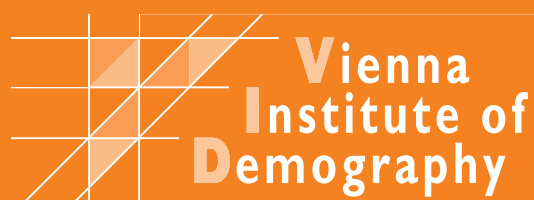




The Vienna Institute of Demography **2002–2006: A Five Year Portrait**





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Contents

2	A Word from the Directorate
3	The View from the Academy
4	The Spirit of VID
8	Research Highlights
8	A turning point in Europe – Science 2003
9	Redefining ageing – Nature 2005
10	European identity – Science 2006
11	Population, participation, productivity, prosperity – Population economics
12	Micro, macro and meso – Ageing and productivity
13	Understanding progress – Ageing and economic growth
14	A good year – Vintage models
15	Very particular populations – The age dynamics of learned societies
16	Demography from the bottom up – Agent-based modelling
17	Eventful years – New pathways to family formation
18	Looking into the future – Population dynamics and forecasting
20	Understanding uncertainty – Probabilistic projections
21	People and households – Household projection methodology
22	New perspectives on human capital – Multi-state projections of education
23	The religious future – Religion forecasts
24	Living longer and longer – Forecasting mortality
25	Reconstructing the past – Long-run estimates for Austria
26	Theme and variations: fertility in Europe – Comparative European demography
28	Fulfilled or frustrated? – Fertility intentions
30	Later and lower – Fertility level and tempo
32	At the heart of Europe – The demography of Austria
33	The future of universities – Forecasts for the Ministry of Science
34	Monitoring monthly fertility – The birth barometer
35	30 years below replacement – Understanding fertility
36	Unequal chances – Educational differentials in health and mortality
37	Sex and death – Male-female differentials in mortality
38	The reality of ageing – the SHARE project
39	In-depth perspectives – the FEMAGE project
40	VID Publications
42	VID Conferences and Colloquia
44	VID Connections
46	VID Visitors
47	VID and IIASA
48	The Future of VID
49	List of VID staff – 2002–2006
50	VID Numbers

A Word from the Directorate

Welcome to the Vienna Institute of Demography (VID), a research institute of the Austrian Academy of Sciences.

In 2002 the Academy took a bold new initiative to build an international centre of excellence in demography, significantly expanding the budget, geographic coverage and scientific remit of its existing Institut für Demographie (IfD). Founded in 1976, and following the model of other national demographic institutes in Europe, the IfD focussed principally on population trends in Austria, developing a strong reputation for high-quality analysis and research that cut across several social sciences. Following a very positive, international review of the Institute in 1997, the Academy undertook a consultation exercise on the best way forward, drawing on the advice of the directors of Europe's leading demographic research institutes. Shortly after the dawn of the new millennium, the Academy decided to launch a number of new institutes with wider international ambitions and chose demography as one of them. The Academy could build on the solid foundation of the IfD to create an institute with an international research agenda and scientific staff. To mark this new beginning, the Institute adopted a new identity as the Vienna Institute of Demography (VID). The direction we were moving in received a vote



Wolfgang Lutz, Alexia Fürnkranz-Prskawetz and Richard Gisser

of approval in 2003 in another international assessment.

The goal we were set in 2002 was to play a significant role in the European demographic scene. Five years on, we think we are doing so. Over these years VID has roughly doubled in size; we are now home to more than 20 scientists. We have been able to attract some of Europe's most dynamic and innovative demographers. We have produced a steady stream of publications, many of which have been influential in our field. And the Institute has become an integral part of European demographic research, collaborating with scholars from many countries, arranging seminars and conferences on key demographic issues in Europe, and providing science-based

advice to the European Commission and national governments.

After five sometimes-hectic years, we felt it was worth pausing for breath to take stock of what has been achieved so far. This booklet presents a portrait of the current VID. In it we hope to give you some insights into the nature and scope of our research, what questions we have addressed, and what answers we found. We try also to leave you with an impression of the kind of place VID is. We are proud of what we have built here, and we want to share this with you.

Read on – VID waits for you!

*Wolfgang Lutz, Director
Alexia Fürnkranz-Prskawetz and
Richard Gisser, Deputy Directors*

The View from the Academy

Professor Peter Schuster is the President of the Austrian Academy of Sciences. While preparing this portrait, we asked him some questions.

VID: What does the Academy expect from its institutes?

President: First and foremost, excellence. Our institutes must be at the forefront of their fields, and this must be confirmed by rigorous assessments. This commitment to quality is especially relevant for a small country like Austria. We cannot realistically aspire to support world-class research across the whole spectrum of science, so we have to be selective. We look to build on expertise in key areas that can be developed to create internationally competitive research institutes.

Why does the Academy support research in demography?

The aim for all our institutes is to enhance research in innovative areas. These fields are often interdisciplinary in character, and deal with subjects that are not yet well established in the university system. And, particularly in the social sciences, we are looking for research that can make a significant contribution to society. Demography clearly fits all these requirements. It is an inherently interdisciplinary field, and has an increasingly

important role to play in policy. Some of the greatest challenges facing Europe today are demographic in nature: for example, population ageing and the influx of migrants. We need good demographic research to know how to cope with these novel developments.

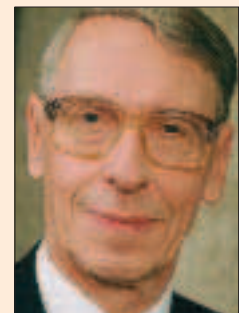
What is our national role?

VID needs to provide expert commentary and advice on demographic issues. Scientists have a responsibility to make the results of their research known to policy makers and the wider public. There is a great need for evidence-based policy, and we want our researchers to be engaged with these broader audiences, as well as with their disciplinary peers.

What is our international role?

Science is probably the most international of all activities, and cooperation plays a special role in Europe. Only by pooling our resources can we hope to match America as a global scientific leader. With the creation of the European Research Council, and other steps towards a single European research area, we are moving in the right direction. The next decade will offer new and exciting possibilities and we hope VID will participate actively in these developments.

Professor Gerhart Bruckmann has chaired our Board of Directors (Kuratorium) since 1986. We asked him to reflect on 20 years of involvement with the Institute.



Prof. Bruckmann

Professor Bruckmann: Among the many and varied tasks I had over the course of my career, chairing the Kuratorium was one of the most satisfying. The Kuratorium has the responsibility of ensuring the Institute's smooth and effective functioning. In fact, I could observe how well the Institute was run, and confidently leave the managerial tasks to the Institute's leadership.

The importance of the Institute's work was heightened by the fact that outside the Academy the discipline of demography has been badly neglected in Austria; it is virtually absent from the university system. In recent decades, however, interest in demographic research has grown rapidly and demography has proven to be an excellent focus for interdisciplinary research. Thanks to the appreciation of this fact by the Academy, and with the strengthening of the funding base, the Institute has been able to carry out research of the highest quality. With its broadly based and well-balanced staff, the institute is excellently positioned to address the new research challenges that lie ahead.



Prof. Schuster

The Spirit of VID

Combine excellence with relevance

In demography, as in more or less every science, a distinction is often made between basic and applied research. The former is seen as inherently more innovative and demanding, receiving greater recognition in the world of scholarly achievement. In contrast, applied research is frequently regarded as little more than the routine application of well-known methods to specific problems with no general implication. Since professional status largely accrues to advances in fundamental research, few leading scholars become deeply involved in policy-related demographic studies. We believe this dichotomy to be deeply misleading and counter-productive. In our experience, addressing practical problems often demands substantial methodological innovation and scientific creativity. In fact, carrying out the best policy-relevant research requires not only the best methods, but also the involvement of the most skilled researchers.

The need for policy-related research in the population field has never been greater. No lesser figure than the President of the European Commission, Jose Manuel Barroso, has pronounced that demographic change is “one of the three greatest challenges facing Europe, along with globalisation and technological change”. It is scarcely possible to open a serious newspaper anywhere in Europe without coming across articles, editorials or opinion pieces highlighting the

role of demographic change in reshaping society. In this context, we hope to play a significant role in advancing the contribution of demographic research to the wider discussion of population trends and their implications.

“Demographic change is one of the three greatest challenges facing Europe, along with globalisation and technological change.”

Jose Manuel Barroso

Our aim is to transcend the conventional dichotomy and produce research that is both relevant for policy and scientifically excellent.

Make forecasting an integral component of research

According to the novelist L.P. Hartley, “The past is a foreign country, they do things differently there.” So too is the future, and people will not behave in decades to come the way they do today. In this respect demographic forecasting can make a major contribution to planning for the future in many areas of economic and social life. In order to understand demography’s role, it is necessary to grasp the lengthy process by which

policy is formulated and implemented. Research and policy advance together in a sort of shifting, and sometimes uneasy, collaboration in which forecasting can play a vital role. Policy discussion at any point of time, in so far as it is informed at all by research, is likely to be drawing on scientific findings that often go back several years. It inevitably takes some time for the insights from research to percolate into the policy-formation community. Moreover, research itself is usually based on data that are already several years old; data collection and processing also take time. In short, even the most informed policy makers are likely to be basing their deliberations on a view of society that may already be a decade or more old. Devising policies in response to these perceived needs and getting them onto the statute books takes yet more time, so that even a brand new policy may in some respects be decades out of date, given the speed of social change. It is in this context that demographic forecasting can be of enormous value. There is a continuum of past, present and future, in which many aspects of population change have considerable momentum. Thus the laws of population dynamics can provide a relatively robust basis for forecasting how society will change over the coming decades, and thus what the future will be like.

