VIENNA INSTITUTE OF DEMOGRAPHY
Working Papers
8 / 2013

Paola di Giulio, Thomas Fent, Dimiter Philipov, Jana Vobecká and Maria Winkler-Dworak

State of the Art: A Family-Related Foresight Approach

Vienna Institute of Demography
Austrian Academy of Sciences

Wohllebengasse 12-14
A-1040 Vienna · Austria

E-Mail: vid@oeaw.ac.at
Website: www.oeaw.ac.at/vid

Abstract

This state-of-the-art report discusses the substantive and methodological background for the construction and application of a family-related foresight method. The substantive part includes a brief presentation of two preceding family-oriented foresight methods: one run by the OECD in 2012 (producing two scenarios) and the other by the *FamilyPlatform* (producing four scenarios), the forerunners of the *FamiliesAndSocieties* project. The methodological background focuses on microsimulation and agent-based models, two quantitative models that will serve as new tools for foresight. Their application is considered in a systematic framework along with other standard foresight tools such as workshops and focus groups.

Keywords

Family foresight, microsimulation, agent-based models, online questionnaire

Authors

Paola di Giulio*, Email: paola.digiulio@oeaw.ac.at

Thomas Fent*, Email : thomas.fent@oeaw.ac.at

Dimiter Philipov*, Email : dimiter.philipov@oeaw.ac.at

Jana Vobecká*, Email: jana.vobecka@oeaw.ac.at

Maria Winkler-Dworak*, Email: maria.winkler-Dworak@oeaw.ac.at

* All authors are researchers at the Wittgenstein Centre for Demography and Global Human Capital (IIASA, VID/ÖAW, WU), Vienna Institute of Demography/Austrian Academy of Sciences

Acknowledgments

The research leading to these results has received funding from the European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement no. 320116 for the research project Changing families and sustainable societies: Policy contexts and diversity over the life course and across generations (FamiliesAndSocieties). Olaf Kapella gave us useful advices along with clarifications about the foresight in the FamilyPlatform project.

State of the Art: A Family-Related Foresight Approach

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(in alphabetical order)

1. Introduction

In recent years and decades, the European family has undergone a wide variety of dynamic changes. New family forms have emerged and proliferated. Extra-marital cohabitation with or without children has become almost everywhere a normatively accepted living arrangement. Same-sex couples are not anymore neglected and their status is legally recognised in the jurisdiction in some countries. In globalising societies, families with mixed ethnicity and/or culture are not exceptional and are spreading increasingly. The rise and spread of these and other family-related trends are a result of individuals' action that impinges on traditional social norms and behaviours and calls for consequent policy and legislative action.

While these changes are initiated by individual behaviour, the macro-level environment affects families in various ways. On the one hand, contemporary family policies are frequently adapted to comply with recent economic changes and are expected to provide more comprehensive and higher-quality services to families. On the other hand, the recent crisis has hampered family well-being. Rising poverty entails the risk of being reproduced in families: children living in poverty today will be tomorrow's parents of poor children: poverty and hardship leave long-lasting imprints on life. Hence generations socialised in times of hardship are now referred to as the 'scarred' generations. Some families need specific social and policy support, e.g. those with disabled members or families in vulnerable population groups (e.g. ethnic and cultural minorities).

How will these trends develop in the future? Will individual preferences lead to new living arrangements? Will poverty and hardship persist and reproduce? What policy responses will become relevant and needed?

These and related questions are addressed in the large-scale integrating project *FamiliesAndSocieties* – Changing families and sustainable societies: Policy contexts and diversity over the life course and across generations, coordinated by Stockholm University (see www.familiesandsocieties.eu). The main objectives of the project are to investigate the diversity of family forms, relationships, and life courses in Europe, to assess the compatibility of existing policies with family changes, to contribute to evidence-based policy-making. The overall conceptual framework is based on three key premises: family life courses are becoming more diverse, the interdependency of lives matters, social contexts and policies matter. Building upon these premises the project explores the growing complexity of family configurations and transitions, examines their implications for men, women and children with respect to inequalities in life chances, intergenerational relations and care arrangements, investigates how policies address family diversity, and develops short- and longer-term projections to identify future policy needs.

Therefore, a comprehensive picture of the future of the family in the next couple of decades is a prerequisite for addressing this challenge and must encompass much more than a conventional demographic forecast of the size and number of families and households. It must include information about the most likely development of the macro-environment, individual preferences as well as their interactions. This broader area of expected family dynamics is the topic of the 'foresight activities' work package in the *FamiliesAndSocieties* project, that is lead by the Vienna Institute of Demography.

This state-of-the-art paper presents a review of substantive and methodological aspects of foresight studies that are relevant to *FamiliesAndSocieties*. In doing so the paper follows two main guidelines. The first one is a review of the available studies. At present, substantive works on foresight activities regarding family matters are scarce. In fact, there are only two comprehensive studies: one prepared by the *FamilyPlatform* project which preceded *FamiliesAndSocieties* and one by the OECD. Both are discussed below.

The second guideline is a discussion of the state-of-the-art in methods that will be applied in the *FamiliesAndSocieties* foresight activities. From the methodological point of view, foresight activities rely on a selection among a wide variety of qualitative and quantitative methods. Each one of them makes its own specific contribution to the overall foresight, while all of them form a system of methodological tools that constitute the foresight approach. Model selection is a key methodological component which needs to be considered when planning a foresight approach. This is all the more important if the intention is to use new methods whose contribution might not be immediately clear as is the case in *FamiliesAndSocieties*.

The foresight is expected to cover both a short-term period (until 2020) and a longer-term period (until 2030-2040). The activities are structured along qualitative and quantitative components. Two qualitative components include a workshop and focus groups. An online questionnaire will be designed in a qualitative form that can be quantified; hence it is a qualitative-quantitative instrument. Two quantitative models will be applied, namely microsimulation and agent-based models.

We develop the foresight activities in the project in conjunction with the accumulation of information in other substantive work packages. In this way, we make use of achievements related to the scope and operationalization of family well-being, key drivers of future family change and challenges confronting the family in the next couple of decades.

After a short introduction to the essence of the foresight approach in social sciences, this report summarises the two relevant substantive background studies on family foresight mentioned above. This is followed by a description of the methodological background with a focus on the methods less frequently used in a foresight framework, namely microsimulation techniques and agent-based models.

