 recession period (Dietrich, 2012). Based on these results, we expect that the determinants of transition probabilities to employment will differ between young women and men.

Age: Even among young people, findings vary among studies, with majority of scholars agreeing that the behaviour of young people in the labour market differs from that of older age groups. Quintini, Martin, and Martin (2007) conclude that the 15-19 age group is more likely to be unemployed than the 20-24 age group in all EU member states, although they do not face lower

employment prospects. The gap in the employment rate widens for those between 25 and 54 years old, although the situation varies considerably across OECD countries (OECD 2002). Moreover, Kretsos (2011) highlights behavioural differences between age groups towards labour market institutions: young people below 25 years old do not exhibit a stance against labour unions. To address these discussions, the following age groups are considered: teenagers (15-19 age group) and young adults (20-24 and 25-29 age groups).

Marital status: The life course position regarding marital status (e.g. single, married, or widowed) influences labour force behaviour due to changes in household size and structure. Differences in labour market participation by marital status and gender are documented in previous studies and have changed over time. The decision to enter the labour market or transition between labour force statuses is closely tied to marital status (Unay-Gailhard and Kataria, 2014; Jacob and Kleinert, 2014). In a recent study by Garrouste and Rodrigue (2013) of European countries[24], being a single woman and/or a mother without childcare support negatively affected the speed of transition to permanent employment.

Socio-economic characteristics

Education[25]: Over the life cycle, investments in education or training (e.g. direct costs of tuition) generate returns through increased earnings or more certain employment, which are associated with higher levels of human capital. However, there is no definitive link between education levels and finding a job without long unemployment spell. Research in OECD countries has found that youths with low levels of human capital, less experience and low skills face a greater risk of long-term unemployment and low-quality employment outcomes (OECD, 2005). However, a recent study by Baert et al. (2013) investigates young graduates in Belgium and finds that over-education can be a trap at the beginning of one's career rather than a means of career advancement. This trap is particularly important during the early stages of an individual's career when it generates long term unemployment spells. Based on German Socio-Economic Panel data

[24] Austria, Belgium, Czech Republic, Germany, Denmark, Estonia, Spain, Finland, France, Greece, Hungary, Ireland, Iceland, Italy, Lithuania, Luxemburg, Latvia, Malta, Netherlands, Poland, Portugal, Romania, Sweden, Slovenia, Slovakia, and United Kingdom.

[25] For detailed information on the German education system and approaches to labour market transition, see Stevens (2009), and Soro-Bonmati (2000).

(SOEP), Prasad (2003) finds that higher education increases reservation wages in Western Germany, which decreases the probability of reemployment and thus prolongs the duration of unemployment.

Degree of urbanisation of place of residence: Following Culliney (2014), we consider the rural disadvantage studies concerning the youth labour market and note the importance of location as a form of social capital for young rural jobseekers. A study by Cartmel and Furlong (2000) offers arguments on the relationship between location and youth employment outcomes: social capital theory assumes that the influence of social networks results from how social contacts affect the productivity of individuals and groups. Previous studies consider social capital a significant predictor of the future employment potential of youths (Porfeli et al., 2009). Given the previous findings, we expect that young people in rural areas – who face a disadvantage with respect to social capital and networking – are in an unfavourable position from which to access their first job within a year of graduation. Following previous studies (Unay-Gailhard and Kataria, 2014; Unay-Gailhard and Baqueiro-Espinosa, 2015), our study distinguishes among urban, peri-urban and rural areas based on the LFS definitions.

Interrelations with labour market institutions

Registration for public employment services: In Germany, between 2009 and 2010, there were decreases in the total numbers of registered unemployed and registered job seekers at public employment services (EJML, 2013). However, based on survey conducted by the International Social Survey Program (ISSP) in 2011, the share of employed individuals who heard about their job through public employment services was approximately 12% in West Germany, while the corresponding figures were 6% in Italy, 5% in Denmark, and 3% in Switzerland (Romani and Larsen, 2010; Larsen and Vesan, 2012). Regarding the youth population, these individuals are often not yet eligible for financial benefits from public employment services (an individual lacking the necessary work experience is ineligible for unemployment benefits). Prior studies report that family resources (specifically financial assistance from one's parents) have a positive effect on the transition from education to the labour market (Schioppa and Lupi, 2002, Jacob, 2008). This particularity of youth gives us the opportunity to contribute to this literature by examining the influence of public employment services provided to registered youth.

5.3 Data and methodology

German Labour Force Survey (LFS)

This study used German LFS data for the 2002-09 period, which are representative at the country level and contain German labour market records. The LFS is included in the Eurostat online database and is conducted as part of an annual micro-census, following Germany's micro-census law. Demographic, social and economic variables for the population are collected for an average week in each quarter by sampling the population in all weeks of the quarter. Approximately two-thirds of the individuals surveyed in the first quarter of the current year are interviewed in the first quarter of the following year. The primary statistical objective of the LFS is to divide the working-age population (those aged 15 years and above) into three labour market working statuses, (i) employed, (ii) unemployed, and (iii) inactive persons, and to provide explanatory data on each of these categories. This classification accords with that of the International Labour Office (ILO) and is often applied in labour market transition studies (Garibaldi and Wasmer, 2005; Deschryvere, 2005; Gesthuizen and Wolbers, 2010; Iannelli and Smyth, 2008).

In the school-to-work transition literature, the SOEP, Research into Employment and Professional Flexibility (REFLEX), and European Community Household Panel (ECHP) have become increasingly used by researchers in addition to the LFS, depending on the study focus (Betti et al., 2005; Quintini, Martin, and Martin, 2007; Iannelli and Smyth, 2008; Jacob, Kleinert, and Kühhirt, 2013). In our study, the LFS gives provides information on relevant labour market aspects across all sectors of the economy and allows the conceptualisation of a "student to employment" flow population. In the LFS, the "previous year working status" variable codes for "student" status, which permit us to analyse the labour force transitions of the previous year's students continuously over the following year. For example, we can observe whether an individual who was a student in the previous year flows into a job or into unemployment/inactivity in the current year. Further, the broader perspective on the individual's socio-familiar position and the socio-economic characteristics associated with LFS allows the assessment of the effect of these characteristics on labour market outcomes. While the LFS can be used to compile estimates of labour force flows at the country level, it allows reliable analysis at the sub-national level, such as rural and urban regions that can be defined from the level of

urbanisation of the respondent's area of residence. This aspect is of considerable importance in the context of EU rural labour market studies.

One limitation of the LFS is that student status was not coded in the "current year working status" variable. Therefore, in the student to inactivity flow, current year students are coded as inactive. Interpreting and drawing conclusions from the student to inactivity flow was therefore avoided in this study. A presentation of the used LFS variables is provided in Table 5-1.

Table 5-1: German Labour Force Survey (LFS), list of used LFS variables with definitions.

Previous year working status: WSTAT1Y: Situation with respect to activity one year before the survey:

1= Carries out a job or profession, including unpaid work for a family business or holding, including an apprenticeship, paid traineeship, etc.

2= Unemployed

3= Pupil, student, further training, unpaid work experience

4= In retirement or early retirement or has exited the labour force

5= Permanently disabled

6= In compulsory military service

7= Fulfilling domestic tasks

8= Other inactive person

9= Not applicable (child of fewer than 15 years)

Current year working status: ILOSTAT: International Labour Office (ILO) working status

1= Employed: *A person is considered as having employment if he or she did any work for pay or profit during the reference week. "Work" means any work for pay or profit during the reference week, even for as little as one hour.*

2= Unemployed: *comprises persons aged 15 to 74 who were:*

(a) without work during the reference week, i.e., neither had a job nor were at work (for one hour or more) in paid employment or self-employment;

(b) currently available for work, i.e., were available for paid employment or self-employment before the end of the two weeks following the reference week;

(c) actively seeking work, i.e., had taken specific steps in the four-week period ending with the reference week to seek paid employment or self-employment or who found a job to start later, i.e., within a period of at most three months.

3= Inactive: *Those who are neither classified as employed nor unemployed*[26]*. As reflected in the LFS, examples of inactive individuals would be: individuals who are not seeking any employment, discouraged workers who believe that there is no work available, and the individuals caring for children or incapacitated adults (Eurostat, 2006).*

4= Compulsory military service

9= Persons fewer than 15 years old

This study dropped individuals in compulsory military service and those fewer than 15 years of age from the model.

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[26] As inactive status in the LFS may be assigned, a more detailed analysis was conducted to obtain an unambiguous definition of the status. As reflected in Guinea and Betts (2003), classifying an individual as inactive is subject to the responses provided to the following questions in the LFS : (i) "*Were you looking for any kind of paid work?*", (ii) "*Are you available to work?*", and (iii) "*Would you like to have a regular paid job at the moment?*"

Socio Professional Categories: ISCO1D: International Standard Classification of Occupations (ISCO)

Skill levels	Socio Professional Categories (SPC)
3+4	100=Managers
4	200=Professionals
3	300=Technicians and associate professionals
2	400=Clerical support workers
2	500=Service and sales workers
2	600=Skilled agricultural, forestry and fishery workers
2	700=Craft and related trades workers
2	800=Plant and machine operators and assemblers
1	900=Elementary occupations

In ISCO, while skill is defined as the ability to perform the tasks and duties of given job, skill level is defined as a function of the complexity and range of tasks and duties to be performed in an occupation.