Because populations tend to change relatively slowly, demography is often taken for granted and its impact under-appreciated. However, rather like some slow geological process that is imper-

ceptible in the short-run, demographic change often has an ineluctable force, and ends up transforming the whole social and economic landscape. Eventually, the sheer scale of demographic change forces it to a spot high up on the policy agenda. Understanding the long-term processes of demographic change is thus of paramount importance, and forecasting plays an essential part in this work. However, forecasting is not generally viewed as central to demographic research. Most demographers regard making population projections as simply the routine application of long-established methods, and leave the task to minor functionaries in national statistical offices. Our aim is to overturn this view of the proper intellectual terrain of demographic research and, by means of our own examples, to place forecasting squarely in the centre of the research task. In this way we aspire to transcend another conventional dichotomy in demography and make a significant contribution to many social sciences. For there are many aspects of society in which change is shaped by the way younger cohorts replace older.

Ask challenging questions

The role of research is not to revere a body of knowledge, but to challenge it. Nothing is more inimical to scientific advance than the unquestioning acceptance of conventional wisdom or received opinion. It is essential that researchers, especially junior researchers, do not show too much respect for the judgements of their predecessors. Rather, we try to cultivate a certain irreverent scepticism that often challenges orthodox approaches and viewpoints. The Polish-born British polymath, Jacob Bronowski, expressed this philosophy very well, “That is the essence of science: ask an *impertinent* question, and you are on the way to a *pertinent* answer.”

With this in mind, we can see that many of the “big questions”

of demography have an almost childlike simplicity. “Why do people have the number of children they do?” “How should we measure fertility?” Such apparently naïve questions force us to reflect on the very bases of demography as a scholarly enterprise, both theoretical and methodological. For example, by far

“Many of the ‘big questions’ of demography have an almost childlike simplicity.”

the most widely cited index of fertility is the total fertility rate (TFR). So generally is this indicator used that it is regarded as virtually defining the reality of childbearing. Quite simply, in many contexts, the TFR is assumed to be what fertility *is*. Yet the measure is in many regards a strange statistical entity, based on numerous assumptions, many of which are debatable, and some of which are demonstrably misleading. Alternatives to the conventional measures can have quite different implications for policy. Similarly, when it comes to theory, a degree of scepticism is often

a good way to start out. Perhaps the most pervasive paradigm used to explain why fertility is at a historic low in Europe today argues that we are experiencing the “Second Demographic Transition.” This term refers to a series of loosely inter-related changes in attitudes and behaviour with regard to childbearing. The coiners of the term, Dirk van de Kaa from the Netherlands and Ron Lesthaeghe from Belgium, were initially so tentative in their conclusions that they added a question mark at the end of the title of the 1986 article in which they proposed the term. Whatever the caution of its creators, once introduced the idea spread rapidly; the term is now bandied about by many others with a casual lack of specificity. The evidence for such a transition remains, in our view, ambiguous, but once a concept acquires a name it can take on a life of its own; an abstraction thus becomes “real”. Philosophers term this kind of transformation “reification”, acting as if something abstract was concrete reality. By questioning such ideas, and testing how far they can be scientifically proven, we look to transcend the limitations of conventional thinking.

View all of Europe as home territory

Vienna, it hardly needs to be said, is in the middle of Europe. Equi-



distant from London and Athens, halfway between Madrid and Moscow, the city is today emerging as a natural hub for European interchange. This international dimension runs through the



whole life of the city, and provides a vibrant backdrop for our research. Throughout its 30 years of life, the Institute has fulfilled a variety of national tasks, some of which led on naturally to comparative European analyses. However, with the new departure in 2002 we expanded our research to focus more explicitly on European issues. Today, only a modest fraction of our work deals exclusively with Austria. Instead our research ranges over the whole of Europe, from the Atlantic to the Urals, from the Arctic to the Mediterranean. Some research deals with individual case studies of countries where data are unusually detailed or where a scientific question can be answered most clearly, while other work carries out comparative analyses of carefully selected cases.

Our commitment to a European future is also evident in the recruitment of researchers. The Institute is home to demographers from all parts of the continent: from France to Bulgaria, from Russia to Italy, as well as having a good supply of home-grown Austrian talent. After five years of work, the result is that the VID probably has a

more diverse body of researchers than any comparable demographic institute in Europe. In sum, in our choice of research subjects and in our commitment to recruit the best scholars from all over Europe, we aspire to be a truly European institution. Demography as a scholarly enterprise was born in Europe, yet today world leadership in the discipline resides in the United States. One significant reason for this is the fragmentation of the European community of scholars in population research. Our aim is to transcend the limitations imposed by nationally focussed institutions, and thereby to help shape the future of our discipline in Europe.

Stay focussed; stay connected

The VID is not, by most scientific standards, a large institution. During 2006 the whole research team was equivalent to 18 full-time positions. Even within the relatively small field of demography, there are much larger centres in several other European countries, France, Ger-



many, Italy, the Netherlands and Spain, for example. If we are to play a significant role in the European demographic scene, we need to focus on specific areas of expertise and to have extensive research collaboration with scholars elsewhere. These two

requirements help shape the nature of VID. The scope of our research can be gauged from the names of our four constituent Research Groups: Population Economics, Population Dynam-

“Our research ranges over the whole of Europe, from the Atlantic to the Urals.”

ics and Forecasting, Comparative European Demography, and the Demography of Austria. Within our research to date we have focussed more on fertility than on either migration or mortality. However, our research agenda is always evolving, and there are significant projects now underway in both these relatively under-represented topics.

Although divided into the four Research Groups for purposes of

reporting, in fact VID operates as a single, flexible research community. We form ourselves into teams of interested scholars to address each new project that emerges, drawing on members of all four groups. In this way we hope to be able to mobilise a critical mass

of expertise for each project. The lack of strict hierarchy in the way we organise our research reflects a wider preference for informality in our day-to-day operations. The Directors are always clear that their role is to be *primus inter pares*. This is a long-standing tradition of the Institute, and creates a working environment that we believe is both enjoyable and

“A commitment to research collaboration is one of the hallmarks of VID.”

highly productive. Visitors rarely fail to comment on the welcoming atmosphere and enthusiastic staff.

A commitment to research collaboration is also one of the hallmarks of VID. Essentially all of us engage in scholarly networking of one kind or another. Such collaboration takes many forms, from research and training networks and projects running over several years to informal one-off efforts to write a single paper. We also endeavour to maintain close links with policy makers, especially with the European Commission and the Austrian government. Our various in-house publications aim to communicate our research findings to several different audiences, and our annual conference in December brings scholars from around the world to address a topic of wide current scientific interest. Finally, we also benefit greatly from our international research visitors. Coming for periods ranging from a few days to a whole year, our visitors provide us with a further way of making links and enhancing our scientific impact.

In addition to our global and European links, we have close ties with many scholars working in related fields in and around

Vienna. Two institutions in particular deserve to be singled out. Firstly, Statistics Austria played a crucial role for the first 25 years of the Institute's existence, nurturing the young organisation to maturity with financial and logistical support. Although less formally engaged since 2002, Statistics Austria is still one of our key partners. Secondly, we have very close links to the International Institute for Applied Systems Analysis (IIASA), which has been at the forefront of demographic research since 1974. Several of us, including VID Director Wolfgang Lutz, are also affiliated with IIASA, and although now VID is significantly larger than IIASA's World Population Program, our relations are marked by a very productive symbiosis.

We like to think that by staying focussed and connected we make a larger contribution to the European demographic scene than our relatively small size might suggest. As one of our visitors put it to us, “VID punches above its weight.” If you read the rest of this booklet, we hope you'll agree.



This Portrait

The rest of this Portrait shows how the spirit of VID is embodied in our work. We begin with three Research Highlights, papers pub-

lished in leading international journals that have attracted considerable attention worldwide. After these brief hors d'oeuvres, we have sections on each of the four Research Groups, picking out



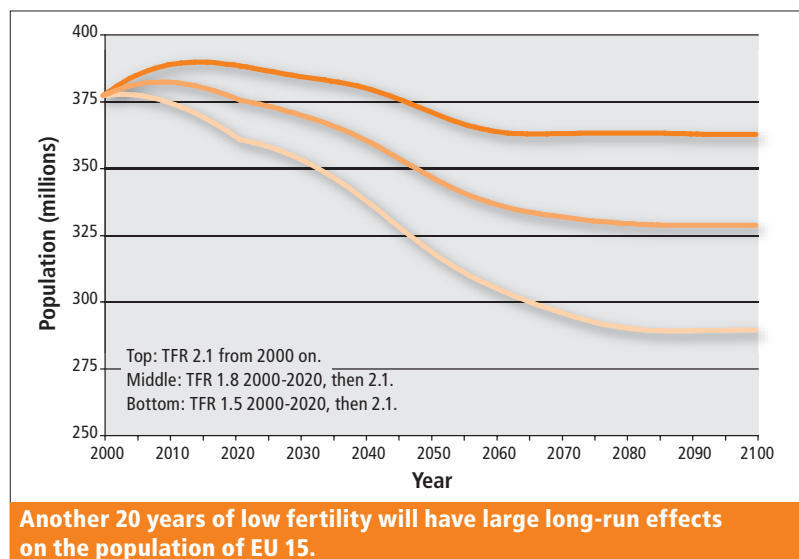
a few of their main scientific contributions. As you might imagine, we are more excited by our recent research than by the work we did some time ago. So the sections on the Research Groups largely deal with work that is underway

or has recently been completed. Finally, there are short pieces on specific aspects of the life and work of VID, Publications, Conferences and Colloquia, Connections, Visitors, the nature of the VID- IIASA relationship, and some thoughts on our future.