2. Foresight – A Brief Outline

The foresight method emerged from future studies. The latter have existed since the 1960s and refer to a holistic set of methods that not only includes forecasting exercises and trend extrapolation methods (in use since the 1930s) but also methods that synthesize experts' views. From the 1980s onwards, a distinction was made between 'future studies' and the term 'foresight', whose scope enlarges to include wider interdisciplinary networks and various views or scenarios about the future.

The foresight method became later a major component of forward-looking activities[1]. The spread of new information technologies, the increasing importance of technological innovations, the development of services, globalisation, demographic and cultural changes all stimulated the need for managing enormous amounts of data and information and for understanding the longer-term implications of shorter-term decisions[2].

The foresight approach is linked with the need to inform policy makers about future developments in good time to enable them to introduce the required reforms. For this reason, the foresight approach is not confined to a specific scientific discipline. It should rather be seen as a broad methodological framework and an opportunity to connect the knowledge provided by science to the needs of society.

The wide scope and the great variety of tools and methods that can be used for its implementation make it difficult to rigorously define the foresight approach. According to the European Foresight Platform, "(f)oresight is a systematic, participatory, future-intelligence-gathering and medium-to-long-term vision-building process aimed at enabling present-day decisions and mobilising joint actions."[3] This definition emphasises that foresight is essentially a process designed to construct visions about the future while facilitating present-day decision-making. Moreover, foresight comprises "thinking about the future", "debating about the future" and "shaping the future" (op.cit.). The last-mentioned characteristic is particularly important: foresight results can help to shape the future, i.e. to direct trends so they develop in the desired way.

In addition, end results, tools and strategies are typical features of this approach:

- *End results* naturally refer to information about the future, which is provided in various ways. They are either designed to inform policy-makers or to help interested stakeholders improve their organisation. Some end results are made available as reports on scenarios, priority lists or action plans. They can be used to improve future policies, raise awareness among interested stakeholders or recommend structural changes. Others may refer to networking.

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[1] http://ec.europa.eu/research/social-sciences/forward-looking_en.html
[2] "Handbook of Knowledge Society: Foresight", European Foundation for the Improvement of Living and Working Conditions; available in electronic format only: http://www.eurofound.europa.eu/pubdocs/2003/50/en/1/ef0350en.pdf.
[3] http://www.foresight-platform.eu/community/foresightguide/what-is-foresight/, downloaded on 10 July 2013.

- Foresight activities use a combination of *tools* to generate knowledge. There are two main groups: quantitative and qualitative tools. Quantitative tools include such statistical methods of analysis as trend extrapolation, forecasts and other statistical and mathematical models such as microsimulation and agent-based models that are described in the following sections. They also comprise methods for reporting results of expert opinions quantitatively e.g. the Delphi method or specifically designed questionnaires. Quantitative methods have the advantage that the data (generated by official statistical offices or specialised surveys) are usually reliable and easily comprehensible (for example when the results are visualised in figures and graphs). A potential disadvantage is the need to specify assumptions under which the application of statistical methods is possible, restricting the relevance of the results to specific situations. Qualitative methods are instead based on the informed opinions of experts and stakeholders in the field. Their participation is an important component in a foresight approach. Specific tools for discussions as those used in some variations of the Delphi method, focus groups and various types of workshops help collect and systematise a vast body of information that is neither available in quantitative data nor can be quantified for use in statistical methods.
- There are several *strategies* for implementing foresight activities combining quantitative and qualitative approaches: 'top down' and 'bottom up'. While interaction among a large group of experts and collecting information from a wide range of sources are of minor importance in the former, they are emphasised in the latter.

In the foresight approach, uncertainty is not a synonym for the absence of knowledge. On the contrary, uncertainty may even increase when more knowledge becomes available, especially because our world is getting increasingly complex. As a result, the output of a foresight application may yield contradicting paths of future development (Kuhlmann 2002). Hence, the foresight method is different to a forecast, as the latter is only feasible and useful when the future is somewhat predictable (as for instance in demographic forecasts of number of births and deaths).

Under the *FamiliesAndSocieties* project we prefer to use the term 'foresight activities' rather than 'foresight', given the wide variety of purposes, methods, end results and strategies that can be used in the construction of a foresight approach. As well, the approach to be developed under this project can also be considered a 'forward looking activity' where the foresight method plays a major but not the only role.[4] Along with a better anticipation of the future, the purpose of the activity is to inform policy-makers and hence help identify future-related policy implications.

The importance of the foresight approach as a fundamental forward-looking activity method is underlined by the increasing number of projects funded by the European Commission's Framework Programme that are requested to contain this kind of activity. A brief list of selected projects is contained in the Appendix.

[4] See: http://ec.europa.eu/research/social-sciences/forward-looking_en.html

3. Foresight Activities Related to Family Issues: A Review

Foresight activities are mainly used by research on management and technological innovation. Its usage in social sciences is still undervalued. Where families are considered, two foresight projects are available: one carried out by the OECD, and the other was part of the *FamilyPlatform* project.

3.1 Families to 2030, IFP-OECD[5]

In 2009, the OECD International Futures Programme (IFP) launched its project on *Families to 2030* to identify and examine trends in household and family structures and explore their implications for key policy areas. This was the first time ever that the foresight approach was used in connection with family issues. The project comprises two main parts: one is dedicated to projections of families, households and populations, while the other considers future-oriented scenarios.

3.1.1 Projections

An important premise of the project is that social structures change slowly and are therefore stable for a period of 20-30 years. This constitutes the basis for discussing future changes in families and households and their societal landscape, deduced from country-specific projections available in OECD member countries. The results indicate the following changes:

The results show that there will be an increase in such non-standard family and household types as single parent families, cohabiting couples, couples without children, single-person households and reconstituted families. The relative growth of these family forms suggests significant challenges in the future:

- Rising poverty as some of these non-standard forms are most vulnerable to poverty. This holds particularly true for single-person households which mainly consist of aged people (a result of population ageing).
- Weakening family ties and undermining of informal family care.
- Increased pressure on housing as a result of decline in family size, family dissolution, a growing number of single-person households.
- Higher employment among women will decrease their provision of informal family care.

[5] This section is based on information provided by OECD (2012).

The project offers results of various population projections which centre on fertility, life expectancy, migration and urban growth. Projections of other closely related social trends include marriage and divorce, education, labour market potential and participation. It explicitly underlines future technological developments, and in particular medical technologies and information and communication technologies (ICT). The broad societal environment around the family is completed by including general economic prospects.