SEX: Sex of interviewed person

1= Male
2= Female

AGE: Age of interviewed person.
This study divided the LFS age groups into three main categories as follows:

15-29= youth population
30-54= prime age groups
55-64= old workers

Our analysis considered respondents aged 15-29 and dropped the other two age categories. In the LFS while age 15 represents the average of ages 13-17, age 29 reflects the average of ages 24-29.

Marital Status: MARSTAT: Marital status of respondents

1= Single
2= Married
3= Widowed
4= Divorced or legally separated

In the multinomial logit model, the marital status groups were coded as MARITAL STATUS= 1 and 3 and 4 for single individuals and MARITAL STATUS=2 for married individuals.

Education : HATLEVEL: Highest level of education or training successfully completed

1= Low education level (Early childhood education, Primary education, and First

stage of secondary education)

2= Medium education level (Second stage of secondary education and post-secondary, non-tertiary education)

3= High education level (Bachelor's, master's and doctoral or equivalent programmes)

The classification of the levels contains 8 levels of the International Standard Classification of Education (ISCED) statistical framework.

Graduated disciplines: HATFIELD: Field of highest level of education or training successfully completed: general programmes; teacher training and education science; humanities, languages and arts; foreign languages; social sciences, business and law; life science; physical science; computer science and computer use; engineering, manufacturing and construction; agriculture and veterinary; health and welfare; and services

Urbanisation Degree of Residence: DEGURBA: The level of urbanisation in the respondents' areas of residence

1= Densely populated area: *This is a contiguous set of local areas, each of which has a density of greater than 500 inhabitants per square kilometre, where the total population of the set is at least 50,000 inhabitants.*

2= Intermediate area: *This is a contiguous set of local areas, not belonging to a densely populated area, each of which has a density greater than 100 inhabitants per square kilometre and either with a total population for the set of at least 50,000 inhabitants or located adjacent to a densely populated area.*

3= Thinly populated area: *This is a contiguous set of local areas belonging neither to a densely populated nor to an intermediate area. A set of local areas totalling fewer than 100 square kilometres, and failing to achieve the required density, but entirely enclosed within a densely populated or intermediate area, is considered to form part of that area. If it is enclosed within a densely populated area and an intermediate area, it is considered to form part of the intermediate area.*

The analysis considers these three categories urban, peri-urban and rural areas, respectively. This concept is based on the population size, density and contiguity of local administrative units (LAUs[27]) level 2. This typology is based on the OECD method, which defines rural regions within the share of population in rural LAU2s by population density (Eurostat 2011).

Registration Status to Public Employment Service: REGISTER: The individual's

[27] The intention of LAUs is to divide the economic territory of the EU for statistical purposes at the local level. Two levels of LAU have been defined: (i) the upper level (LAU1, formerly NUTS level 4) is defined for most, but not all, EU countries. (ii) The lower level (LAU2, formerly NUTS level 5) consists of municipalities or equivalent units in the 27 EU Member States.

registration status at a public employment office (PEO) to receive unemployment benefits be entitled to other benefits (e.g. community assistance; health insurance) and/or to receive assistance with job search tasks.

1= Person is registered at a (PEO) and receives benefits or assistance
2= Person is registered at a (PEO) but does not receive benefits or assistance
3= Person is not registered at a (PEO) but receives benefits or assistance
4= Person is not registered at a (PEO) and does not receive benefits or assistance

In the multinomial logit model, this variable was operationalised by transforming the four categories into dummy variables, specifically, REGISTER=1 and 2 for registered status and REGISTER= 3 and 4 indicate non-registered status.

COEFF: Yearly weighting factor: *Each person in the survey sample may be considered "representative" of a certain number of other persons not in the sample. The record for each responding individual is therefore assigned a weight indicating how many persons are "represented" by this individual in this sense. To ensure consistency between individual and household statistics, the same weighting factor should be allocated to all members of the household.*

Source: Eurostat (2010); ILO (2012); and EU (2003)

Gender-specific multinomial logit estimation

Labour force flow analysis describes the movement of labour into and out of a labour market and is used as a tool in studies that focus on labour mobility and adjustment (Schettkat, 1996). In statistics, there is a set of assumptions that are potentially useful for flow analysis. One of the most commonly used flow analysis assumptions is based on the Markov process due to its adequate approximation of random utility discrete choice models and its simple flow model. In a Markov process, only the present state (t) provides information about the future state (t+1), and knowledge of the history does not add any new information. Markovian assumptions may be appropriate when individual work histories are less important (Lehman, 1995).

In a discrete choice model, the labour force flows within a parametric form where the parameters are estimated from the data. The tractability of the parameter estimation that is based on probability theory is an important factor in the model selection. For this tractability reason, the multinomial logit model is one of the most widely used discrete choice models with Markov process assumptions in choice modelling (Blanchet et al., 2013). Studies such as Bellmann et al. (1995) for East Germany, Gustafsson et al. (2002) for Germany, Britain, and the Netherlands, Lauerová and Terrell (2002) for Czech Republic, and Chiara and Enrico (2014) for Italy and

Spain apply Markov transition probabilities in multinomial logit models of the European labour market.

This study estimates a multinomial logit model of transition probabilities (based on Markovian assumptions) to assess the determinants of job access after leaving education. Youth labour force transition probabilities are examined within three flows: (1) student to employment, (2) student to unemployment, and (3) student to inactivity. The transition probabilities are expressed as a transition matrix that depicts the flow of a labour force into and out of these three states between time *t* and *t* + 1. In addition, gender-specific multinomial logit models are introduced because we assume that student's gender differences would allow us to test the hypothesis that discrete transitions between labour market statuses depend on the roles and responsibilities of gender itself as well as on individual characteristics. The overall aim is to develop new insights into the German rural labour market and to reflect on the factors that influence the student to employment transition without a long term unemployment spell.

Interpreting the coefficients of a multinomial logit model is not straightforward (Greene 1994). Therefore, following previous studies that apply multinomial logit estimation to the youth labour market (Lauerová and Terrell, 2002; Tasci and Tansel, 2005; Deschryvere, 2005), we present the marginal effects evaluated at the sample mean transition probabilities (Baum, 2006). A brief presentation of the sample using key variables provided in Table 5-2.

Table 5-2: Study sample as a percentage (%) of the population (average of 2002-09).

	Female N= 47,217			Male N=46,104		
	(1) Student → Employment N=8,919	**(2) Student → Unemployment N=1,226**	**(3) Student → Inactivity N=37,072**	**(1) Student → Employment N=8,411**	**(2) Student → Unemployment N=1,323**	**(3) Student → Inactivity N=36,370**
Socio-familiar position						
Age groups						
15-19	43.01	50.98	68.19	48.48	50.79	66.38
20-24	36.95	30.26	24.67	27.10	28.50	22.82
25-29	20.04	18.76	7.14	24.42	20.71	10.80
Marital Status						
Married	2.61	3.92	1.36	2.15	2.49	0.65
Socio-economic characteristics						
Education						
Low	43.72	57.01	70.60	52.23	59.33	69.99
Medium	44.18	28.22	27.91	35.83	29.71	28.78
High	12.11	14.76	1.49	11.94	10.96	1.22
Urbanisation degree of residence						
Urban	15.17	18.35	17.89	16.75	16.33	17.23
Peri-urban	27.55	28.55	31.34	31.07	29.02	31.83
Rural	57.28	53.10	50.77	52.18	54.65	50.94
Interrelations with labour market institutions						
Registration status to Public Employment Service						
Registered	2.48	70.15	1.01	2.28	73.92	1.09

Source: German Labour Force Survey

5.4 Empirical results

An overview of job access after leaving education in rural Germany

The empirical analysis provides an overview of labour force flows and allows us to focus on rural youths' job access after leaving education in Germany. Table 5-3 summarises the previous year student labour flows into employment, unemployment and inactivity over the 2002-2009 period. It reports each flow for German rural, peri-urban and urban regions.

Table 5-3: Labour force flows for rural, peri-urban and urban Germany.

	Rural	Peri-urban	Urban
(1) Student → Employment	2,762	5,070	9,498
	(17.15)	(17.48)	(19.7)
(2) Student → Unemployment	441	734	1,374
	(2.74)	(2.53)	(2.85)
(3) Student → Inactivity	12,899	23,197	37,346
	(80.11)	(79.99)	(77)
Total	16,102	29,001	48,218
	(100)	(100)	(100)

Source: German Labour Force Survey
Note: Labour flows from student to employment; unemployment and inactivity are given for rural, peri-urban and urban areas in Germany. Each flow is expressed as total number of individuals (the first rows) and as a percentage of the previous year's students (in parentheses). The statistics are for the 2002-2009 period. N=17,330 for (1) Student → Employment; N=2,549 for (2) Student → Unemployment; N= 93,321 for Student → Inactivity.

Looking at the rural sample, 2,762 individual moved out of student status into employment, that is, 17% of the previous year's students. Additionally, 441 individuals residing in rural areas moved into unemployment, which is approximately 2% of the previous year's students. If we interpret the percentage of students who flow into employment as a proxy for labour market flexibility in accessing a first time job, then rural and peri-urban labour markets are much less flexible than urban markets. While 17% of the previous year's student population flows into employment in rural and peri-urban regions, approximately 20% do so in urban areas. The percentage flowing into unemployment is similar across all study areas (approximately 2%).