A Turning Point in Europe

A country's past experience of mortality, migration and fertility is written into its age structure. This in turn shapes the future numbers of births. Today's children are tomorrow's parents. A population with many young people will grow (this is termed positive momentum by demographers); a population with few young people will shrink (negative momentum). Around the turn of the millennium Europe moved into an era of negative momentum for the first time since modern statistics began to be collected 150-200 years ago. Wolfgang Lutz and Sergei Scherbov co-authored with Brian O'Neill of IIASA a study into how much negative momentum was really "locked-in" for Europe and what role was being played by the increasing delay of childbearing. Their work was published in *Science's* Policy Forum in March 2003.

To understand the impact of momentum in Europe's demographic future, we need to look above all at the history of fertility. For the European Union as a whole the baby boom peaked around 1964 and the number of babies born each year has declined almost monotonically since. After the baby boom came the "baby bust". Taking the EU as a whole, the cohorts born in the 1990s, for example, were only about 70% as large as those of the 1960s. The first of the baby bust cohorts are already in the childbearing ages, and the number of potential mothers is certain to decline substantially in the decades ahead. Even if fertility rises somewhat from its historic low levels, there can be no



repeat of the birth rate seen during the baby boom of the 1950s and 1960s, simply because there are so few potential mothers today; in 20 years the number will be smaller still. This is the remorseless logic of inter-generational replacement.

For 35 years, Europeans have been having their babies at progressively older ages. At some point, however, this "tempo effect" can go no further before biological sterility sets in. Forecasters presume that the ending of postponement will cause average fertility to rise by about 0.3 children per woman. When this increase occurs will have major long-run consequences. We assumed a fertility level to begin with of 1.5 children per woman, and that this would rise to 1.8 at some point, either induced by policies or through a natural end to postponement. We used demographic projections to look at the impact of an immediate rise, and of delays of 10, 20, 30, and 40 years. We also looked at the scale

of population decline if no rise occurred and fertility remained at 1.5 children per woman.

If there is no increase in fertility the population of the EU 15 will decline by 144 millions by 2100. In contrast, an immediate rise to 1.8 children per woman would keep decline to only 15 millions. For each decade of delay before the fertility rise, the population in 2100 goes down by about 15 million. Sometimes apparently small changes can have big impacts. Our results have considerable relevance for policy. Three years on, we feel that our conclusion in *Science* was fully justified, "Discouraging further delays in childbearing could help confront the population-related challenges faced by Europe."

More information

Lutz, W., B. O'Neill, and S. Scherbov. (2003) "Europe's population at a turning point." *Science* 299: 1991-1992, (28 March 2003).

Redefining Ageing

What does it mean to be 50 years old? Or 40? Or 60? And does it mean the same thing today as it did in the past? Sergei Scherbov and Warren Sanderson of the State University of New York at Stony Brook (a frequent visitor to both VID and IIASA) used population dynamics to provide answers to such questions that might be hidden from a conventional view. The answers they found were published in *Nature* in June 2005.

Age can be thought of as indicating how far we are along our life course – how many years have elapsed since we were born? But we can also look forward. We are all used to thinking of age in retrospective terms, but a prospective view is highly relevant to a wide range of phenomena. The cost of medical care, the timing of retirement, the nature of inheritance and bequests, consumption patterns, and the accumulation of human and tangible capital are all related both to age and to the time left to live. Our understanding of ageing must also reflect both of these dimensions.

When conceived of in this way, we see that what it means to be 50 today is not at all the same thing it was half a century ago. With the great improvements that are taking place in mortality, the average remaining lifespan for a 50 year old in 2005 may be the same as for a 40 year old in 1955. Thus, prospective age of these two individuals is the same. This statistical observation accords with our experience of life: people are staying “young” longer than they did in the past.

“A perspective that incorporates the new measures presented here is crucial.”

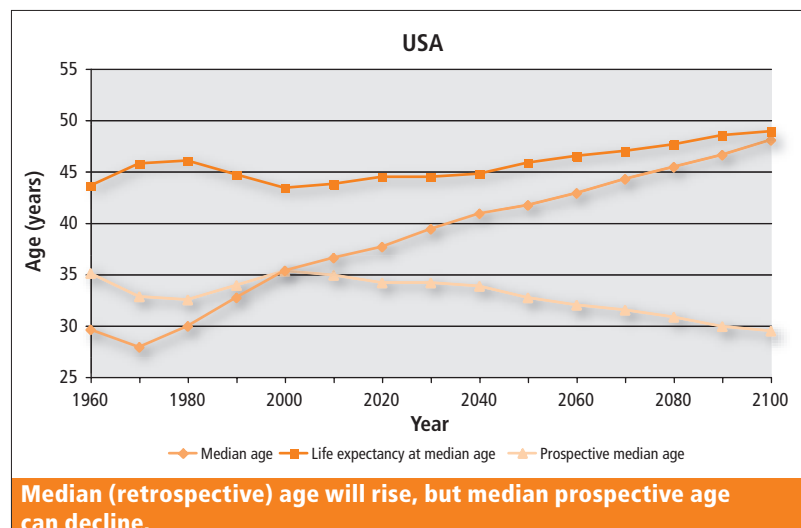
To gain a quantitative perspective on what ageing lies ahead, we carried out population projections for three countries, Germany, Japan and the United States, to 2100, calculating trends in both the median (retrospective) age and the median prospective age. The graph on this page shows the values for the United States, along with the life expectancy at the median age. Using the technique of standardisation, the life tables of 2000 provided the reference for calculating prospective age. The results are striking. While the conventionally defined median age increases monotonically, the median prospective age

can stay constant or even decline. From the projected populations we could also calculate dependency ratios defined in both conventional and prospective terms. The future track of conventional old age dependency ratios has caused anxiety that verges on apoplexy in the policy-making community. If we take remaining lifetimes into account the changes look much less dramatic.

Our intention in proposing this alternative approach is not to supplant conventional measures of ageing but to supplement them. As we concluded our *Nature* paper, “A perspective that incorporates the new measures presented here is crucial if we are to understand and react appropriately to the challenges of population ageing.”

More information

Sanderson, W.C. and S. Scherbov. (2005) “Average remaining lifetimes can increase as human populations age.” *Nature* 435: 811-813. (June 9, 2005).



European Identity

Taking the long view comes naturally to demographers. Populations change rather slowly and demographic statistics go back centuries. So it is, perhaps, no surprise that when two demographers – Wolfgang Lutz and IIASA's Vegard Skirbekk – teamed up with a political scientist, Sylvia Kritzinger from the Institute for Advanced Studies in Vienna, to look at the emergence of a sense of European identity, we saw long term trends that look

and strength; identity bequeaths legitimacy. What we see in Europe today is the emergence of multiple identities; people are increasingly feeling that they are both nationals of their home country and Europeans. Contrary to the views of both Euro-federalists and determined nationalists, the development of a European identity does not necessarily lead to the decline of national or regional sentiments. Identity is not a zero-sum game, and the sense of European identity is growing year by year.

to some extent. Graphing the percentage with multiple identities at each age in 1996 and 2004 shows a clear upward trend, which if continued to 2030 will result in more than two-thirds of adults in the EU-15 feeling European: 226 million versus 104 million.

To get a more penetrating insight we applied another classic method of demography, an age-period-cohort model, to determine the separate impacts of each of these three factors. The model results make clear that a strong cohort effect is in operation. Cohorts born one year later are on average about half of one percent (0.48) more European. This sounds a small effect, but carried on for 26 years, as in our projections, it will most likely transform the political landscape of Europe. A lack of data means that the ten countries that joined the EU in 2004 cannot be analysed in the same way, but there are some suggestive results there already. Younger cohorts (those under 40) in the new EU states are more European in outlook than their equivalents in the EU-15. Thus expanding our analysis to the full EU-25 once data are available should only strengthen our conclusions.

As we concluded our *Science* piece, "Although the politics of European integration remain volatile and unpredictable, these long-term tectonic shifts in identity are likely to have major and enduring consequences for the future of Europe."

More information

Lutz, W., S. Kritzinger, and V. Skirbekk. "The Demography of Growing European Identity." *Science* 314, (20 October 2006).

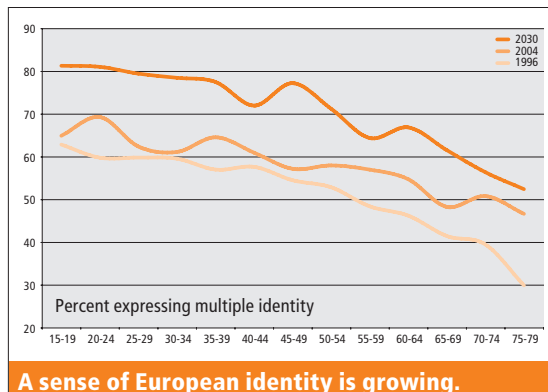
How European are we?

Country	Expressing European identity
Luxembourg	77.9 %
Italy	72.3 %
France	68.1 %
Spain	63.7 %
Belgium	58.8 %
Netherlands	58.7 %
Germany	55.6 %
Denmark	54.0 %
Ireland	52.9 %
Austria	51.3 %
Portugal	50.1 %
Greece	46.0 %
Sweden	45.0 %
Finland	43.4 %
UK	40.2 %

1996-2004 average

the Policy Forum section of *Science* in 2006.