3.1.2 Scenarios

Projections regarding the development of quantitative aggregates of families and societal trends depend on specifically designed assumptions which are external to the projection models. The dependence on assumptions limits visions about the future of the family. In addition, the family landscape contains a large number of uncertainties which cannot be quantified and need to be made more explicit when designing views about the future of the family. The scenario method is one way to do this. In a workshop, participants developed four scenarios, which were subsequently merged into two contrasting views of the possible future: “Golden Age?” and “Back to Basics”.

The scenarios are set within two dimensions: stability of economic growth and the adoption of new technologies. The “Golden Age?” scenario is characterised by stable but modest economic growth and openness to new technologies; the “Back to basics” scenario by low economic stability and slow adoption of new technologies. Both scenarios share modest average growth rates, continuing pressure on public sector finances and only marginal improvement in fertility rates, but differ in the economic stability, importance of structural unemployment, the role of the state, gender roles and the balance between formal and informal child and elderly care. Basically, the scenarios picture two ways out of the financial crisis of the past years: one offers better perspectives for many by means of major reforms (leading to more equal gender roles and a better work-life balance), the other involves a re-evaluation of traditional values (e.g. traditional gender roles) and practices. Inequalities are a topic in both scenarios: In the first scenario, chronic poverty decreases, while the likelihood for the poor to experience social exclusion is higher in the second. Neither scenario, however, depicts modifications due to increasing population ageing as entirely positive or negative, which underlines the need to include a holistic life course perspective in any and all foresight activities and policy options.

In addition, the analyses of projections, trends and scenarios were streamed into three main family issues: (1) low-income families and social cohesion, (2) work-family life balance and (3) the role of the elderly as recipients and providers of care in the family. In this exercise, the following policy challenges and options were identified:

- In case of modest economic growth and other social and economic developments that exert pressure on public finances and expenditures, it will be hard to sustain current levels of social benefit coverage.

- Improved social outcomes can be obtained without increasing spending by rebalancing responsibilities among individuals, the family and the state.

- Develop coherency in policy domains; e.g. more coherent policies that refer to the entire life cycle of individuals.

- Get people out of long-term disadvantaged situations, such as long-term unemployment and chronic poverty.

- More spatial mobility, intergenerational solidarity and gender equity.

3.2 Foresight Activities in *FamilyPlatform*[6]

In the *FamilyPlatform* project, the focus of the foresight method was on the creation of scenarios and narratives about future family developments up to 2035. The results were mainly obtained with the Delphi method.

The work started with the following preliminary steps:

1. A literature review to identify existing major trends in society that might influence the future of families, in particular in the areas of population ageing, dynamics of marriage, divorce, remarriage and out-of wedlock childbearing rates, but also with respect to the role of grandparents, childcare services, instability of work and poverty.

2. The definition of 'wellbeing of the family' was left to the researchers, stakeholders, policy makers and NGO representatives participating in this project. The actors discussed in small groups and had several rounds of consultations. They defined 10 *key dimensions of wellbeing for families:* security, individual self-fulfilment; health; involvement in society; love, respect and tolerance; balance; time; equality; support for families; living and environmental conditions.

In the next step, characterized by several rounds of brainstorming sessions, key challenges (a) and key drivers (b) were identified that could be used to construct scenarios:

a) *Key challenges* facing the family in the future. Each group identified four key challenges, leading to the prioritisation of the following challenges:

i. Work life balance and time management
ii. Changes in behaviour
iii. Ageing/demographic changing
iv. Uncertainty
v. Gender roles
vi. Diversity
vii. Families not valued by society
viii. Economic crisis
ix. Immigration

[6] This section is based on information provided by the *FamilyPlatform* (2011).

b) K*ey drivers* that are expected to have an impact on the wellbeing of families:

i. Inequalities
ii. Migration
iii. Education and values in society
iv. Care systems

Finally four feasible future scenarios were constructed along the four key drivers and described narratively with examples of families living in these contexts. The scenarios are summarised in Table 1 below.

Table 1: The four scenarios developed in *FamilyPlatform*

Scenario	*Inequalities*	*Migration*	*Education and values in society*	*Care systems*
1	Equal opportunities	Open	Diverse	Mix of public and private
2	Increasing	No (very selected)	Private education, extreme position in values	Privatisation of care systems
3	Increasing	Open limited	Private education, accepted diverse values	Privatisation of care systems
4	Equal opportunities at low level	Restricted	Rigid public education with specific curricula, accepted diverse values	Public care systems

Source: *FamilyPlatform* (2011)

The four scenarios describe future family environments. 16 narrative discussions outline the situation of a case family within the realm of each scenario.

For example, the first scenario describes a social setting characterised by the prevalence of a positive cultural attitude and successful integration of migrants; i.e. a confident society with few social and economic fears and a strong welfare system. Families can choose but need to be flexible and well informed. Individual orientations may lead to weaker family ties; hence there are emerging emotional needs for greater family solidarity and support.

The following issues with policy implications were identified in the discussion of the four scenarios and 16 family narratives:

- Intergenerational solidarity and communities
- Sufficient time for families
- Unpaid work and care arrangement
- Children's perspectives (rights and best interests)
- Periods of family transitions
- Family mainstreaming and individualisation
- The impact of technological advancement on families

3.3 The Need for a New Round of Foresight Activities in Family Studies

Both "Families to 2030" and *FamilyPlatform* have the merit of pioneering achievements in the introduction of foresight activities to the future of the family. Their contribution needs an update for several reasons.

An update is needed for the simple reason that the present foresight activities will be conducted several years later, hence new challenges and problems may have emerged. Updating forecasts and foreword looking activities is a common practice.

Next, both projects, as well as other foresight activities that were conducted before or shortly after 2009, did not fully incorporate in their results the effects of the economic crises which was at its beginning at the time. Meanwhile the effects of the economic crisis appeared stronger and will last longer than expected. This could lead to changes and raise additional questions in the potential influence on changes in family forms and roles (care of older/disabled members, access to resources, etc.) and enhanced restrictions to family policies.