In recent labour market studies, the percentage flowing into inactivity is a commonly used measure of the difficulties faced by youths in the labour market (Bassanini, 2006; Quintini and Manfredi, 2009; Scarpetta et al., 2010). It captures inactive young people who are not engaged in education or training due to the risks of social and economic exclusion. The share of youths

neither in employment nor in education and training[28] provides further details on discouragement and marginalisation, which reflects social exclusion. The statistics for the 2007-11 period for Germany indicate that the youth neither in employment, education nor training (NEET) rate is below 10% (OECD, 2012), which lower than the majority of other G20 countries.

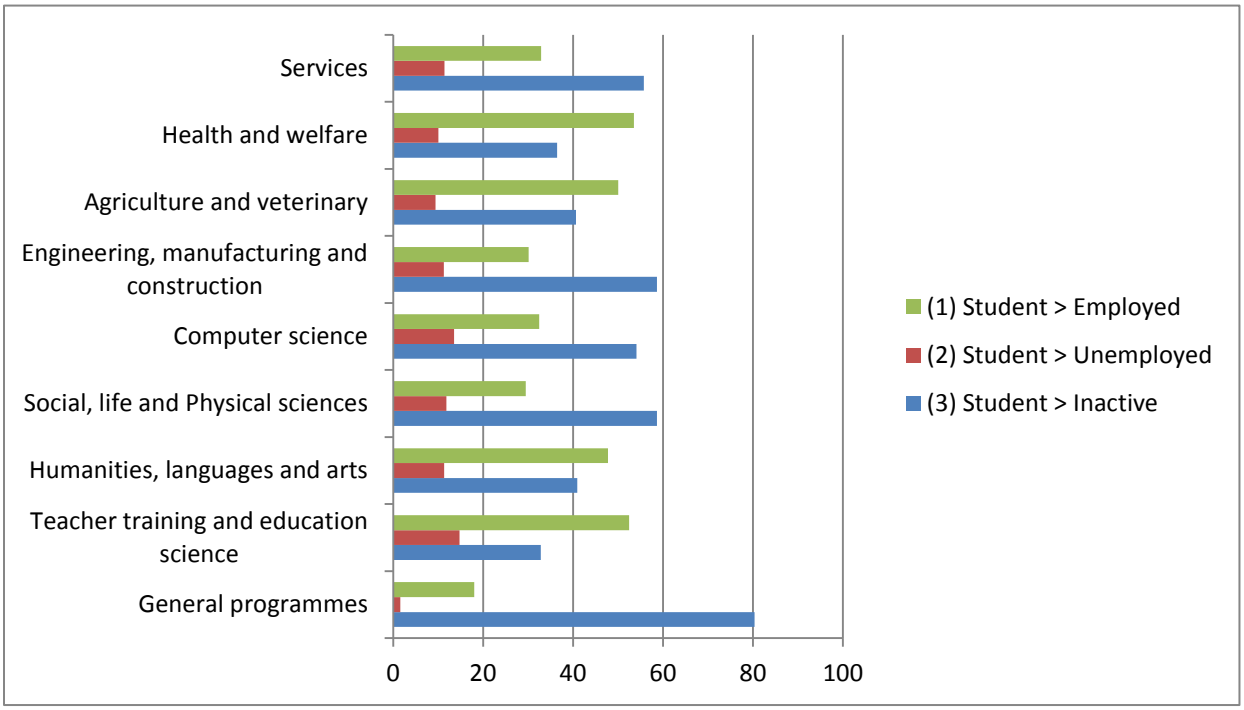
In Table 5-3, the percentage flowing into inactivity is high across all three urbanisation levels. More than one-half of the previous year's students flow into inactivity in the current year – approximately 80 % for rural, 79% for peri-urban and 77% for urban areas. This overestimated result can be explained by both the LFS dataset coding of the "current year working status" variable (as mentioned in the data section) and the peculiarity of the transition into the labour market just after graduation. The time gap between graduation and starting a job search could affect the current year working status of an individual, which could easily count as inactive, that is, not seeking employment during the previous four weeks.

The role of the discipline studied in first-job access

Figure 5-1 gives the percentage of employed, unemployed and inactive population among graduates by discipline.

[28] This measure, called the NEET rate, is studied using concepts such as "problematic transitions" (Furlong, 2006) and/or "disconnected youth" (Fernandes and Gabe 2009; Pfeiffer and Seiberlich 2010).

Figure 5-1: Percentage employed (1), unemployed (2) and inactive (3) among previous-year graduates by nine disciplines, rural Germany



Source: German Labour Force Survey
Note: The statistics are for the 2002-2009 period, N= 15,427 (n=2,614 for Student → Employed sample; n=423 for Student → Unemployed sample; n=12,390 for Student → Inactive sample).

There are substantial differences in the transition probabilities to employment among disciplines. In rural Germany, if a graduate is searching for a job, the probability of finding a job during the one-year period is between 18 % and 53 % (on average), depending on the discipline studied. The probability of flowing into employment is more than 50% for graduates in health and welfare (53%) and teacher training and education science (52%). As expected, for students graduating in fields such as agriculture and veterinary (including market-oriented, skilled agricultural workers, farmers, and fishers), a high percentage (48%) is employed relative to other disciplines.

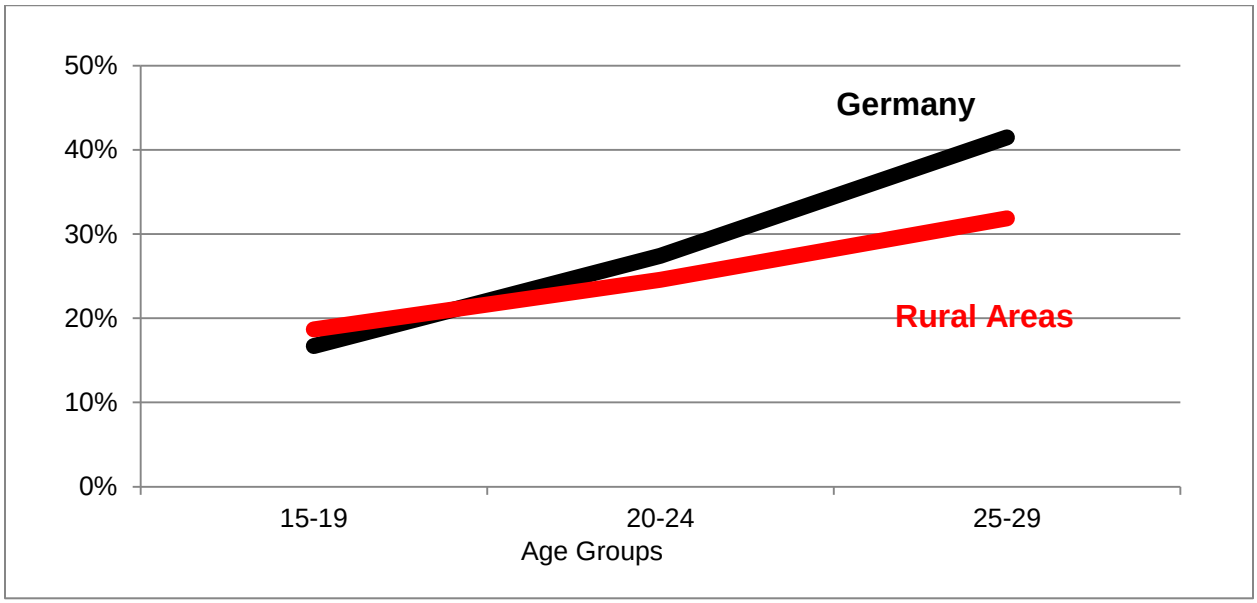
Overall, Figure 5-1 allows us to capture the important role of the discipline studied in first job access for graduates of the health and welfare, agriculture and veterinary, and education science fields. Graduates in these disciplines have higher probabilities of flowing into employment relative to other disciplines, and these fields exhibit lower probabilities of flowing into

unemployment. The high percentage flowing into employment among graduates of health and education science may be explained by the standing role of public services in rural regions. In many rural areas of Germany, the proportion of very old and very young individuals within the demographic structure creates the highest demand for public services (OECD, 2007). Specifically, the importance of having graduated from the health and welfare fields to accessing a job within a year is probably due to the increased demand for healthcare in rural regions due to ageing and decreasing workforce availability (e.g. graduates not settling in rural areas) (Holst, 2015; OECD, 2007). The development of the German health care system and rehabilitative care services in rural areas may allow health and welfare graduates to access jobs without an intervening long term unemployment spell. In the area of rehabilitative care, services are provided primarily at inpatient facilities located in rural areas (Busse and Blümel, 2014). These health services are provided by health resorts, which also offer spa treatments that have become important in physical therapy in the German health sector (Busse and Blümel, 2014).