Europe's citizens are developing a sense of collective identity that has enormous implications. When citizens identify with a political system, it acquires stability



A sense of European identity is growing.

very different from the headline-grabbing stories of a crisis in the European Union. Our results were reported in

To get a quantitative assessment of the phenomenon, we analysed Eurobarometer (EB) surveys from 1995 to 2004 for the EU-15, and projected the trends we discovered on to 2030. We calculated an index of multiple identities, and the patterns that emerged were clear and consistent. In 2004 58% of the population aged 15 and over (177 million people) expressed some degree of identification with Europe, with the other 42% (130 million) expressing solely a national sense of identity. As might be expected, there were marked differences between countries, but even in Eurosceptic Britain 40% of people feel European



Research Group Leaders

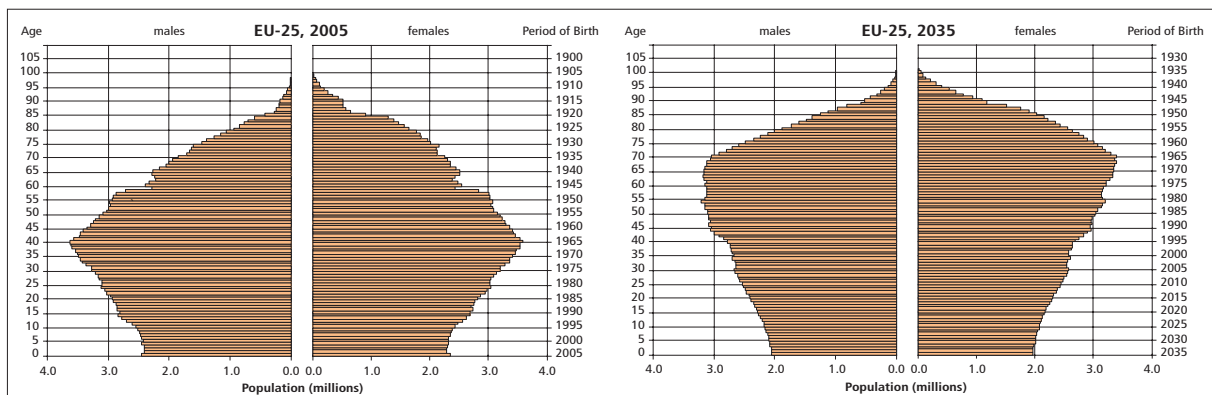
Alexia Fürnkranz-Prskawetz
Gustav Feichtinger

Population, participation, productivity, prosperity

The 20th century was an era of sustained population growth; the 21st century will be an era of ageing. Thus a key task facing population economics is to understand the implications of ageing and to analyse the options for adapting to it. Within this broad field, we see our niche as modelling how to incorporate more detailed information

demographic waters and have no helpful experience to define a roadmap of responses. Some insight into the nature of change can be gained by comparing the population pyramids of the EU-25 in 2005 and 2035. The steady progress of the large, baby-boom cohorts through the age structure dominates the scene. Our goal is to understand in depth what these

create issues, we look at how ageing relates to economic growth and productivity. Linking statistics on Austrian businesses in 2001 with the population census of the same year, allows us to conduct in-depth studies on the role of the age structure of the workforce on firm level productivity. To gain insights into the impact of age structure changes on economic growth



The ageing of the baby boomers dominates the next decades.

on age-structure and age-specific human capital formation into classical economic models.

From reading discussions of demographic issues in the media, it sometimes seems as if authors wish to confirm the reputation of economics as “The dismal science.” While the scare stories of an impending disaster are certainly overstated, there is no doubt that the extent of ageing in Europe in the coming decades goes well beyond any previous experience. We are moving into uncharted

changes will mean for the economy. Perhaps the most important point to realise is that changes in age structure cannot be adequately expressed in a single number, such as the ratio of people over 65 to those aged 15-64 (the old-age dependency ratio). Rather we must consider the impact of change across the whole age span.

In the pages that follow, we present several dimensions of our research into these issues, some substantive or contextual, others methodological. Addressing con-

we apply pooled time series and cross-country regressions for the EU countries. Two methodological topics, agent-based modelling and vintage models, help us gain new insights into the fundamental inter-relations that underpin population economics. We also look at the impact of ageing on one very specific population – the members of the Austrian Academy of Science – our parent organisation. And finally we consider the implications of recent trends in labour force participation and education on family formation.

Micro, macro, meso

Ageing and productivity

Labour productivity, the economic output per worker, is the heart of economic growth, and demographic trends in the composition of the workforce play a crucial role in shaping productivity at the aggregate level. Overall, there is a widely reported hump-shaped pattern in which older and

level of the whole economy and the meso-level of the firm.

To understand the complexities of the real world, you sometimes need to think about relationships in a simple way. We looked at projections of productivity in a “pure labour economy”, leaving aside other factors of input such as

physical capital.

By addressing the core of the relationship between age structure and productivity in this way we showed that the degree of substitutability between workers at different ages has a pronounced influence on projected productivity. In simulations for a number of developed countries we investigated the implications of imperfect substitutability across workers of different age. The results were striking: the parameter that measures the degree of substitutability proves

topic we linked data on individuals from the census or population registers with information on firms based on business statistics. This is a considerable effort: data from tens of thousands of firms and millions of people need to be merged, but the results make it worthwhile. The familiar hump-shaped curve for productivity appears, but the peak is later than many people think. This holds when we control for potentially confounding issues like educational attainment and gender balance in the workforce.

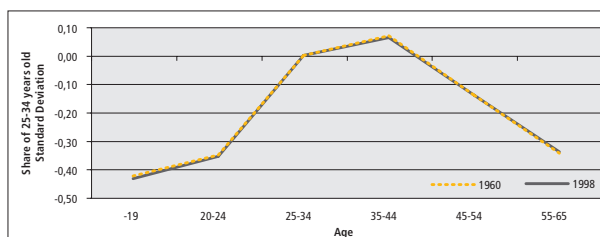
The implications of this finding are considerable. For example, over the next 10-20 years workforce ageing is likely to increase productivity because the baby boom cohorts are still in the prime of their careers. These cohorts are numerous and well educated. As they replace older workers (with lower human capital) this will boost productivity. It offers Europe a window of opportunity in which to reorient its labour markets in ways that will be advantageous, even essential, once the baby boomers retire. Clearly, to investigate these issues in depth, we must make use of the expertise and insights of both economics and demography.

More information

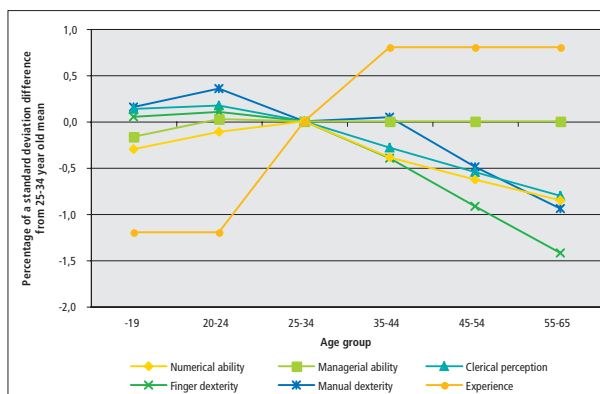
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http://europa.eu.int/comm/employment_social/social_situation/studies_en.htm



Overall productivity is hump-shaped ...



... but specific skills are not.

younger workers are less productive than those in the middle of their careers. What lies beneath this simple pattern is less obvious. Because productivity is not just an attribute of an individual, rather it is the outcome of the economic system. Thus the impact of an ageing workforce needs to be understood at three levels: the micro-level of the individual, the macro-

to be more important than differences in the age-specific profile of productivity.

To understand how such issues play out in the real world, we need to move to the meso-level. The expectations and human resource policies of firms play a decisive role in shaping individual productivity. To examine this

Understanding progress

Ageing and economic growth

Economic growth underpins all aspects of progress; understanding what drives it is a fundamental task for the social sciences. Economic demography offers special insights into the role of age-specific effects on economic growth. In this regard, history provides us with an unprecedented opportunity. The baby boom and subsequent baby bust constitute a unique variance in the age structure over the last five decades that enables us to identify demographic impacts on economic growth more clearly than in any previous era.

At present the age structure of the population, the labour force participation rates by age, and

estimated age-specific productivity all show a hump-shaped pattern, thus amplifying their combined effect. We know with considerable accuracy how much population ageing will take place in the next half-century. What we need to discover is how far changes in the two other basic determinants can compensate for and mitigate potential problems this ageing could cause.