From the methodological point of view the *FamiliesAndSocieties* project will use the foresight activities approach in its integrity with a combination of qualitative and quantitative methods. The application of qualitative methods only may lead to intuitive results that may fail to provide any information about how *likely* is something to happen and what *magnitude* its effect would have. *FamiliesAndSocieties* envisages the use of microsimulation techniques in a similar way as used in Thomson et al (2012), to obtain quantitative views about the development of family forms in the future. We will use also agent based techniques, designed specifically to help mobilize policy makers and check the potential consequences of their decisions (as examples of applications see Bourguignon and Spadaro 2006, Billari et al. 2007, Aparicio et al. 2011). The main idea is that we take into account the heterogeneity of "agents" by means of micro-level data and let the agents interact with the environment and with each other to assess what effect a certain action (a policy) has.

Where qualitative methods are concerned, we go beyond the use of workshops and focus groups. With the help of technological means – specific software and web-designed surveys – we will receive valuable information by means of a large-scale questionnaire from a large group of experts. The experts are confronted with the quantitative results and the outcome of their discussion will be condensed in a form that will be useful to policy makers. This approach has been already developed and is being used for the ERC project "Forecasting Societies Adaptive Capacities to Climate Change" awarded in 2008[7].

In the following section we focus on the methods that will be used in the *FamiliesAndSocieties* project.

[7] European Research Council (ERC) Advanced Investigator Grant focusing on "Forecasting Societies' Adaptive Capacities to Climate Change" (ERC-2008-AdG 230195-FutureSoc).

4. Foresight Tools in *FamiliesAndSocieties*: An Innovative Mixture of Quantitative and Qualitative Methods

A contemporary foresight approach comprises several methods selected from a large number of available tools. In this section, the focus is on the methods to be used in the *FamiliesAndSocieties* project. They include five main tools: 1) a workshop in the form of a world café, 2) focus groups, 3) an online questionnaire, 4) microsimulation and 5) agent-based modelling. The latter two are described in more detail as they are rarely used in foresight activities in social sciences. The former three are better known and are therefore discussed only briefly with respect to their application in a family-oriented approach.

The foresight activities are organized in sequential steps. First, a task-force workshop involving stakeholders will help identify the key areas for foresight activities. A second step will consist in performing micro-simulation and agent-based computational estimates about family forms in the short- and mid-run. The methods should assess changes in family forms that are expected to occur and expand, in particular under conditions of a recession. The micro-simulation will provide information about the prevalence of different family configurations under different demographic scenarios. The agent-based methods will complement the view given by the micro-simulation observing how the "simulated" actors of a hypothetical society react to the hypothesized changes in the rules of the demographic behaviour affecting families and how interactions of individual behaviour affects society. The work proceeds then with the setting up of focus groups, with stakeholders and with policy makers, to provide plans and acting strategies to mobilize active policy makers. An innovative feature of *FamiliesAndSocieties* is that the views about the future are continuously updated during the project, to include the views expressed by stakeholders and policy makers on the results emerged from other working packages in the forms of additional implementations of agent based models. The "actors" of a hypothetical society will follow the rules and manifest the behaviours worthy of note for the well-being of the different kinds of families, and implications will be drawn about the predictability of some situations and the possibility to avoid or encourage some developments.

4.1 Qualitative Approaches

4.1.1 Workshop: Setting the Scene

This method facilitates envisioning possible future families, living arrangements and family wellbeing. The aim is to describe desirable and undesirable scenarios and family forms by means of narratives. This requires the active participation of researchers, policy makers, NGOs and other stakeholders during several stages of the process.

The *FamilyPlatform* used the Delphi method to synthesise the expectations of a panel of experts in the early stage of the foresight activity preparation and design. An important feature of this method is that it deploys the implicit and explicit knowledge of the participants and their experience. The issues are discussed by several groups in several rounds of questions and answers. The groups give feedback to the panel and new groups are created to further discuss and comment the previous groups' findings. The participants

identified the future key challenges for families, defined the key drivers of future changes and outline scenarios that indicate what future families and societies might be like.

Besides the Delphi method, there are various other techniques to pull together the knowledge and experience of a heterogeneous group of experts and stakeholders, among them the world café and other forms of structured and unstructured brainstorming. The world café method was developed by Brown and Isaacs (2005). The main difference to the Delphi method is that each group appoints a host who delivers a summary of the findings from one round to the participants of the next group. Hence there is no feedback report to the entire panel. This leads to a local segregation of knowledge, which helps to maintain a higher degree of heterogeneity with respect to knowledge and solutions elaborated within the different groups.

4.1.2 Focus Groups

A focus group can be defined as "a group interview centred on a specific topic ("focus") and facilitated and co-ordinated by a moderator or facilitator – which seeks to generate primarily qualitative data, by capitalising on the interaction that occurs within the group setting" (Sim and Snell 1996: 189). A focus group is used in order to understand how people feel and think about an issue, service or idea.

Compared to questionnaires or non/standardised interviews, focus groups have several advantages. First of all, they provide information on the 'dynamics' of attitudes and opinions in the context of the interaction that occurs between the participants (Morgan 1988). Secondly, they may encourage a greater degree of spontaneity in the expression of views than alternative methods of data collection (Butler 1996). Thirdly, participants may feel supported and empowered by a sense of group membership and cohesiveness (Goldman 1962, Peters 1993). When interpreting and analysing the data, we have to bear in mind certain limitations and specificities of focus groups. Opinions expressed in focus groups should not be used as a measure of consensus. The problem of 'censoring' dissenting views held by less confident participants within the group may always exist. Therefore the *absence* of diversity in the data does not reliably indicate an underlying consensus (Sim 1998). To capture the range of issues which are relevant to the participants and to increase the reliability of the data, it is desirable to conduct more than one focus group. It is also difficult to *determine the strengths of expressed opinions*. There is no one-to-one relationship between the apparent prominence of an issue within a group and its importance for the members of this group (Sim 1998: 349). *Generalising* from focus groups may be problematic because we do not work with a representative sample and get the data from a social interaction occurring in a particular context. We can therefore only generalise on a theoretical level. This means that we can expect that members of a social group – of which the focus group is a (statistically non-representative) sample – generally share common frameworks of concepts and propositions regarding an issue (Sim 1998).

In the *FamiliesAndSocieties* project, we will conduct four focus groups with different sets of participants (users or practitioners) in four different European countries (each with about ten participants). Our primary aim is to reveal the potential users' and practitioners' subjective views. The focus group is a good method to achieve this aim (Morgan and

Spanish, 1984). Users and practitioners include families and stakeholders who will form separate focus groups.