Age groups and trends in the student to employment flow

In Germany, rural regions face challenges in terms of employment, skilled worker availability, and land productivity (OECD, 2007). Additionally, demographic trends are important due to the high level of out-migration from rural regions (Becker and Moser, 2013). Regarding migration balance by the degree of urbanisation, the percentage of youths (18-29 age group) migrating from German rural regions increased fivefold between 1995 and 2004 (as quoted in OECD 2007). To explore the role of age in youth access to jobs, Figure 5-2 compares the percentages flowing from student to employment at the national level and in rural areas for three age groups: 15-19, 20-24, and 25-29.

Figure 5-2: Percentage of the previous year's students who are employed in the current year (Student → Employment) by age group, average for the 2002-09 period



Source: German Labour Force Survey

For the 15-19 and 20-24 age groups, the probability of flowing from student to employment is approximately 20% and does not differ much between the two samples (national level and rural areas). In line with our findings, a study by Culliney (2014) identified no difference in the shares of rural and urban respondents (under age 25) who access part- or full-time jobs in Britain.

We do observe a gap between the rural areas and the national sample for individuals in the 25-29 age group. The lower likelihood of transitioning from student to employed status among rural residents highlights the challenges faced by youths in accessing a first job in rural areas.

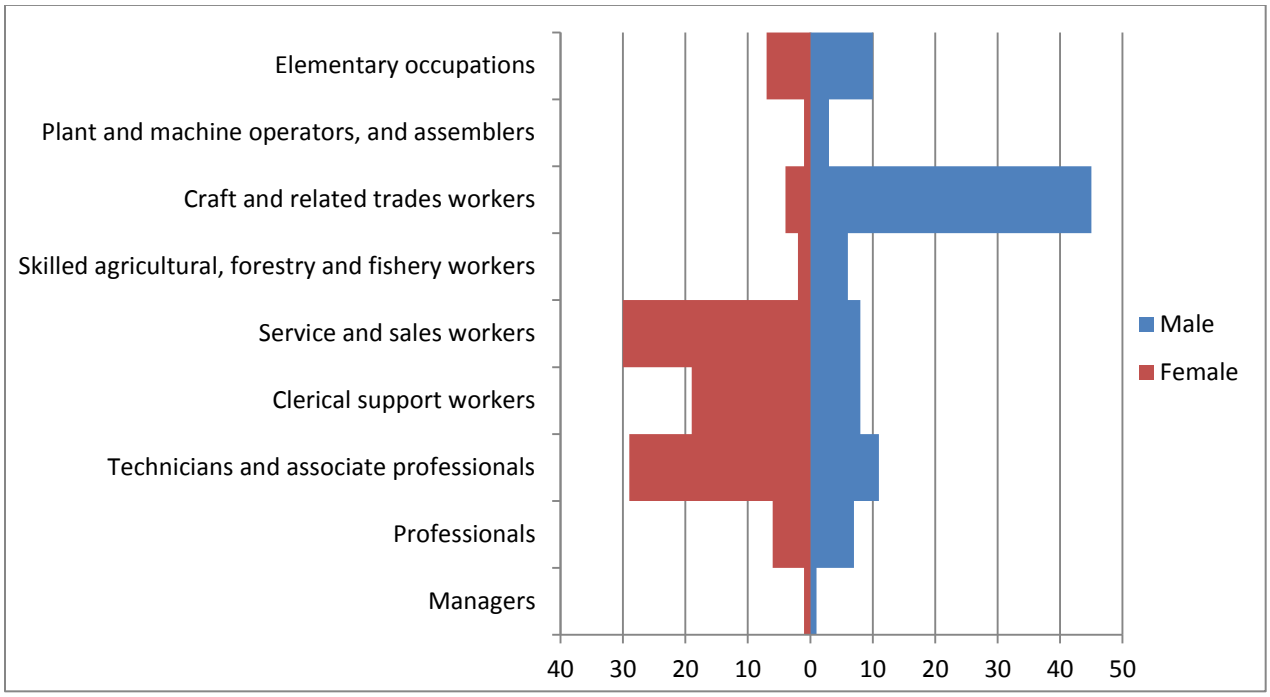
The results indicate that beginning around age 25, youths have greater difficulty accessing jobs in rural labour markets relative to the urban labour market. The difference in access to a job between age groups is due to factors such as a greater chance of finishing a high level of education in the 24-29 age group, not looking for seasonal jobs and/or the higher skill level required compared to the younger age groups. Unlike at the national level, a lower probability of flowing into employment among the 25-29 age group may be explained by restricted opportunities in rural regions, such as shortages of affordable housing and poor or costly transport. This is one of the common features of rural labour markets identified in a study by

Cartmel and Furlong (2000) and observed by Unay-Gailhard and Baqueiro-Espinosa (2015) for West Germany.

Gender in the student to employment flow by socio-professional category

Figure 5-3 compares the male and female populations and depicts the socio-professional distribution of individuals in the student to employment flow.

Figure 5-3: Percentage of the previous year's students who are employed in the current year (Student → Employment) by socio-professional category, rural Germany



Source: German Labour Force Survey
Note: N= 8,117 for the female sample and N= 7,499 for the male sample, average for the 2002-09 period.

The results indicate that there are striking gender differences by the fields in which individuals are employed in their first jobs. Of the males in our sample, 45% are employed as crafts and related trade workers. This category includes metal, machinery, handicraft, electrical and food-processing workers. In contrast to the male sample, half of the female socio-professional distribution is not concentrated in a single profession. While 30% of rural females work in the services sector (includes personal services workers, sales workers, and personal care workers)

29% of women work as technicians and associate professionals and 19% as clerical support workers. Very few males work in these three categories (below 8%). The next highest share for females is in the elementary occupations (7%), which is similar to the 10% observed for males.

These patterns are consistent with those found in other studies on Western European countries. As summarised in studies by Smyth, (2002) and Russell et al (2010), there are certain regularities in discipline and profession by gender. While females have dominant roles in health and welfare (covers mainly service workers), teaching and education (covers mainly professionals) and the arts, males dominate among engineering professionals.

In Figure 5-3, gender differences in employment by socio-professional category are greater when we interpret the distribution taking the corresponding skill level of each profession[29] into account (see Table 5-3 for the mapping of skill levels). It appears that rural females are more able to access higher-skilled occupations as a first job relative to rural men (while technicians and associate professionals are equivalent to skill level 3, crafts and related trade workers represent skill level 2). A further gender-specific analysis of the socio-professional category distribution for urban areas indicates that, relative to rural areas, there is higher percentage of females than males in high-skill occupations. This pattern is in line with the fact that in Germany, rural regions face shortages of skilled workers (OECD, 2007).

That a high proportion of females obtain their first jobs in the service sector corresponds to the finding that a small percentage of females whose degrees were related to services are unemployed. Without gender division, a study by Jacob et al., 2015 provides a complementary overview, presenting evidence for Germany using the International Socio-Economic Index of Occupational Status (ISEI) and finding that a higher proportion of graduates obtain service positions as their first job.

[29] In the LFS, the skill level is defined as "A function of the complexity and a range of tasks and duties to perform in an occupation" (ILO, 2008). While managers and professionals represent high skill levels, elementary occupations, plant and machine operators represent low skill levels.

5.5 Econometric model: determinants of job access after leaving education

The econometric model aims to estimate the impact of each individual's socio-familiar position, socio-economic characteristics and interrelations with labour market institutions on job access after leaving education. The three labour force flows are modelled as employment, unemployment, and inactivity with a base category of employment. Based on our main research question, the interpretation focuses on the determinants of the transition to employment. Table 5-4 presents the average marginal effects of the multinomial logit model evaluated at the sample mean transition probabilities.

Table 5-4: Results of the gender-specific multinomial logit models, 2002-09

	(1) Student → Employment		(2) Student → Unemployment		(3) Student → Inactivity	
	Female	**Male**	**Female**	**Male**	**Female**	**Male**
	Coef. (Std.)	Coef. (Std.)	Coef. (Std.)	Coef. (Std.)	Coef. (Std.)	Coef. (Std.)
Socio-familiar position						
Age groups						
20-24	0,038***	0,038***	0,003*	0,004*	-0,041***	-0,042***
	(0,006)	(0,007)	(0,002)	(0,002)	(0,006)	(0,007)
25-29	0,067***	0,073***	0,003	0,001	-0,069***	-0,075***
	(0,008)	(0,008)	(0,002)	(0,003)	(0,008)	(0,008)
Marital Status						
Married	-0,029**	0,069***	0,003	0,000	0,026**	-0,069***
	(0,012)	(0,015)	(0,003)	(0,004)	(0,013)	(0,016)
Socio-economic characteristics						
Education						
Middle	0,095***	0,026***	0,001	0,005**	-0,096***	-0,031***
	(0,006)	(0,007)	(0,002)	(0,002)	(0,006)	(0,007)
High	0,301***	0,286***	0,020***	0,022***	-0,321***	-0,309***
	(0,010)	(0,010)	(0,003)	(0,003)	(0,010)	(0,011)
Degree of urbanisation of place of residence						
Rural	0,003	0,022***	-0,001	-0,003	-0,002	-0,019***
	(0,005)	(0,005)	(0,002)	(0,002)	(0,005)	(0,005)
Peri-urban	0,001	0,014***	0,001	-0,002	-0,002	-0,012***
	(0,004)	(0,004)	(0,001)	(0,001)	(0,004)	(0,004)
Interrelations with labour market institutions						
Registration status with public employment services						
Registered	0,105***	0,080***	0,077***	0,082***	-0,182***	-0,162***
	(0,012)	(0,012)	(0,001)	(0,001)	(0,012)	(0,012)

Source: German Labour Force Survey
*Note: standard errors of average marginal effects are presented in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%. In the model, the variables for the 15-19 age group, low education level, single, living in an urban area and not having registered for public employment services were used as the base (reference) categories for the explanatory variable groups. N=47,217 for the female sample and N=46,104 for the male sample.*

As expected, the older the individual, the higher the likelihood of being employed within a year of graduation for both females and males. The positive effect of ageing suggests that the 25-29 age group faces higher probabilities of flowing into employment without a long term unemployment spell relative to teenagers and young adults aged 20-24. This may be explained by the higher probability of labour supply in the 25-29 age group (achieving higher skills and/or educational attainment) than those younger than 24. Recent statistics for Germany support this argument. Glancing at youth education and employment, on average, one-half of 15-25 year-old students' earnings come from employment, whilst this proportion is higher (approximately 65-70%) among 25-29 year-old students (OECD, 2013).