In our work, with Jesus Crespo-Cuaresma of the University of Innsbruck and IIASA, and colleagues from the Institute for Futures Studies in Sweden, we have studied the impact of demographic change on economic growth in Europe since 1950. We then use our model to project the

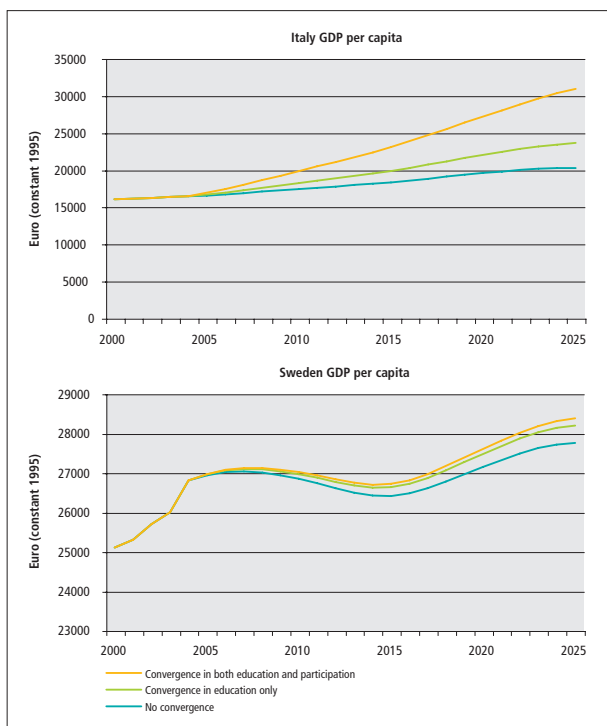
relationships forward to forecast future growth. Our results have important implications. It is possible to distinguish two effects for age-structure changes: the simple fact that the working-age population may be growing faster or slower than the population as a whole (an accounting term) and a more subtle effect in which the growth rate of the working-age population influences output per worker (a productivity term). We show that both are important.

It is also clear that the demographic profiles of different European countries vary substantially. Thus, strong assumptions of economic convergence, of the kind often made in European economic forecasts, may be unjustified given the pronounced demographic diversity. What is not in doubt is that the changing proportions of different age groups in the workforce require new labour market institutions and policies in order to take full advantage of the different opportunities for growth.

European countries differ substantially in both their levels of human capital and their labour force participation rates. The famous Lisbon Agenda of 2001 looks for an increase in both. The importance of such changes is clear when we plot the GDP per head from 2005 to 2025 that results from a simple model that differentiates between alternative productivity and human capital scenarios. The large gap between the three lines by 2025 in Italy, for example, shows just how much it has to gain from a rapid move to meet the Lisbon criteria. In contrast, in Sweden, which already meets the Lisbon objectives, there is less room for manoeuvre. In short, demography is a big story for economic growth, but its impact can only be understood in the context of the wider set of economic institutions.

More information

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The Lisbon Agenda implies different future trends around Europe

A good year

Vintage models

Cohort effects can be seen in many places, not just in demography.

For example, some years are better than others for wine. The circumstances surrounding its birth, mostly the weather, leave an indelible imprint on each vintage that it carries with it, however long it lies in the cellar.

There are also vintages in the population and the economy. Education mostly takes place early in life, and the nature and length of this process largely determine the human capital that each birth cohort acquires. They then keep this level of human capital throughout their work-

“These new methods enable us to incorporate realistic age structures into economic models.”

ing lives. Even capital is not free from vintage effects. Investment at a particular time implies that the equipment installed belongs to a specific vintage. This is especially relevant in fast changing

technologies; older computers are generally much less powerful than more recent versions. In short, both labour and capital have age structures. Yet in most economic analysis they have been treated as homogeneous entities, largely because appropriate methods for introducing heterogeneity (by age or vintage) into the models were rarely available. However, in recent years a team at the Vienna University of Technology (VUT) led by Gustav Feichtinger (who has also played a major role in the Institute since its creation) has pioneered new methods of age-structured dynamic systems within optimal control theory. These new methods at last enable us to incorporate realistic age structures into economic models. This gives demographers a special role.

Demography has a long history of studying age-structure. Changes in mortality, fertility and migration modify the age-structure over time in well-understood ways that have been mathematically formalized in terms of age-structured dynamical systems. These provide an efficient tool for demographic projections, scenario analysis and optimal policy formation. The same or similar mathematical models play an increasing role in economics, known there under the name vintage models. The deep similarity between the demographic

and economic processes means that age-structured (vintage) models provide powerful tools for population economics.

In our own research (much of it in collaboration with the team at VUT), we have applied descriptive and optimal-control vintage models in several research areas, many of which encompass both demographic and economic dimensions. These topics include the optimisation of migration and capital accumulation at the macro-level, and the development of prevention and treatment policies to minimise the demographic consequences of AIDS. Among the topics related to human capital, we have investigated optimal policies for employment and human capital formation at the firm level, and optimal educational policies at macro-level, in conditions of changing demography. Other research investigates the negative effects on optimal capital investments caused by the anticipation of future technological progress. In all these areas we believe that the new methods are opening possibilities for the fruitful synthesis of demography and economics.

More information

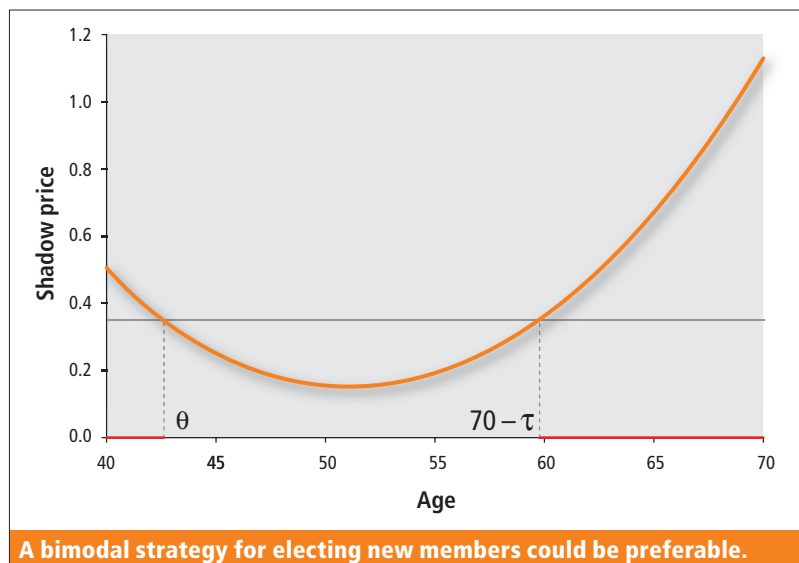
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Very particular populations

The age dynamics of learned societies

Demographic methods can be applied to any population, however large or small. Most demographers deal with big numbers. But we have also studied the demographic profile of a population whose total size is less than 200 – the members of the Austrian Academy of Sciences, VID's parent organisation. In particular, we have helped the Academy assess the implications of alternative strategies for electing new members in the context of an ageing population.

The Academy's "vital events" differ, of course, from those of a conventional population. The population gains new members, not through birth or immigration, but by way of elections. The Academy is limited to 90 full members, evenly divided between two sections: mathematical and natural sciences and social sciences and humanities, and the current members elect newcomers when positions fall vacant. When they reach the age of 70, members cease to count towards the 90 positions and are no longer eligible to be elected to the Academy's Presiding Committee. However, they retain membership (including voting rights) until death. Many of these features are shared with similarly constituted bodies in other countries, the National Academy of Sciences in the United States or the Royal Society in Britain, for example. And, once we completed our own analysis, we organised a workshop to compare findings with foreign scholars who had undertaken similar research on their own academies. In one word, we can sum up the greatest challenge facing us all: ageing.



Since Academy members are elected for life, as longevity increases, so does the number of members. This is especially significant because Academy members are unusually long lived. Compared to the same age groups in the Austrian population as a whole, the standardised mortality ratio (SMR) was 0.55, implying an annual death rate that is just over half the national level. Even comparing members with the rest of the university-educated population indicates an SMR of 0.74. Moreover, life expectancy at age 60 for members is rising faster than the national figure. These highly favourable trends make ageing all the more pronounced, and must be taken into account when considering the one real decision that lies in the power of the Academy: how to elect new members.

We used demographic projections to examine different election scenarios and applied dynamic opti-

misation to probe the best mix of young and old in a bimodal age-at-election strategy. With this array of information, we were able to offer clear policy advice to the Academy. A bimodal distribution is to be preferred, with some members elected in their 40s and others in their 60s, with relatively few elections in between. An example is graphed on this page. This is almost the exact opposite of recent practice. Beyond simple age dynamics, the two groups represent different reasons for election. Electing young members means rewarding excellence, while election of older members is a recognition of lifetime achievement. It is for the Academy itself to decide which mix of these attributes is best suited to its long-term goals, but we are happy to have provided the Academicians with a scientific basis for their choice.

More information

For up to date information on this project please check the VID homepage.

Demography from the bottom up

Agent-based modelling

Sometimes being a pioneer gets a bit lonely. As far as we know, we and our close research collaborators are the only demographers in Europe working with agent based modelling (ABM). In the rest of the world, a count of demographers with similar interests would probably not exhaust the fingers of one hand, in spite of the fact that ABM is flourishing in several nearby disciplines: economics, political science and sociology. Whatever the reason, demographers are conspicuously absent from attempts to turn computers into laboratories of artificial societies.

So just what is agent based modelling, and why is it useful for demography? ABM is a form of micro-simulation in which ‘agents’ (in demographic work, mostly individual people) act and interact according to certain rules set by the investigator, with the results of their interactions building to form patterns at the level of the population. Thus ABM is a mechanism whereby

micro-level decisions generate macro-level phenomena. The readiness to move between the micro- and macro-levels is, of course, one of the characteristic features of demography. However, without a strong paradigm, such as that of the “representative agent” that underlies mainstream economics, demography has to solve its aggregation problems taking into account the fact that choices are made by heterogeneous and interacting individuals, and that some decisions may be made collectively by couples or families. Computer simulation provides a way of transforming micro into macro without having to impose unrealistic assumptions on the micro-level (e.g. a homogenous population). ABM (like other simulations) is of most use in situations that are too complex to solve analytically, and which also cannot be investigated statistically because of a lack of data. With ABM we can test the effect of individual decision rules (and changes in the rules) on macro-level outcomes.