4.2 Quantitative Approaches: Agent-Based Models and Microsimulations

A foresight approach can combine expert-based narrative views about the future with quantitatively assessed, model-based probabilities and selected choices for future paths of development. Quantitative models, and in particular microsimulation and agent-based models, are, however, used less frequently than qualitative methodological tools. Among others, they were utilised in foresight developed in studies on obesity (McPherson et al. 2007), chronic diseases (McPherson et al. 2012) and urban planning (Bazzanella et al. 2012). However, their application in social disciplines is limited, if at all existent.

In general, the aim of family policies is to allocate resources to households with children to provide them with the means to have and raise children. More specifically, Thévenon and Luci (2012) discuss three broad categories of family policy objectives: "The first objective is to assist parents with the direct costs of children in order to reduce differences in the standard of living between households with and without children. The second objective is to help parents to combine work and family life [...], the third objective is to support children's cognitive and social development." Although policies are negotiated and implemented at the macro level, their implications – with respect to these three objectives – operate at the micro (household) level. Besides, both the households' reactions to policy changes and also the actual achievement of policy goals do not only depend on the macro level environment and the ensuing behaviour at the micro level, but also on interactions between households or individuals. Montgomery and Casterline (1996) distinguish between *social learning*, which is based on the exchange of knowledge and information, and *social influence* arising from the *desire to avoid conflict within social groups* and the *threat of group disintegration*. They argue that social networks (i) provide information that expands the set of choices, (ii) demonstrate the consequences of behaviour adopted within the group and (iii) affect individual preferences through social influence effects and conformity pressures. Thus, any household exerting a particular behaviour may induce a snowball effect. In order to investigate the impact of policies on family well-being it is desirable to explore the macro level, the micro level and the interactions between these levels (micro-macro link) and within the micro level (social learning and social influence). By using the individual unit as basis of the modelling work, simulation at the micro level allows us to analyse the distribution of resources across different population groups.

The main tools for simulating individual behaviour are standard microsimulation models (MSMs) and agent-based models (ABMs). Unlike traditional macrosimulation, which produces average indicators or focuses on typical or median cases, "[m]icrosimulation models open up a much richer vein of research by enabling the exploration of heterogeneity and diversity within the simulated population [and thus …] has proven to be a particularly useful tool for policy analysis" (Zaidi and Rake 2001, p. 1). Microsimulation answers 'what if' questions about demographic or social and economic policy scenarios. Microsimulation methods are particularly suitable for assessing changes in family forms that will occur and spread, because they provide information about the

prevalence of different family configurations in different demographic scenarios. Moreover, microsimulation lets us analyse the impact of specific lifetime events and identify the population-level implications of individual-level family processes (Thomson et al., 2002). In addition, dynamic microsimulation models, which operate prospectively, consider the future profile of individuals, which is "particularly important in capturing the full distributional impact of some policies […], whose full effects take a considerable amount of time to filter through" (Zaidi and Rake 2001, p. 1). Hence, dynamic microsimulation models play an important role in informing social scientific thinking about the future and thus make a valuable contribution to foresight activities. While microsimulation models typically use empirically estimated transition probabilities to investigate the flow of the life course in a multi-state space, the agents in ABMs usually have a goal and communicate with other agents to achieve this goal. This sometimes leads to the emergence of aggregate level outcomes which initially were not intended by the subjects nor were imposed on them. Moreover, nonlinearity, path dependence and local interactions render the dynamical evolvement of the model unpredictable by classical statistical methods. However, microsimulation and agent-based models both complement conventional empirical approaches.

Microsimulation models allow us to move from analysis to synthesis (Willekens 1999) as they help us to "link multiple elementary processes in order to generate complex dynamics and to quantify what a given process contributes to the complex pattern of change" (Spielauer 2009a, p. 10). Agent-based models complement inductive and deductive reasoning. A set of statistical data may serve as starting point for a model that fits the data. This model then leads to a theory that has to be tested. However, the process also works in the opposite direction: A general, abstract model based on existing rules may produce *a priori* unknown patterns that can be analysed by induction. Epstein (1999) characterises ABMs as a tool for conducting generative social science. According to Epstein, 'generative' means to explain the emergence of macroscopic societal regularities, and in particular to generate regularities as a result of decentralised local interactions.

4.2.1 Agent-based Models

In demography, ABMs have been used, for instance, to explain mate choice and union formation (Kalick and Hamilton, 1986; Simão and Todd, 2003; Todd and Billari, 2003; Todd et al., 2005; Aparicio Diaz and Fent, 2006; Billari et al., 2007; Hills and Todd, 2008; Walker and Davis, 2013), fertility (González-Bailón and Murphy, 2008, 2011; Aparicio Diaz et al., 2011), migration patterns and the effects of family policies (Baroni et al., 2009a, b; Zamac et al., 2010; Baroni, 2011; Fent et al., 2011). Demographic events like mate choice, union formation, the birth of a child or migration typically originate at the individual level. They are subject to individual decisions guided by individual tastes and preferences, heterogeneity and bounded rationality, which qualify them as archetypical examples for ABMs. Nowadays, the increasing diversity of family forms, relationships and life courses in Europe add to the usefulness of ABMs.

Several ABMs on mate choice and union formation attempt to explain patterns of the age-specific hazard function of age-at-marriage (Simão and Todd, 2003; Todd and Billari, 2003; Todd et al., 2005; Billari et al., 2007), which typically shows a steep ascent at young

ages, followed by a moderate descent. While the earlier approaches use an exogenously given, normally distributed waiting time to obtain appropriate results (Simão and Todd, 2003; Todd and Billari, 2003; Todd et al., 2005), Billari et al. (2007) incorporate social effects, which permits an endogenous explanation of empirically observed age-at-marriage rates. The ability of ABMs to incorporate any kind of heterogeneity and individual preferences has successfully been deployed to study, for instance, ethnic preferences and interactions between ethnic groups in marriage markets. Walker and Davis (2013) apply an empirical simulation model to investigate marriage markets in New Zealand. The allocation of the agents' characteristics is taken from the New Zealand Census of Population and Dwellings to approximate the regions of New Zealand. The characteristics age, education, ethnicity and the observed rate of inter-ethnic partnership are used to match the agents. The model can consistently produce patterns of ethnic partnering in New Zealand.