The findings concerning marital status indicate that for women, the marginal effect of being married is negative and significant. This may be interpreted as follows: among youths, married women are less likely to transition to employment from student status. In contrast, the marginal effect of being married is positive and statistically significant for men. Overall, while marriage increases the probability of obtaining one's first job within a one-year period for males, it decreases the likelihood for females, possibly due to different gender roles, responsibilities or strong spousal peer effects on labour market outcomes. This difference may be explained by the concept of work-life balance, the relationship between work and the commitments in the rest of the individual's life. Although in the previous literature (Hardy and Adnett, 2002; Panisoara and Serban, 2013), work-life balance has been predominantly viewed as a female problem (mainly due to childcare responsibilities), this study demonstrates that being married decreases the employment probability early in the careers of young females. This finding seems to be in accordance with a socio-economic study by Evans (2002) on labour market participation equality in German society from a young adult perspective (18-25 age group). As the author mentions, "*although women were generally seen as having the same chances as men at work, this view was often expressed that women must at some point choose between work and family*" (Evans, 2002, p. 267).

Regarding the three main levels of education, in the female and male models, the marginal effects of medium and high levels of education on the student to employment flow are positive and significant. Considering the average marginal effect of each education level, youths who leave education at a high level (bachelor's, master's and doctoral degrees or equivalent programmes) are more likely to access employment within a year than their counterparts who

leave at the medium level (second stage of secondary education and non-tertiary education). This is consistent with the social capital literature, which sees the education level as an important predictor of positive outcomes in the labour market for young people (Putnam 2000; Porfeli et al. 2009) because more educated individuals are more likely to achieve higher qualifications. Our findings support this view for both genders, with slight differences in coefficient of the average marginal effects. Whilst these may be considered small differences, they further demonstrate that the positive effect of high level of education on employment access within a year is higher for female relative to male graduates.

The study by Iannelli and Smyth (2008) provides broader evidence of gender differences in the highly educated youth labour force's transitions across 12 European countries[30], and countries vary in the extent to which gender affects early labour market outcomes. In France and Belgium, young female are found to be at a disadvantage in accessing employment relative to their male counterparts, even if they have high educational qualifications, whereas the reverse is the case in Slovenia and Romania (in post-communist countries). The authors explain this gender differentiation across countries based on the nature of the countries' welfare regimes, with the difference being more pronounced in familial and conservative systems.

Contrary to our expectations, living in rural locations does not suggest an unfavourable influence on accessing a job within a one-year period. When we consider the role of urbanisation on the student to employment flow, the results indicate that the effect differs by gender. While the marginal effects of the variables for rural and peri-urban areas are statistically insignificant for females, they are positive and significant for males. Males who live in rural and peri-urban areas are more likely flow into employment from student status relative to those in urban areas. However, this positive sign must be interpreted with caution. The results related to access to employment opportunities in rural and peri-urban locations do not provide a link between the residence of an individual and the occupation entered or the place of employment. Although there are few studies of rural youth employment prospects, previous literature has noted that rural youths are more dependent on temporary jobs and/or occupations without promotion opportunities (Hodge et al., 2002; Midgley and Bradshaw, 2006; Culliney, 2014). Additionally, commuting between rural places of residence and urban places of employment is commonly

[30] Austria, Belgium, Spain, Finland, France, Greece, Hungary, Italy, Romania, Sweden, Slovenia and Slovakia.

observed among most European countries (Eliasson et al., 2003; Moss et al., 2004; Unay-Gailhard, and Baqueiro-Espinosa, 2015).

The estimation results for being registered for public employment services indicate that the marginal effects on employment flows are statistically significant and positive for both genders. This suggests that, relative to the non-registered youth population, registered individuals are more likely to obtain their first job within one year. The findings indicate that, in the year immediately following graduation, registering for public employment services is an effective job search strategy for obtaining an occupational match. Our results are in line with studies considering this issue from the employee perspective. Unemployment benefits are seen as a "search subsidy", and there are positive effects of unemployment benefits on flows into employment and unemployment durations (Gangl, 2003). However, benefit receipts concern a notable number of young people in Germany (Brigitte, 2013), and the important role of public employment services besides unemployment benefits for young graduates concerns active job search support.

5.6 Discussion and Conclusion

The aim of this paper is to investigate the labour market transitions of young people attempting to access jobs after leaving education and to explore differences in these transitions between women and men in rural Germany. The labour market transitions experienced at the beginning of one's career can be influenced by both the supply and demand sides of the labour market. The supply side refers to potential employees and their characteristics, whereas the demand side refers to employers' requirements.

Our study applied a TLM approach and focused on potential employee characteristics, such as socio-familial characteristics (age, marital status), socio-economic characteristics (education, degree of urbanisation of place of residence) and interrelations with labour market institutions. The empirical analyses provided insights into whether living in rural areas must be considered an obstacle to accessing to a first job within a one-year period relative to those living in urban areas. The gender-specific multinomial model focused on the student to employment flow during the one-year period after graduation.

Age and education variables that are widely used in previous studies linking human capital theory and labour markets were included in the student to employment flow analysis. Consistent with the results reported by Lauerová and Terrel (2002), our study indicated that age and education are important in explaining the transitions of both females and males to employment. Furthermore, our study highlights that the probability of a school-to-work transition without a long unemployment spell increases considerably with age. Despite these results, our interpretation is made in light of Dietrich (2012), which provides valuable insights. This author mentioned that in EU member states, 50 per cent of unemployed people below 25 years of age could have been in a period of short-term unemployment that lasted less than six months.

The conclusion that highly educated individuals are more likely to find a job within a one-year period contrasts with the findings of Baert et al. (2013). They observed that over-education may be a trap at the beginning of one's career. This different conclusion can be easily explained by the definition of a "high education level". In our study, the high level of education includes bachelor's, master's and doctoral degrees or equivalent programmes, while in Baert, et al. (2013), a worker is considered overeducated if her/his education is higher than the level that is typically required to perform a job adequately. Based on their analysis of the role of a low education level in flows into employment, Bottrell and Armstrong (2007) highlight changing labour market conditions for youth and suggest that working class school resistance is becoming increasingly difficult due to diminishing unskilled labour trends and increasing competition for unskilled work. On the demand side of the labour market, as the fixed costs of hiring highly educated workers and training them are higher than those associated with less educated workers, unskilled individuals are more likely to be hired by employers (Lauerová and Terrel, 2002). Although we have seen that individuals with a medium level of education are less likely to flow into employment within a one year period than their highly educated counterparts, it remains clear that a high education level is seen as a means to prevent the risks of long term unemployment after graduation without considering earnings, type of contract or job satisfaction.

From a life course perspective, marriage may accept as transitions on a personal level due to the construct of attachment cause individual trajectories of change. Our study indicated that being married decreases female graduates' likelihood of transitioning from student to employment relative to their single peers. These results are in line with previous studies on normative expectations in German society; the withdrawal of women from the labour market is socially and

culturally accepted (Gottschall and Bird, 2004; Evans, 2002). From our perspective, this is especially true for married women younger than 30 years old. However, being married has a positive influence on flows into employment for male graduates. The opposite effects of being married on flows into employment by gender may be explained by both job search theory and the traditional division of labour supported by existing tax rules for married couples. Although further research is needed to shed more light on the actual reasons for this pattern, our findings are line with job search theory (Devine et al., 1991), that is, a partner with financial resources is seen as providing a "search subsidy" to the other partner, causing a long term unemployment period. Further, as Wrede (2003) remarks, the German income tax system subjecting the major earner to lower taxation and the minor earner to higher taxation may promote the division of labour inside a family and might harm the marriage partner who is more efficient in household production.

From the TLM view, the negative relationship between marriage and entering the labour market for female graduates may create both a barrier to employability and a potential social risk that may increase the difficulty of integration into the labour market over the long run. In the politics of TLM, it is important to know the perception of risk at specific phases of an individual's life. To avoid social risks, our findings call for equal opportunity policies in terms of affirmative action early during married women's careers.