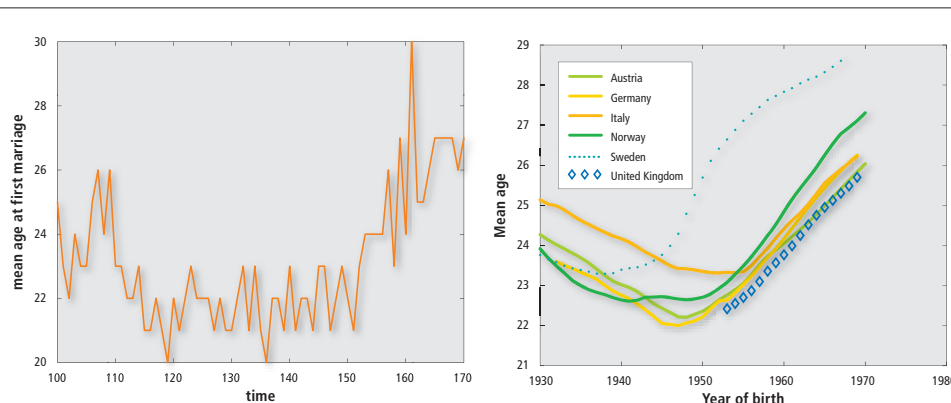
ABM agents have goals, and the modelling explores what results emerge from their attempts to reach these goals. Thus we can use ABM to see the implications of the agents’ intentions. This intentionality is one of the main reasons why ABM could be especially valuable for demography. Rather than trying to recreate society, ABM is mainly used to facilitate the development of theory. Simple rules that are thought to govern a process can be applied to agents, and the results examined for plausibility. As the research develops, the agents’ environment and goals can become more complex and realistic. As ABM pioneer R Axelrod puts it, “the purpose of agent-based models is to enhance intuition.”

All in all, demography seems an ideal candidate for ABM applications. So far we have used it to investigate a number of distinct demographic phenomena: the emergence of norms concerning age at marriage, the chance of marrying, the transition to parenthood, and most recently

issues in the labour market. As the graphs here show, the results can replicate real marriage behaviour, even when the system of rules being followed is relatively simple.

More information:

Billari, F.C., T. Fent, A. Prskawetz, and J. Scheffran (2006) *Agent-Based Computational Modelling: Applications in Demography, Social, Economic and Environmental Sciences*. Springer-Verlag.



Our ABM marriage model (left) produces trends which parallel changes in observed age at marriage (right).

Eventful years

New pathways to family formation

The years of early-adult life are full of transitions: finishing education, starting to work, leaving home, forming a union, getting married, having children. Between our late teens and our mid-30s we experience more demographically significant events than at any other time in our lives. Moreover, these various processes are interwoven in complex ways. In order to study such intricate relationships we need to have information on exactly where in the life course individuals are. If they are enrolled in education, when will they finish? If they are working, when did they start? This means calculating detailed variables to reflect each person's specific circumstances. If these numerous data slices are to be statistically meaningful, we need a data source that is far larger than is conventionally available for research on family formation. For this subject, size matters. Fortunately, just such a dataset exists: the 1999 French Family History Survey (*Etude de l'Histoire Familiale*). In collaboration with Laurent Toulemon of INED in Paris, we have used this survey to examine in detail the changing relationship between family formation, education and employment for a sample of more than 240,000 people born since 1940. The data from this survey are also unusual in that they include large samples of both men and women; most family surveys focus overwhelmingly on women.

Educational attainment and employment have undergone tremendous changes in the past few decades, especially for women. Educational expansion has been accompanied by a rise in female employment. Rates of employ-

“Our results confirm some convergence hypotheses, but not others.”

ment for women aged 25 to 39 years – where the competition between maternity and participation in the labour force is crucial – are close to 80 percent in many European countries. Several theorists have argued that convergence in family formation patterns is to be expected, given the increasing similarity in careers. We have been able to investigate in detail how the effects of educational attainment and working status changed over time, defining new pathways for the education-work-family transitions. It is feasible with this survey to assess how gender-specific differences in the transitions to adulthood have changed, particularly, whether these differences have diminished, or even vanished, in recent years, as gender roles become less marked. Crucially, the large sample size enables us to test convergence hypotheses

with sophisticated models that cover several interactions.

We used event history techniques to examine two transitions: entering a first union and having a first child. Our results confirm some convergence hypotheses, but not others. The impacts of both educational attainment and work status are now similar for men and women for the entry into a first union. However, whether or not someone is working has different effects for the two sexes for the entry into parenthood. For example, for women having left school but not working does not delay motherhood. However, men in this category are much less likely than others to become fathers. Finally, the impact of work experience, although still somewhat different, has been changing in similar ways for both men and women.

The results are already throwing new light on complex phenomena. To try to disentangle these interwoven patterns we are now moving on to a new and potentially very revealing methodology – sequence analysis – in which we study the order in which people experience the various transitions. There will always be lots to learn about the rapidly changing world of family formation in Europe.

More information

Winkler-Dworak, M. and L. Toulemon (2007) “Gender Differences in the Transition to Adulthood in France: Is There Convergence Over the Recent Period?” *VID Working Paper 01/2007*. Available at http://www.oeaw.ac.at/vid/download/WP2007_01.pdf



Research Group Leader
Sergei Scherbov

Looking into the future

Demographic projections come in many forms and we are actively engaged in several of the main genres. Much of our research is carried out jointly with IIASA, drawing on their long-standing tradition in population dynamics and forecasting. Together, we constitute one of the most productive independent groups of demographic forecasters.

If you open one of the many works entitled “Demographic Projections” published by national statistical offices you will see page after page of populations broken down by age and sex, but with few or no additional cross-classifications. This is the core business of most demographic forecasters, and these basic estimates of population size are essential inputs for many aspects of economic and social planning. Our research in this area involves both developing projection methodology and carrying out case studies. The heart of this style of projection is a technique known as cohort-component projection, first proposed as long ago as 1895 by the British economist Edwin Cannan, though it only gained widespread currency the 1930s. For each birth cohort, the projection is based on the components of change – births, deaths, and migration. In order to estimate these components we need to make assumptions about future rates of fertility, mortality and migration at each age. This is where things start to get interesting, because there is no consen-

sus on how best to make these assumptions. As a 2000 report by the US National Academy of Sciences put it, “Non-demographers may be surprised at the lack of a rigorous theoretical or even historical basis for the scenarios underlying the most commonly used projections.” In forecasting, assumptions make the world go round. Thus, one important strand of our research is the development of methods for making these assumptions.

Assumptions also play a crucial role in addressing a fundamental question for all forecasters – how to deal with uncertainty. Most official projections take a fairly simple approach to this matter, presenting future populations for a small number of scenarios, defined by different tracks of fertility, mortality or migration, which are assumed to cover a “plausible” range of future outcomes. A recent survey in the European MicMac project showed that this approach is followed in official projections in 24 of the then 25 EU member states; it is also the basis for projections made by Eurostat, the US Census Bureau and the United Nations. However, over the last 15-20 years researchers have been developing a new way of handling uncertainty – probabilistic projections. These provide a statistically more sophisticated approach in which the projection outcomes are accompanied by a probability of occurrence. We have worked on several distinct aspects of uncertainty. For example, we can distinguish between long-term and

short-term effects, and between uncertain trends and the variability around the trend. One particularly interesting dimension

“A fundamental question for all forecasters is how to deal with uncertainty.”

of research on uncertainty concerns mortality, where we have sought to use insights from a new paradigm of long-term mortality change to improve projections.