Research on fertility in Europe has seen paradigm shifts due to increasing diversity and complexity. Recent studies show that there is no longer a monotonic relationship between fertility and income, education, development, female labour force participation or gender equity. These nonlinearities, in turn, open promising new avenues for ABMs to analyse fertility and family policies. So far, ABMs were used to study the dynamics of fertility in a diverse range of time horizons. González-Bailón and Murphy (2008, 2011), for instance, study the spatial diffusion of low fertility in France during the 19th and early 20th century, while Aparicio Diaz et al. (2011) try to find explanations for shifts in age-specific fertility between 1984 and 2004. González-Bailón and Murphy make use of ABMs' ability to incorporate individual and spatial heterogeneity and the role of social influence in fertility decisions. The agents decide about the desired number of children, taking into account their own inclination to have children and also the desired number of children of agents within their geographic neighbourhood. Their approach could replicate the observed demographic trends including regional diversity, in particular with respect to the timing of the decline in fertility. The simulation results suggest that different regional trends can partially be explained by the heterogeneous impact of the revolution. The starting point of Aparicio Diaz et al. (2011) was Kohler et al.'s (2002) hypothesis that lowest-low fertility in Europe has emerged from the combination of five distinct demographic and behavioural factors: (1) distortions of period fertility measures due to the postponement of births to later ages of mothers, (2) economic and social changes, (3) social interaction processes, (4) institutional settings and (5) postponement-quantum interactions. Aparicio Diaz et al. show that a model that takes into account social interaction can explain the shift in age-specific fertility between 1984 and 2004. This demonstrates that the behavioural factor of social interaction (argument 3 in Kohler et al.'s hypothesis) is indeed a plausible explanation of fertility changes during that period. By applying one common social mechanism, the model can, moreover, explain the observed decrease of fertility at younger ages along with the increase of fertility at higher ages. This supports the assumption that postponement of first births may be partially compensated by recuperation of fertility at later ages. Complementary to these exercises of reconstructing or explaining past fertility dynamics, Zamac et al. (2010) investigate strategies to escape the low fertility trap (see Lutz et al., 2006). The agents in their model take decisions based on rules combining economic and social effects. In a scenario with fixed social norms, society is not trapped in a low fertility setting. Once captured in the trap, an escape requires

persistent and costly policy measures over a period exceeding the expected remaining life time of the currently active population.

In micro-founded macroeconomics, the impact of policy changes is often studied within a representative agent framework. As diversity increases in modern societies, the share of the population actually represented by the representative agent is quickly shrinking. Policy-makers should not aim at optimising the well-being of a small subgroup of society – represented by the so-called representative agent – but should rather aspire to improve the well-being of the majority of the population. In this respect, another important aspect of ABMs is their ability to transcend the representative agent approach and investigate well-being not only for various subgroups but even for each and every individual. Baroni (2011) exploits this property of ABMs to investigate the effect of family policy reforms on female old-age poverty. In particular, she addresses the question of how households react to changes in parental leave arrangements. Within that modelling framework, the women can choose between full time, part time and voluntary housework. This leads to a trade-off between working more and higher income, on the one hand, and looking after the children and saving on childcare costs, on the other hand. The simulations reveal that only highly educated women gain from the reform because their labour force participation and earnings are higher.

4.2.2 Microsimulation

Microsimulation was introduced to social sciences by Guy Orcutt's (1957) seminal paper. Frustrated by the macroeconomic modelling of these days, he proposed a new type of model comprising decision-making and interacting units such as individuals, families and firms (Harding and Gupta, 2007). The core of a typically data-driven microsimulation model is a population micro-database storing the characteristics of all members of the population. The individuals are in a predefined number of states, which are switched randomly in line with a transition probability, which usually depends on the individual characteristics. The population database is then dynamically updated in a simulation run according to the micro models of behaviour and policy rules. The user can parameterise the models, so that the transition probabilities are often derived from empirical evidence (Morand et al., 2010).

Dynamic microsimulation models are mainly categorised according to the way they handle time and whether the model population is open or closed. Most models treat time as a discrete variable, which determines all possible transitions for all individuals and each time period, but disregards the exact time point within the interval. When different events occur during the same time period, the order of events is chosen according to a predefined rule. More recent models adopt a continuous time approach, which uses statistical models of durations to associate time with an event within the framework of competing risks. Starting at a fixed time point, a random process generates the duration of all events. The event with the shortest duration is executed first, while the later represents the new starting point (Morand et al., 2010; Spielauer, 2009a). As the exact times of events, and thus also their sequence, are determined by the model rather than by any exogenously imposed rule, continuous time models are preferred to discrete-time microsimulation models (Willekens,

2006) although they make heavy demands on the underlying data and computer resources (Zaidi and Rake, 2001).

Moreover, microsimulation models are classified according to whether the population is modelled open versus closed. In open models, individuals are simulated independently from one another: individuals experience events such as union formation, having children, etc. without any explicit relationship with other individuals. Closed models include links between individuals, e.g., when a married person dies, the spouse becomes a widow/widower and the children become orphans of this parent. Besides, closed models explicitly model a marriage market, while open models create a partner with suitable characteristics when an individual enters a union (Morand et al., 2010). While the modelling of open populations requires some abstraction, closed models permit tracking kinship networks and enforce more consistency. However, closed models have drawbacks such as sampling problems and stronger computational demands associated with partner matching (Spielauer, 2009a).

Besides these two major distinguishing criteria, microsimulation models also differ regarding the type of starting population, which is either a cross-sectional population or a birth cohort. Moreover, the starting population may either be based on a cross-sectional or survey dataset or on a synthetic population, i.e., the characteristics are imputed from different information sources (Morand et al., 2010; Spielauer, 2009a).

In the wake of Orcutt's (1957) idea, dozens of large-scale general-purpose models and countless specialised smaller models have been developed around the world. However, the majority of them do not aim at creating a demographic model but rather model the nation-specific demographic evolution and are a starting point for more specific issues such as tax-benefits, pension plans, health and long term needs, student loans, etc. or kinship studies (Morand et al., 2010).[8] Nevertheless, the demographic modules of these models contain a detailed simulation of fertility, family building and dissolution, i.e. births, deaths, migration, cohabitation and marriage, divorce/separation and children leaving home as well as education, health and working status. However, "[c]omprehensiveness and complexity comes at the price of making it difficult to interpret results and to separate out the impact of individual processes" (Spielauer, 2007, p. 43). Hence, for the *FamiliesAndSocieties* workpackage, a purely demographic model is better suited (1) for assessing changes in family forms that will occur and spread and (2) for providing information on the nature of changes in future family forms.