The higher probability of unemployment in rural areas relative to urban regions has been cited as a significant explanatory factor for social exclusion problems among youths residing in certain rural areas (Shucksmith, 2004). This issue has been analysed in depth in immigration studies (Rérat, 2014). In our labour force transition study, living in rural locations does not suggest a significant negative effect in accessing a job within one year among graduates. Our approach revealed that living in rural areas has a positive effect on the likelihood of becoming employed within a one-year period for the previous year's male graduates, whereas this effect does not explain the employment transitions of females. However, this positive labour force transition pattern for the male population should be interpreted with caution due to the complex nature of rural labour markets in which we more frequently observe short-term or part-time employment (Cartmel and Furlong, 2000). Further, the location individuals turn to in realising their job preferences and the extent to which these job opportunities are seen as traces of rural-urban integration through commuting ties between rural places of residence and urban places of

employment remains unclear. From another point of view, if the positive effect of the degree of urbanisation on male employment crowds out female employment via decreased female hires, then one would expect female rates of transition to be negative in rural and peri-urban areas. This crowing-out effect could be clarified through further analysis of the relationship between male and female transition rates over time.

Living in rural regions is not found to be a significant determinant of the likelihood of transitioning to employment among young females. The absence of a significant effect for rural areas suggests that it has no or little influence on access to employment among young female graduates (although it is important to access employment in previous studies). These findings further illustrate that a rural location should not be treated as a single concept that produces similar effects in the early careers of graduates of both genders; indeed, gender differentiation needs to be considered.

Although individuals who registered for public employment services after graduation are more likely to flow into employment within a one-year period, our empirical results indicated that the youth sample faces strong incentives to not register. Prior studies demonstrate that the limited number of individuals registering for such services do so to avoid matching with the worst occupations (Larsen and Vesan, 2012). Although our results did not reveal the level of satisfaction the previous year's graduates with their occupations in the current year, the findings indicate that public employment services are beneficial for addressing unemployment among youths, even early in their careers.

From an institutional labour economics perspective, our results confirm that providing institutional services to graduates increases the speed of transitions to employment. Consistent with a recent study by Wunsch (2013), the service type and period in which it is provided by the public employment services agency (e.g. duration of job search assistance) is important for accessing a job. This author provides evidence from West Germany (over the 2000-2002 period), suggesting that, in line with existing policies, job search assistance programmes are more effective if provided to individuals for short durations at the beginning of an unemployment period. Overall, the findings indicate the importance of registering for public employment services to accessing a first time job. Policy discourses on the strengths and weaknesses of youth activation policies in Europe (Quintini, Martin, and Martin, 2007; Martin and Grubb, 2001;

Wilkinson, 2003; Blundell et al., 2003) and more detailed proposals for successful public employment services over the school-to-work transition must occur.

Although the labour flow analysis yields a clear picture of the movement of the youth labour force into and out of the labour market, the use of extant frameworks could offer deeper insights into the institutional basis of the job market by considering contract type and job satisfaction. Due to the limitations of the dataset, the authors do not provide further evaluations of differences in the structure of the labour market between East and West Germany. As highlighted by previous studies (Brakman and Garretsen, 1993; Kluve et al., 2009; Schmitt, 2012), in addition to our focus on rural-urban differences, the East-West divisions in the labour market are observed in many areas (e.g. wage structure, labour productivity, labour force participation rate, childcare facilities, and long term unemployment rates). Further research on the school-to-work transition should consider both the institutional basis of first-time contracts and the spatial structure of East and West Germany using an economic geography framework.

6. General Conclusions

In the rural economy, "agricultural structure and structural change" include farms' embeddedness within and interactions with agricultural value chains, (rural) society, the (rural) economy and landscape, as well as institutions and policies (Balmann et al., 2006). This thesis viewed structural change in rural regions as constant changes in the deployment of the rural production factors of land, labour and capital (Buchenrieder et.al, 2007; Happe, 2004).

The specific research focus of behavioural analysis of rural individuals addressed two production factors: land and labour market. The presented studies illustrate the structural change in land-use decisions towards AEM participation behaviour in Slovenia and Germany, and labour force transition behaviour comparing German urban and rural regions.

The overall objective is to investigate the prospects for choices in the field of rural economics by studying specific challenges. The emphasis was put on concrete rural policy problems, and we aim to contribute the policy programs that address the implementation of AEMs and active labour market policies.

In this thesis four different research questions were formulated and answered in two main parts: (I) Analysis on land-use decision behaviour towards agri-environmental farming practices, and (II) Analysis on rural labour behviour with transition approach. Each study question was related to rural behaviour, the choices and decision-making process of individuals. These questions were examined using different cases and assumptions by use of applied choice analysis.

In this general conclusion chapter, the main findings for each of the questions are discussed in the context of the current academic discourses. In the following, the relevance of this thesis in terms of policy and political economy is presented. In the remaining last chapter of the thesis, based on given results, we provide recommendations and suggestions for further research.

6.1 Main Findings

There are many scientists in the literature who have made contributions to the topic of AEM participation behaviour and on rural labour transition behaviour. However, each study approaches the topic from a different perspective, with its own theories, surveys, methods, and analyses. The following sections give an overview of our perspective, providing the main findings of the four research questions of this thesis.

6.1.1 Explicit Examination of the role of farm size in AEM participation behaviour

Research question 1: *"To what extent do farm sizes contribute to decision making in connection with changing land-use towards environmental farming practices among Slovenian farmers? If we consider the role of farm sizes explicitly (as small, medium and large farms), how do farm accountancy factors influence the decision-making process of voluntary AEM scheme participation in each farm size group?"*

The first aim of this thesis is to investigate factors influencing farmers' AEM participation in the EU. The second chapter provided an illustration of how farm accountancy factors influence decisions towards AE farming practices in Slovenia. The study gives an overview of the structural changes in the number and size of Slovenian farms. Three types of farm size are considered: small, medium, and large. Our analysis uses a theoretical framework to assess the influence of the role of farm size on AEM participation in other EU member states.

Our comparison of the determinants of farmers' AEM participation behaviour by farm size groups shows how previously confirmed influencing factors differ for different farm sizes. These results show that farm capital per land, off-farm income and farm type are significant determinants for large but not for small farms. Land productivity negatively influenced participation in AEMs for large farms, whereas it is positively influenced the participation of small farms.

There are several things of note about the way in which farmers behave dissimilarly in different farm size groups. In our case, for small farms in the FADN survey, willingness to participate in AEMs is significantly influenced by variables of the share of agricultural land use, land

productivity, eligibility for LFA payments. In all farm size groups, we found that there is a significant negative effect of the share of agricultural production on AEM participation behviour. This result highlights the fact that the received AE support cannot compensate for the opportunity cost in cereal and forage crops production farms. This finding is in line with previous results for other EU member states (Wynn et al. (2001) for Scotland, Hynes and Garvey (2009) for Ireland, and of Defrancesco et al. (2008) for Italy). Reviewing literature on "*What makes farmers likely to participate in AE schemes?*" reveals that farms with less intensive agricultural production appear to be adjusted, whereas farms with more intensive agricultural production are discouraged. Our contribution on this point is that farm size division does not give the opposite results; small, medium and large agricultural production farms do not seem to think and behave differently from each other with regards to AEM participation. Furthermore, LFA location has a significant positive effect on AEM participation regardless of farm size division. Both the previous literature and our interviews with rural stakeholders explain this tendency by the economies of scale involved in enrolling in AEMs. These results thus support the current criticisms that AEMs cannot be implemented by very intensive farms.

Main findings:

- Previously confirmed factors influencing AEM participation differ for different farm size groups (small, medium-sized and large farms).
- In all studied farm size groups, AEM participation is less attractive for farms that are under agricultural land use (in our case cereal and forage crop farms) and more attractive for LFA located farms.
- There is a significant positive effect of land productivity on AEM participation for small farms whereas it is negative for medium-sized and large farms.
- Large vineyards, dairy and livestock farms are more likely to participate in AEM. However, this positive effect is not observed for small and medium-sized farms.

6.1.2 The role of social networks in continuity of AEM participation behviour

Research question 2: *"What is the role of social networks in the continuity of AEM participation among German organic farmers? How frequently do formal and informal information sources influence the AEM adoption process?"*

The second research question on AEM participation behaviour concerns the sustainable behaviour of organic farmers in Germany. Consistent sustainable behaviour might be influenced by the complexity of a farmer's behavioural choices. Based on previous literature, we define sustainable behaviour as an individual action that focuses on a "long period of time" (Milfont and Gouveia, 2006; Rabinovich et al., 2010). Our analysis considered organic farmers who had previous experience with AEMs, because they had already practiced the environmental management standards required for organic production. Furthermore, it was examined how they incorporated additional AEMs for continuity of sustainable agriculture practices, with recognition of the importance of social networks -particularly the influence of interpersonal communication channels- on farmers' behaviour. Beside the main question of decision-making, this study also aims to contribute to the characterization of the validation of information sources and influence flows within farmers' social network.