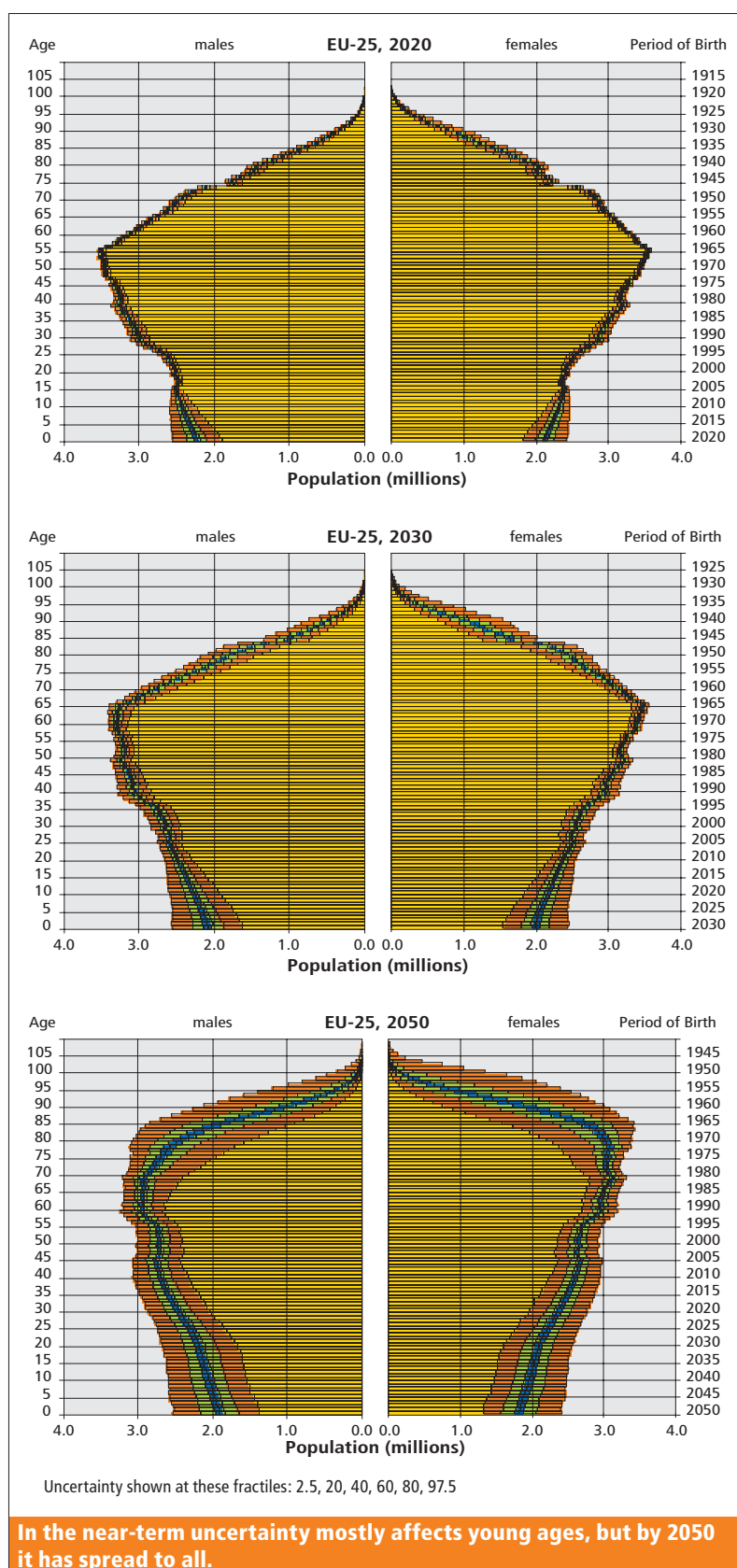
The population pyramids presented here show the value of the probabilistic method. It is immediately obvious that the largest uncertainty in 2020 affects the young age groups – uncertainty over fertility has an especially large short-term impact. However, by 2050 uncertainty affects the whole age span.

Another fundamental question for projection is how to incorporate heterogeneity. One very promising way forward is multi-state demography. This method was developed at IIASA in the 1970s. However, although the method has been available for 30 years, its potential is still underappreciated. We have used multi-state methods extensively in recent years, making projections for several different dimensions of heterogeneity: educational

attainment and human capital, religious affiliation, and ethnicity. Our application of multi-state methods to human capital formation has been especially influential, with both the World Bank and UNESCO closely involved. The results from some of our other multi-state projections have also received a good deal of attention. Our estimates of Austria's future population by religious affiliation have been of great interest here. And using a synthesis of multi-state and probabilistic methods we have worked with David Coleman of Oxford University on the ethnic composition of the United Kingdom.

A further basic challenge for all demography, not just projections, is how to link individual (micro-level) information with aggregate (macro-level) trends. Demographers are used to operating at both levels, but finding a systematic way to connect the two quantitatively has been an elusive goal. In this context, our work as part of the MicMac project offers new insights into the linkage. The full title of the project “MicMac: Bridging the micro-macro gap in forecasting” indicates its scope. The aim is to create a forecasting system that incorporates projections at both levels of aggregation. Our contribution is to develop and extend our methods for human capital projections to produce breakdowns of the future population according to educational attainment.

Another dimension of the aggregation problem is represented by our research into household projections. Individuals live in households, but no standard methodology exists for projections of households. We are developing a method that shows great promise in this respect. Simple in conception and data requirements, although underpinned by a thorough mathematical and logical structure, the method can be used worldwide. We believe the new approach to be a significant advance over the methods currently in use.



The world of demographic projections is a diverse place, and in the pages that follow we illustrate our work on several themes

– probabilistic projections, household projections, multi-state methods, mortality assumptions and long-term trends.

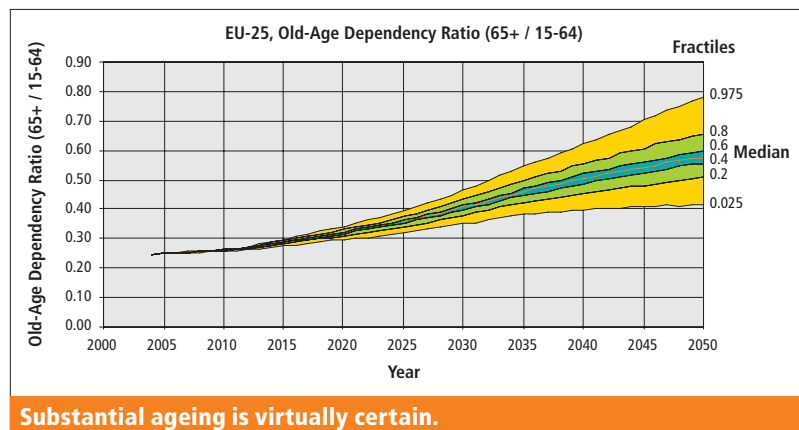
Understanding uncertainty

Probabilistic projections

The future is uncertain, but it is far from random; some outcomes are more likely than others. But how likely? And how do we know? Answering these questions takes us to the heart of forecasting.

Most demographic forecasts handle uncertainty in a manner that can only be described as rather basic. The authors make projections for a small number of different scenarios that they hope will give some indication of the range of possible futures. However, there is often no quantifiable relationship between the scenarios and it is rare for any 'storylines' underlying the scenarios to be spelled out. Almost all official forecasts made today are of this kind. Establishing more accurately the degree of plausibility should be one of the main ingredients of population projections, bringing great added value for policy makers. Our aim is to produce distributions of future outcomes about which we can make truly probabilistic statements. Although being developed by just a handful of groups worldwide, this probabilistic approach offers the biggest advance in demographic projections since 1895.

If the initial base population for a projection is known, then the uncertainty arises because we do not know future trends in the components of change: fertility, mortality and migration. Over the last 25 years demographers have attempted to get to grips with such issues in three main ways. One approach uses the scale of errors in past projections as a guide to future uncer-



tainty. A second way forward has been the use of statistical methods of time-series analysis of the kind widely used in econometrics. Thirdly, expert opinion can be called upon. In our work we draw insights from all three approaches. Our openness to this range of methods and the importance we attach to the subject were indicated in 2002 when it formed the subject of our first annual conference. The speakers covered the full range of opinions, and we learned much from the meeting. The papers were published in a themed issue of the *International Statistical Review* in 2004.

Compared with most other groups producing probabilistic projections, our work probably gives greater emphasis to expert opinion. In any demographic projection, no matter what the technique, the forecaster reaches a point at which judgement is called for. In our view it is simply impossible to make the whole business of projection a purely algorithmic operation. Formal methods can help identify

where judgement is needed, but in the end nothing can replace informed opinion.

Although the work involved in making probabilistic projections is both complex and extensive (one possible reason why most official bodies have so far been reluctant to adopt them), the output they produce enables us to make clear visual presentations of the scale of uncertainty. This clarity helps communicate results to policy makers more readily. One of our recent projects has been to produce probabilistic forecasts for the EU-25 as a whole. The figure on this page shows the inexorable rise in the old-age dependency ratio. From personal experience, we know that this figure communicates very powerfully the quasi-inevitability of substantial ageing.

More information

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http://www.oew.ac.at/vid/download/edrp_1_06.pdf

People and households

Household projection methodology

People live in households; this is a basic feature of every society. Households form a primary focus of demand for housing, transport, energy, water, and many other commodities and services. Yet there is no consen-

“Producing household projections is often as much an art as a science.”

sus among demographers on how to project the number and size of households. Ideally we want a method that is simple to use yet free from the risk of producing obvious inconsistencies. We think that we have developed just such a method. This methodological research was initiated as part of an EU-funded project to help the Russian Statistical Agency to carry out household projections for Russia. However, in solving the particular problems posed by the Russian data, we have arrived at a general method that can be applied worldwide.

The household projection methods that currently exist can be divided into two classes. First, there are sophisticated models and simulation software that are used by researchers, but rarely if ever by official agencies. This is because the methods require elaborate input data and model assumptions. Moreover, the complex models often have a ‘black-box’ aspect, in which, although input and output are known, the internal causal links are obscure.

A second set of methods is based on a much simpler approach, and is widely used by public agencies for official projections. This type of work takes the number of the number of households per person as a jumping off point, and then derives a variety of further indices. The ratio of households to population is termed the headship rate. The simplicity of headship rate methods means that they can be extended from the total population to specific age and sex categories or by other relevant parameters. They are easy to implement and only require simple and widely available data. There are, however, substantial drawbacks – the simple methods can produce inconsistent results. Even the most advanced of official forecasters cannot always avoid such problems. In fact, in order to avoid inconsistencies, a wide array of adjustment tech-

niques is routinely (and often manually) used by statistical agencies. These adjustments, in turn, may result in new inconsistencies, leading to a cascade of assumptions and adjustments. As a result of such difficulties, producing household projections is often as much an art as a science.

In order to escape from the plethora of inconsistencies, yet still save the simplicity and robustness of the headship approach, we have developed a new method, drawing on ideas used by Statistics Austria since the mid-1980s. Our key innovation is a new way to convert the average household size (the inverse of the headship rate) into a distribution of households according to their size. We have used both formal mathematical relations and more contextual constraints to carry out this decomposition. In the process we have identified a number of important theoretical relations that facilitate making projections and allow independent checking of consistency in the estimates. The methods can be used for projecting households by both size and by age of the household head. We have great expectations for our new method.