The small, purely demographic models developed in the 1960s and early 1970s seem to have disappeared (Galler, 1997). Currently, there exist only a few applications focussing on family building issues, including FAMSIM (Lutz, 1997) and several applications of RiskPath (Spielauer, 2009b,c) on the interaction of fertility and union processes (Spielauer et al. 2007; Bélanger et al., 2010; Thomson et al., 2012). FAMSIM (Lutz, 1997) is a dynamic microsimulation model designed for projections and the evaluation of family

[8] For a detailed description of most prominent microsimulation models see, for instance, Zaidi and Rake (2001), Spielauer (2007), Morand et al (2010) and Li and O'Donoghue, C. (2012) and for their applications, e.g., Harding and Gupta (2007), Zaidi et al (2009).

policies; it is based on FFS data (Doblhammer et al., 1997). The microsimulation is a pseudo-continuous model, i.e. a discrete time model with monthly time units. Such small time units almost eliminate the problem of multiple events (Wolf, 1997, ch. 4). Moreover, FAMSIM models childbearing, the formation and dissolution of (marital and non-marital) partnerships as well as the schooling and working behaviour of the individuals.

Using FAMSIM, Spielauer and Vencatasawmy (2001) simulate the future number of births for Austria until 2050, where the aggregated forecasts correspond well with macro measures from independent sources. However, by using microsimulation, the authors could produce forecasts offering more detailed information than any macro model. For instance, the results show a trend towards an increasing number of childless women and unmarried cohabitation, which will become the predominant partnership arrangement for women below age 30 (Spielauer and Vencatasawmy 2001).

The more recent applications of microsimulation models on family issues move from prediction to a synthesis of micro-level processes underlying the connections between union behaviour and childbearing. These studies employ variants of RiskPath (Spielauer, 2009b, c), which is a continuous-time, competing risk microsimulation model that generates synthetic cohort fertility and marital histories. RiskPath is implemented in Modgen, a generic microsimulation programming language developed and maintained at Statistics Canada (2009). Using Bulgarian and Russian GGS data, Spielauer et al. (2007) decompose the observed fertility decline in first and second births in these countries into the impact of changes in union formation and dissolution and mere fertility changes in different partnership situations. The simulations reveal that the Russian fertility drop can be almost entirely attributed to reductions in first and second birth risks, while a substantial part of the lower number of births can be ascribed to delayed partnership formation in Bulgaria (Spielauer et al., 2007).

In another application of RiskPath, Bélanger et al. (2010) investigate differences in marital behaviours (marital vs. common-law unions) in explaining lower fertility in Quebec as compared to the rest of Canada. Common-law unions are more widespread in Quebec; they are found to be less stable and to exhibit lower fertility than marital unions. However, common-law unions are generally entered at younger ages (where fertility is higher) than marital unions. In contrast, marital unions and marital births dominate in the rest of Canada and partnership formation usually occurs later in the individual life courses. Using data from the Canadian General Social Survey (Statistics Canada 2002), Bélanger et al. run different scenarios by varying fertility and union formation and dissolution parameters from Quebec and the other provinces of Canada. They demonstrate that the more complex marital histories of Quebecers can explain more than one quarter of their fertility differences with the rest of the country (Bélanger et al., 2010).

Thomson et al. (2012) investigate the implications of changes in union formation and dissolution on fertility, which depends on the relative strength of two opposing forces. On the one hand, union dissolution reduces opportunities for conceiving and bearing children. At the same time, it produces a pool of persons who may enter new partnerships, where additional children may be desired; that is, birth risks in new partnerships are elevated when the prospective child will be the couple's first or second (Thomson, 2004; Thomson et al., 2002). Thomson et al. (2012) use microsimulation to examine the balance between

union formation and dissolution based on the 1999 French Etude de l'Histoire Familiale data (Cassan et al., 2000) with a variant of RiskPath (Spielauer, 2009b, c). In the microsimulation analysis, the authors model the interaction between union and birth history in great detail and find that, in France, repartnering only partly offsets the lower fertility due to union dissolution. However, the fertility gap is smaller when family formation is postponed, i.e., when union formation and dissolution or first birth occur after age 30 or when couples delay childbearing until they have formed a union (Thomson et al., 2012).

5. Summary

In recent years, the use of the foresight approach has rapidly proliferated. It has been applied in various fields, usually with the intention of providing policy-makers with information based on scientific findings and methods. In particular the last two Framework Programmes of the European Commission have acknowledged its importance by supporting a growing number of foresight-oriented projects. Moreover, also governments become increasingly convinced of its value. The United Kingdom's government office for science has supported a Government Foresight Programme since 1994 which, among others, has produced a report about the future of demographic changes (http://www.bis.gov.uk/foresight/our-work/policy-futures/demography).

Yet the foresight approach has rarely been utilised in social sciences. It was applied extensively in only two projects on the future of families, i.e. *Families to 2030* by the OECD and the *FamilyPlatform* project. Both yielded important results for policy-making.

The *FamiliesAndSocieties* foresight is designed to update the knowledge gathered by *Families to 2030* and the *FamilyPlatform* project and make at least two important contributions to methodology.

An update is needed because both completed projects covered a period of societal and economic development when the length and impact of the financial and economic crises were unclear. Initially expected to be of a short-term nature, the crises are now known to have a longer effect.

Both *Families to 2030* and the *FamilyPlatform* project used qualitative foresight methods. They took into account future demographic change externally, either in the form of literature reviews or by drawing on results of available projections and forecasts. The *FamiliesAndSocieties* foresight will rely on quantitative techniques which will be combined with qualitative methods to produce a more accurate view of the future of families. In addition, an online questionnaire will provide a large body of expert-based information, which is expected to significantly upgrade the qualitative findings.

This work is expected to produce newer, deeper and more multifaceted knowledge of the future of the families that could contribute best to the needs of policy makers and other stakeholders involved in designing family-oriented interventions.

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Appendix

Projects that deal with foresight or forward-looking activities in general funded under the Seventh Framework Program (FP7) of the European Commission.

The "Handbook of Knowledge Society: Foresight" by the European Foundation for the Improvement of Living and Working Conditions (2003) contains a broad overview of foresight methods, main phases and players.

During the past years, the interest in foresight activities increased considerably and in the European Commission's FP7 2007-2013 several funded projects include research related to foresight or forward-looking activities. They are listed below.