The application of existing theories would lead one to expect differences in sustainable and non-sustainable behaviours associated with AEM participation. Existing research on sustainable AEM participation often claims that those farmers who are satisfied within the confirmation stage of the innovation diffusion process implement additional environmentally friendly farming practices. As argued by Burton et al. (2008) and Burton and Paragahawewa (2011), to ensure long term behavioural change in environmental orientation, AEMs need to allow farmers to display skills that are associated with producing environmental goods and services. Sutherland and Darnhofer (2012) stress the importance of having previous experience with environmental practices to ensure continuity in AEM participation. These authors suggest that formal agencies should provide feedback to farmers on environmental gains that have been achieved by adopting environmental farming practices. In our study, even though frequent participation in formal agencies was not found to explain adoption of other AEMs, the results of SNA show that organic farmers who participate in agricultural organizations' events with a high frequency are more

likely to consider formal network actors as an important source of information on AE programmes. This study concludes that distributing information through formal channels in combination with using informal channels has a substantial capacity to increase sustainable AEM participation behaviour.

There is previous literature on AEM participation behviour among German conventional farmers (Sattler and Nagel, 2010; Prager, 2010). Compared to conventional farmers, organic farmers have more specific interpersonal networks (e.g, relatively closed networks that are difficult for newcomers to enter (Padel, 2001) and different structural adjustment reactions (e.g. different AEM adoption rates, lower stocking rates, and the virtual exclusion of intensive farm types such as specialized pig and poultry farms (Schader et al., 2013). Organic farmers are one of the important actors in the AEM participation behaviour studies but they are often not the most important one when analyzing sustainable behaviour towards additional AEMs.

Main findings:

- Early adopters of organic farming practices are more likely to adopt additional AEMs. This is an adequate representation of continuity of AE farming practices that creates new perceptions and priorities as a personal and/or professional challenge.
- As observed from the previous findings, the positive effect of being located in an LFA on AEM adoption is not only limited to conventional farms. Organic farms that are in LFAs are also more likely to adopt additional AEMs.
- Information validation by organic farmers differs between two types of network actors. (i) Those who frequently participate in agricultural organizations' events are more likely to consider formal network actors as an important source of information on AE farming issues, and (ii) Those farmers who frequently communicate with their neighbors are not found to consider their neighbours as an important source of information on AE farming issues.
- Frequent communication with specific actors in informal networks has an important positive influence on additional AEM adoption by organic farmers. Especially regular communication with younger and more educated actors positively influences organic farmers' willingness to adopt additional AEMs.

6.1.3 Rural labour transition behaviour to inactivity during economic crises periods

Research question 3: *"How did the 2008 global economic crisis influence labour force transitions to inactivity in Germany? Are there differences in the impact of the crisis on rural and urban labour force transition flow? If so, what are the determining factors that caused a change in labour flow before and during the crisis period?"*

The second aim of this thesis is to investigate rural labour transition behaviour in Germany within rural-urban comparison perspectives by using LFS. The fourth chapter investigates the question of labour force transition to inactivity during the period of the 2008 economic crisis. Increases in flow to inactivity from unemployed and employed statuses provide information on the tendency of marginal attachment during crisis periods. Inactive individuals are considered as marginal to the labour force; they want work but are not engaging in a job search for individual or economic reasons.

This study stresses particularly the importance of socio-demographic factors that affect transition to inactivity. Analysis of flows out of the labour market to an inactive status allow for a better understanding of the variation in unemployment during economic crisis periods.

Our focus on the inactive labour force echoes labour activation policy studies that argue for more attention to social exclusion problems. Social exclusion occurs through social risks that are defined as critical life events and transitions that might entail lasting disadvantages in the labour market (Schmid and Gazier, 2002). From this perspective, our study contributes to social risk management studies that are associated with economic crisis periods in the rural labour market. The importance of crisis periods lies for individuals in a high probability of long term unemployment, which leads to a discouraged labour force and/or increase in inactivity.

In the literature there are three different discourses on social exclusion previously identified by Shucksmith and Philip (2000). The *integrationist approach* in which employment is seen as the important integrating force, the *poverty approach* in which the causes of exclusion are related to low income and resources, and the *underclass approach* in which the excluded are seen as being excluded by moral and cultural norms.

Our study falls under the *integrationist approach* by offering a case study on the inactive labour force from rural Germany using the TLM framework. TLM emphasizes labour market dynamics

by focusing on flow analysis rather than static analysis. Our key contribution to the TLM literature is to extend inactive flow analysis by focusing on rural individuals by addressing the social risks associated with economic crises.

Main findings:

- Differences in transition flow to inactivity patterns between before crisis and crisis period suggest that the nature of the economic shock influenced individuals' behaviour differently in rural and urban labour markets.
- In urban areas, highly educated individuals are significantly less likely to flow to inactivity from unemployment than less educated individuals. However this education effect was not observed for individuals living in rural areas.
- In rural areas, single individuals are more likely to transition to inactivity than in urban areas.
- Decisions to become inactive have a much greater impact on those aged 55-64 relative to the age group 25-54, especially in the crisis period.

6.1.4 Rural labour transition behaviour from school-to-work

Research question 4: "*What are the roles of socio-familial position, socio-economic characteristics, and interrelations with labour market institutions in the school-to-work transition in Germany? Among young people, does gender play a role in this transition flow, especially regarding rural areas?"*

In chapter 5, the second study on rural labour force transitions is concerned with social risks that are associated with demographic trends, and related to youth (un)employment in the rural labour market. The labour flow analysis brings out the need for strategies to ensure successful school-to-work transitions without a long term spell of unemployment.

Previous studies provide evidence that long unemployment spells before labour market entry may have persistent negative effects on employment probabilities and wages later in life (Bynner and Parsons, 2002; Quintini et al., 2007; Perez et al., 2010; Green et al., 2013). In many EU

Member States, active labour market programmes have become part of the school-to-work transition.

Alongside TLM theory, our study used a life course theoretical framework that examines differences in employment outcome between men and women considering the role society assigns to them. The main contribution of our findings to these frameworks is to provide insights into what the determinants of job access are after leaving education in the German rural labour market. This study helps understand the influence of these determinants within similarities or differences in each gender group.

A central conclusion is that gender influences school-to-work transitions without a long unemployment spell, especially for the two studied factors: degree of urbanisation of place of residence and marital status.

The influence of living in the countryside on transitions to employment differs between young women and men. Men living in rural areas are more likely to transition to employment from student status whereas this is not significant for women. The positive effect of living in rural regions for men seems to be the consequence of specificity of rural job requirements (e.g. short-term or part-time employment) and/or a high commitment among young males to pursue jobs that they are unqualified or underqualified to perform. Overall, findings illustrate that a rural location should not be treated as a single concept that produces similar effects in the early careers of graduates of both genders; indeed, gender differentiation needs to be considered.

The discourses on the youth labour market often make reference to deficiencies in young people's employability skills. Literature refers to potential factors such as the socio-economic caracteristics of young people, but also educators, parents, and employers. Our study refers to marital status of young people. This is another factor that prolongs school-to-work transition, and increased the complexity encountered in labour market integration.

Study findings show that marriage increases the probability of obtaining one's first job within one year for men, while it decreases it for women. This reverse effect of marital status on women and men can possibly be explained by differences between the two groups in gender roles and family responsibilities, and contribute to studies that help to explain why some women exit the labour market early. These results provide inputs to the current discourse on the roots of social inequalities in the early careers of young women and men.

Main findings:

- Male graduates residing in rural and peri-urban areas are more likely to transition from student status to employment in a one year period relative to those residing in urban areas.
- Without considering pregnancy and childbirth effect, being married decreases female graduates' likelihood of accessing a job within a year of leaving education relative to their single peers. Marital status has the opposite significant effect for male graduates.
- Age and education variables that link human capital theory and the labour market were significant in explaining transitions of graduates (both females and males) to employment.
- There are striking gender differences in the fields in which individuals are employed for their first job. It appears rural females are more able to access higher-skilled occupations as a first job relative to rural males.

6.2 Policy implications

Regarding to main findings presented in the previous section, the following section presents the outcome of this thesis in terms of policy mean.

6.2.1 Policy implications for AEM implementation

Chapter 3 presented our view that different farm sizes have different decision-making processes towards AEMs. Share of rented land, land productivity, off-farm income, and family labour have various influences on AEM participation that differ between small, medium and large farms. This finding is highlighted by the continued structural change in Slovenian farming since accession to the EU in 2004. Although the average farm size is small by European standards, there is an important increase in the average agricultural area per farm. There is evidence that this change leads to organisational changes towards more professional management and mechanisation of farmland. Our results provide an initial analysis of the relationship between average farm size growth and the provision of private and public goods as a result of AEM participation behaviour.

AEMs are based on volontary-based structured public intervention, and aim towards better-tailored and well-targeted measures at the local level. Three farm size models confirm the different roles played by analysed factors and their various influences on AEM participation according to farms' structural environments. In our view, to overcome this existing bias of various influences on AEM participation, it is important to take into account potential choices of farmers by farm size division when designing volontary-based structured public intervention.

In chapter 3, continuity in AEM participation behaviour was investigated among farmers with experience in organic farming. In the RDP framework, farmers can take up AEMs cumulatively, thus adopted additional AE payments per ha add up for organic farms. In the context of political economy, there are differing views on the cost-effectiveness of support for organic farming by various AEM payments.