- EFP – European foresight platform – Supporting forward looking decision-making. The project launched the www.foresight-platform.eu website and facilitates collecting information and news about foresight activities.
- DEMETER - Development of methods and tools for evaluation of research. The techniques used are based on micro-meso-macro-economics and used for the ex-ante evaluation of research and innovation policies at the sectoral and European levels.
- e-FRAME – European framework for measuring progress. Enhances the relevance of well-being measures and analysis for addressing key policy issues and makes suggestions on how to develop the future research agenda in this field.
- FARHORIZON – Foresight is used to align research with longer-term policy needs in Europe. The project uses a success scenario approach to engage key decision-makers in building a vision for their area of activity and identifying the key steps to get there (agriculture and climate change, innovation, policy, teaching and learning, critical minerals and metals).
- FLAGSHIP - Forward looking analysis of grand societal challenges and innovative policies. The project aims at driving change, supporting the policy shift from adapting to changes through short-term policy responses, towards anticipating, welcoming and managing changes properly.
- GRASP – Growth and sustainability policies for Europe. In a context of challenged and changing multilateralism, the foresight activities include scenarios of future roles of the EU regarding security issues.
- IKNOW – Interconnecting knowledge for the early identification of issues, events and developments (e.g. wild cards and associated weak signals) shaping and shaking the future of science, technology and innovation in the European Research Area. Examines high impact but low probability events to spot surprising developments sufficiently in advance.
- INFU – Innovation futures in Europe: a foresight exercise on emerging patterns of innovation. It develops visions, scenarios and implications for policy and practice.
- METRIS III – Monitoring European Trends in Social Sciences and Humanities.
- MULTILINKS – How demographic changes shape intergenerational solidarity, well-being and social integration: a *multilinks* framework. The objective of

MULTILINKS is to investigate how changing social contexts from the macro-societal to micro-interpersonal level affect social integration, well-being and intergenerational solidarity across different European nations. The project examines (a) multiple linkages in families (e.g. transfers up and down family lineages, interdependencies between older and younger family members), (b) multiple linkages across time (measures at different points in time, at different points in the individual and family life course), (c) multiple linkages between national and regional contexts (e.g. policy regimes, economic circumstances, normative climate, religiosity) on the one hand, and individual behaviour, well-being and values on the other hand. Throughout the project, methodological strategies that enable sound policy making are tested, developed and used.

- PASHMINA – Paradigm shifts modelling and innovative approaches: PASHMINA is an effort to anticipate and model possible paradigm shifts in the economic, social, technological and environmental spheres and to understand their implications. The project creates a host of scenarios depicting major changes in energy supplies, agriculture, land use, transportation and the environment. A central goal of PASHMINA is to avoid the historical tendency of seeing the future as a continuation of the past and instead envision a future that is significantly different from the present.
- POINT – Policy influence of indicators. The project has a major thematic focus on sustainable development.
- SCOOP – Socio-economic sciences: communicating outcomes oriented to policy. Promotes the successful communication between research and policy.
- SIMPATIC – Social impact policy analysis of technological innovation challenges. SIMPATIC brings together a wide variety of top-class researchers specialising on micro- and macroeconomics with expertise in evidence-based policy analysis, impact assessment and the scope and nature of research and innovation policies. The objective of SIMPATIC is to provide policy-makers with a comprehensive and operational tool box allowing for a better assessment of the impact of research and innovation policies in Europe, thus allowing European innovation policy-makers to better address the EU2020 challenges.
- SUSTAINCITY – Microsimulation for the prospective of sustainable cities of Europe. The goal of this project is to address the modelling and computational issues of integrating modern mobility simulations with the latest microsimulation land use models. The project wants to advance the state of the art in the field of the microsimulation of prospective integrated models of Land Use and Transport (LUTI). On the modelling side, the main challenges are to integrate a demographic evolution module, to add an environmental module, to improve the overall consistency and, last but not least, to deal with the multi-scale aspects of the problem: several time horizons and spatial resolutions are involved.
- TEPSIE – The theoretical, empirical and policy foundations for building social innovation in Europe. The project measures social innovation.

Projects containing foresight or forward-looking activities specialising on family issues:

- FAMILYPLATFORM – Social platform on research for families and family policies (see above). The EFP project created a website to record the existence of foresight activities in different fields:

  http://www.foresight-platform.eu/community/foresightguide/what-is-foresight

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Working Papers

Sander, Nikola, Guy J. Abel and Fernando Riosmena, *The Future of International Migration: Developing Expert-Based Assumptions for Global Population Projections*, VID Working Paper 07/2013.

Caselli, Graziella, Sven Drefahl, Marc Luy and Christian Wegner-Siegmundt, *Future Mortality in Low-Mortality Countries*, VID Working Paper 06/2013.

Basten, Stuart, Tomáš Sobotka and Kryštof Zeman, *Future Fertility in Low Fertility Countries*, VID Working Paper 05/2013.

Sharygin, Ethan, *The Carbon Cost of an Educated Future: A Consumer Lifestyle Approach*, VID Working Paper 04/2013.

Winkler-Dworak, Maria and Heiner Kaden, *The Longevity of Academicians: Evidence from the Saxonian Academy of Sciences and Humanities in Leipzig*, VID Working Paper 03/2013.

Feichtinger, Gustav, Alexia Prskawetz, Andrea Seidl, Christa Simon and Stefan Wrzaczek, *Do Egalitarian Societies Boost Fertility?*, VID Working Paper 02/2013.

Muttarak, Raya, *Is it (dis)Advantageous to Have Mixed Parentage? Exploring Education & Work Characteristics of Children of Interethnic Unions in Britain?,* VID Working Paper 01/2013.

Testa, Maria Rita and Stuart Basten, *Have Lifetime Fertility Intentions Declined During the "Great Recession"?*, VID Working Paper 09/2012.

Buber, Isabella, Ralina Panova, and Jürgen Dorbritz, *Fertility Intentions of Highly Educated Men and Women and the Rush Hour of Life*, VID Working Paper 08/2012.

Testa, Maria Rita, Laura Cavalli, and Alessandro Rosina, *The Decision of Whether to Have a Child: Does Couple Disagreement Matter?*, VID Working Paper 07/2012.

Kuhn, Michael and Klaus Prettner, *Growth and Welfare Effects of Health Care in Knowledge Based Economies*, VID Working Paper 06/2012.

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Grafeneder-Weissteiner, Theresa, Ingrid Kubin, Klaus Prettner, Alexia Prskawetz, and Stefan Wrzaczek, *Coping with Inefficiencies in a New Economic Geography Model*, VID Working Paper 04/2012.