Von Alvensleben (1998) argues that the organic farming area support does not allow policy goals to be achieved in an effective way. An efficient policy requires at least as many specific instruments with specific goals (Tinbergen, 1956). Studies by Dabbert et al. (2004) and Schader et al. (2013) shed light on the cost-effectiveness of direct payments to support organic farming area with other AEMs, and recommend that the limited eligibility of organic farms for other AEMs needs to be reformulated. This thesis contributes to these policy discussions by considering the role of social networks in AEM participation by organic farmers. There is more and more research at a European scale into differentiating information and communication tools for AEMs.

In particular the role played by interpersonal network actors has to be further explored in order to achieve well-targeted information diffusion to farmers with different structural and social networks. Distributing information through formal information channels in combination with using informal channels should be considered as having a substantial capacity to influence continuity of AEM practices. More effective information diffusion could contribute towards policy related transaction costs. This is especially true if we look at the adverse selection phenomenon; farmers entering AEMs are those who easily reach AE commitments due to previous experiences.

6.2.2 Managing social risks through transitional labour markets (TLM)

For labour policy implications, from the studies of Rogowski (2008) and Rogowski et al. (2012), we adopt two policy recommendations that are consistent with our empirical analysis to address transitions to inactivity in crisis periods and youth (un)employment after leaving school. First, at the macroeconomic level, there is a need to consider solutions to manage potential social risks in crisis periods with attention to the rural residence labour force. As mentioned in chapter 4, while the factors studied similarly influence the transition to inactivity before crisis periods, their effect was observed to be stronger during times of crisis in rural areas, relative to urban regions. This point is particularly relevant in light of the current debate concerning macroeconomic policies for employability. This thesis shows that during economic crisis periods, the risk of employability (risk of losing income capacity) as a result of the transition to inactive status is higher for those who live in rural areas. This risk becomes a social risk when assessed collectively. As argued by Schmid and Schömann (2004), to consider social risks as a matter of risk management, we need to explicitly involve rural stakeholders through negotiations and entitlements. This would increase understanding of which risks are old and possibly diminishing, which ones are new and possibly increasing, and which exist at which social level.

In addition to the importance of degree of urbanization, the analysis showed that transitions to inactivity during crisis periods are even more persistent for older people in rural areas compared to urban areas. Parallel to this finding, we observe an increase in early retirement[31] (Tivig and Hetze, 2007), low reemployment rates of the elderly (Frosch, 2007) and changes in the demographic labour force structure (e.g. low birth rates, and longer life expectancy) in Germany. From a TLM policy perspective, these forces highlight the need to adopt active retirement policies with new solutions to demographic needs and individual preferences for retirement transitions. As shown by our empirical study at a country level, policies to integrate older people into the labour market are crucial for rural areas during crisis periods.

The second recommendation involves the implementation of policies related to youth labour market interventions. As discussed in detail in chapter 5, the main differences between genders

[31] The German Aging Survey shows that about 60% of employees retired 6 years earlier than planned between 1996 and 2002.

in access to a first time job over the course of one year relate to the degree of urbanization and marital status. Living in rural areas has a positive effect on school-to-work transitions for men; however, this is not a significant factor for women. This could inform policy programmes to address constraints faced by young people from disadvantaged backgrounds (e.g. women, and those living in rural regions). This speed of transition flow to employment needs to be interpreted with caution. Our analysis aimed to reveal neither individuals' job satisfaction nor the type of employment contract.

Marriage appeared to have a positive influence on the school-to-work transition for men, and a negative influence for women. This could show a shift in the life perspectives towards 'breadwinner' status for men: marriage becomes a social risk requiring income to maintain a "housewife" at home and/or reduced earning capacities during caring for children. For women graduates, there is a strong indication that marital status significantly affects women's rate of exit from the labour market. From the concept of TLM, this creates both a barrier to employability and a potential social risk that may increase the difficulty for women to integrate into the labour market in the long run. For the politics of TLM, it is important to know the perception of risk at specific phases of an individual's life. From the perspective of a labour market policy that attempts to avoid social risks, our findings call for equal opportunity policies in terms of affirmative action.

Finally, this thesis shows the importance of registering with a public employment service in accessing a first time job among young graduates. In other words, the success of job search assistance services (e.g. job search training, counseling, and monitoring) for new entrants into the job market allow young people to find a job in a year period after graduation (Betcherman et al., 2004). This finding would mean for two current policy debates: (i) discourses on the strengths and weaknesses of youth activation policies in Europe (Quintini et al., 2007; Martin and Grubb, 2001; Wilkinson, 2003; Van Reenen, 2003), and (ii) proposals made on the success of public employment services over the school-to-work transition period.

6.3 Further research implications

This thesis presents studies that raise a broad range of new issues for future research. To complement the two studies on AEM participation behaviour presented in this thesis, research into EU regions other than Germany and Slovenia is required. There is a rich corpus of literature on the factors influencing participation behaviour, with different case studies of EU Member States (mainly in the EU 15 countries) and various theoretical frameworks. In the meantime, sustainable AEM participation programmes remain a concern to policymakers who aim to achieve continuity over the long term. Continuity might be influenced by the complexity of a farmer's behavioural choices. This question has been investigated only to a limited extent in the AEM participation behaviour literature.

In addition to the investigation of other EU regions, behavioural studies could include a more detailed representation of AE contracts by considering specific measures and/or a specific farm type. This kind of focused study does not need to assume similar aggregated conditions for the study region such as a farmer's managerial ability and eligibility to sign AEMs.

In the two studies on AEM participation behaviour, the determinants of structural adjustment for farm managers are analyzed exclusively using farm size and interpersonal networks. As argued in studies such as those of Prager (2015) for Germany, Mettepenningen et al. (2013) for Belgium, and Pascuci et al. (2013) for Italy, the process of structural adjustment to voluntary based AEMs covers multi-stakeholder perspectives. These include those of institutional organizations (e.g. landscape governance, municipalities and relevant actors) and their policy priorities at a regional level, other rural stakeholders such as non-farming residents and entrepreneurs. Using these perspectives, one could visualize the structural change in land-use decision behaviour towards AE farming practices by explicitly assessing the role of institutional, political and cultural dimensions rather than the economic (market, and technology) and farm level.

Regarding policy implementation, governments can use a variety of approaches to achieve a policy objective such as AE policy goals. These can be classified by the degree of government intervention they imply, ranging from no intervention to a command and control approach (Rousset et al., 2015). In the EU, Norway and Switzerland AEM policy are based on a voluntary approach that includes flat rate payments per hectare of eligible land. Nevertheless, payment per

hectare could also be delivered through auctions (e.g. Bush Tender programme in Australia), and via grants to cover investments in environmentally-friendly equipment, investments such as some tax concession programs in Canada, Japan and Australia, and structural payment programmes in RDP in the EU (Vojtech, 2010). Further research could compare the determinants of AEM participation under existing options of public interventions in voluntary approaches. This would give insights into the importance of "asking the right policy question" (Rousset et al., 2015) in the decision making of farmers towards AEMs.

With respect to the two studies on rural labour force transition behaviour, examined as a second aim of this thesis, further research should initially extend the econometric model to new explanatory variables that are not represented in the German LFS. In addition to variables such as socio-familial position, socio-economic characteristics, and interrelations with labour market institutions, the model could consider the employment characteristics of individuals' main jobs, such as their employment sector, contract specification (e.g. permanency of the job, part-time, and full-time job), and firm size. This extension would increase understanding on relationships between labour force transitions and employment sector information.

In labour behaviour studies, the determinants of transitions to inactivity (chapter 4) and transitions to a first job from education (chapter 5) are modelled using discrete choice models with three geographical divisions on the country level: urban, rural and peri-urban. This categorization of degree of urbanization is a criteria of geographical contiguity together with a population threshold. However, as well as the geographical division of degree of urbanization, as discussed by several authors (Brakman and Garretsen, 1993; Kluve et al., 2009; Brakman et al., 2000; Schmitt, 2012), the structure of the German labour market differs between East and West Germany. Differences may be observed in many components such as wage structure, labour productivity, labour force participation rate (especially for women and young people), childcare facilities, long term structure of unemployment rates and flow. Due to time and data limitations, a more in-depth examination of this well-known German labour market division was not conducted in this thesis. Based on previous conclusions in the literature, further research on rural labour force transitions could consider empirical specifications of the spatial structure of East and West Germany separately under a geographical economics framework.

A final area worth further investigation is the possibility to combine the two main discourses we discuss in this thesis. As argued by Schmid and Gazier (2002), underlying forces of balancing

supply and demand in the European labour market started to change in the 1970's with the institutional break-up of the "standard employment contract". While there is a rich corpus of literature on the effects of changes in employment relationship at a country level, in rural areas, specifically at farm level, contract labour has not yet received much attention from researchers. Previous findings show that AEM payments positively affect labour use on German farms (Petrick and Zier, 2011; Pufahl and Weiss, 2009). It would be interesting to further explore the relationship between different types of labour force by explicitly examining contract labour and AEM adoption behaviour in EU Member States. At the time of concluding this thesis, some initial rural policy studies on this topic have been conducted in France (Dupraz and Latruffe, 2015).

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Selbstständigkeitserklärung

Hiermit erkläre ich, dass ich die vorliegende Arbeit "*Structural change in rural Europe: Land-use and labour behavior. Case studies with applications to drivers of participation to agri-environmental measures and labour force transitions*„ selbstständig angefertigt und keine anderen als die angegebenen Hilfsmittel benutzt habe.

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