More information

For up to date information on this project please check the VID homepage.

New perspectives on human capital

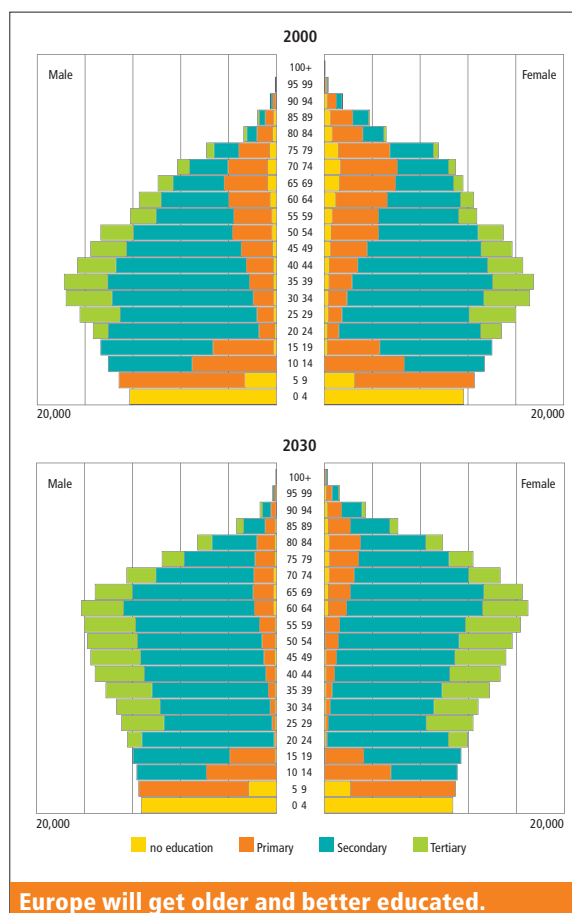
Multi-state projections of education

Education is an essential part of the human condition, an important prerequisite for mastering the many challenges of life and improving both our individual and collective well-being. There is abundant evidence that education has an impact across the whole range of human activities. Higher lifetime income, greater personal empowerment, longer life expectancy, better health; the list of benefits to the educated person and their families goes on and on. Although less easily demonstrated, there is also good reason to believe that human capital, the accumulated result of education, plays a crucial role in economic growth. Given all these many impacts, it comes as something of a surprise to learn that, until we began our work, the subject of forecasting human capital had been rather poorly developed within demography. Most previous research in the topic had been carried out within economics, and generally used little by way of demographic sophistication. The topic, however, is ideal for demographic analysis, in particular by means of the technique of multi-state population projections.

Developed at IIASA in the 1970s, the multi-state model expands cohort-component projection by dividing up the population into “states”, as well by age and sex. Originally states were conceived of as geographical units, with the movements between states being the migration streams. But states can be any clearly defined breakdown of the population, for example groups with differing levels of educational attainment. In this formulation, the movement between states are the transition rates from one educa-

tional category to another.

Projecting human capital stocks by age and sex is an ideal candidate for the multi-state method because each cohort tends to acquire its education early in life and then simply carries its attainment along with it as it ages – a classic cohort effect. Change in the educational composition of the working-age population as a whole (arguably the most important aspect for the economy) is thus driven mainly by the depletion of older (and less well educated) cohorts through retirement and death, and their replacement by younger (and better educated) cohorts. Once conceived of in this way, it is obvious that population dynamics play a crucial role. From the multi-state projections we can make forecasts of human capital for every age group. This constitutes a significant advance on earlier forecasts based on inventory methods. As we can now see, aggregate measures, such as the mean years of schooling in a country, can hide a lot of important details that are revealed in the multi-state projections. The advantages of the method have led both UNESCO



and the World Bank to work with us to apply it.

In the population pyramids we show some of our results for Europe (EU-15). The main conclusion can be stated very simply: for Europe, the key challenge in human capital is to raise the proportion of the workforce with tertiary qualifications.

More information

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The religious future

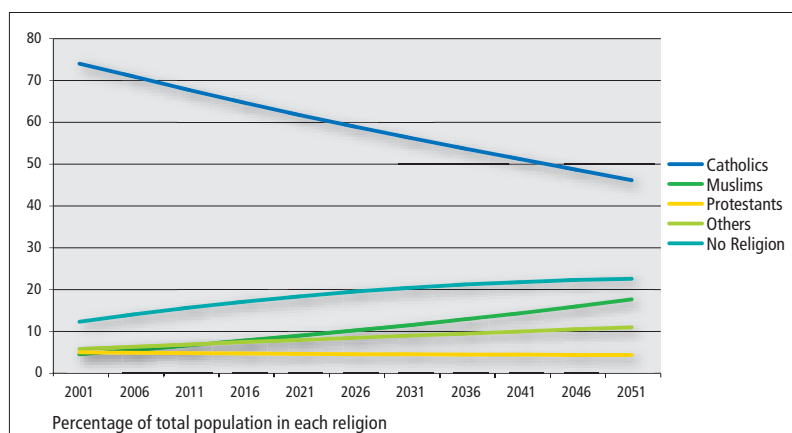
Religion forecasts

Most Europeans are not overtly very religious. The percentage of people who go to a church, mosque or synagogue each week is small compared with the United States, for example. But, while Europeans are no longer likely to engage in formal acts of religious observance, most still retain a less institutional sense of religious identity that can be surprisingly strong. Religion is still something that most people pay attention to. Thus when some

32% by 2051. How did we arrive at these numbers? Along with Vegard Skirbekk of IIASA and Pawel Strzelecki of the Warsaw School of Economics, we carried out multi-state population projections.

To an even greater degree than education, religious affiliation is something usually acquired early in life and then not changed. It is, for most people, something you are born with and which you never lose. The only large-

In order to make a realistic forecast we needed estimates by religion of several demographic processes, most importantly fertility and migration. Fertility shows some striking contrasts. In 2001 the total fertility rate (TFR) varied from 2.34 children per woman for Muslims to 0.86 for the non-religious, compared with a value of 1.32 for Catholics. Migration too is very variable, with by far the largest rates of net immigration for Muslims, scarcely a surprise given the large number of migrants to Austria from the Balkans and Turkey. In order to make our projections we needed to make assumptions about future trends in both the demographic variables and the religious transition rates. In doing so we developed a series of 12 scenarios that cover a wide range of alternative futures: convergence or stability in fertility differentials, constant, higher or lower rates of secularisation, and high or medium immigration. The results for one scenario are graphed here. The future is uncertain to some degree, but, whatever happens, Austria is set to become a much more religiously diverse country than it has been for several hundred years. Very similar results can be expected for most other European countries. Religious diversity is something we can take for granted in the 21st century.



Religious diversity will be the norm in the future in Austria.

of our projections for the future religious composition of Austria were publicised in the media, they generated considerable interest.

Our estimates indicate that Catholics (75% of the population in 2001) may make up less than half by 2051. In contrast, by that date up to 34% will have no religion, and Muslims are likely to constitute between 14 and 18 percent. Among children, the proportion Muslim could be as high

scale change in religious affiliation in Austria at present is the move towards secularisation and the giving up of all religious ties. Although on the rise, the number with no religion was just over 10% of the total population in 2001. So there is considerable stability in religious identity over the life course. Using data from Statistics Austria we were able to develop plausible rates for the transitions from state to state, i.e. from one religious category to another.

More information

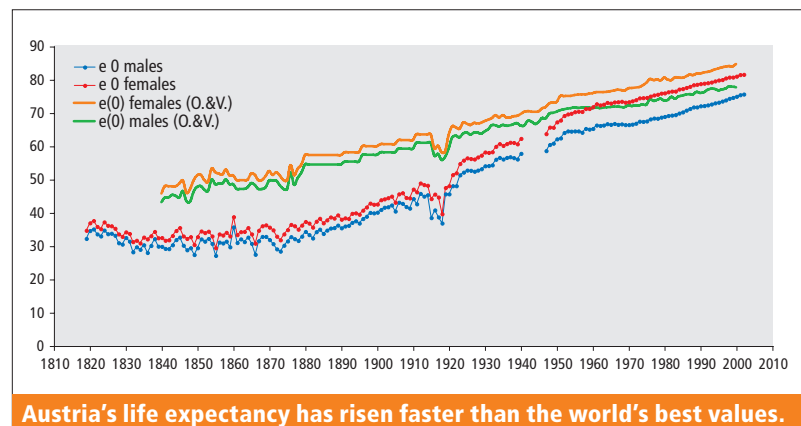
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Living longer and longer

Forecasting mortality

Historian Thomas Kuhn showed how advances in science make leaps that transform the whole character of a discipline. He called these periodic breakthroughs “paradigm shifts.” He also showed that most of the groundwork is done well before the new theory or method is proposed, in the course of what he termed “normal science.” Thus the evidence to support a new perspective was already in place, awaiting, as it were, the new idea to bring it to life. Just such a paradigm shift, drawing on evidence accumulated over decades, is underway in our understanding of long-term changes in mortality.

The old view of mortality was asymptotic: there had been lots of progress, but the rate of improvement must slow down in the near future. Life expectancy was approaching its “natural” limit. The new paradigm challenges this “end-of-history” view of mortality reduction, instead positing the possibility of continued substantial increase in life expectancy. The new theory asserts that, if there is any biological limit, there is no evidence yet that we are getting anywhere near it. Although data supporting the new viewpoint had been available for many years, the transformation of demographers’ views can be traced to a single article in *Science* in 2002 by Jim Oeppen and James Vaupel, now both of the Max Planck Institute for Demographic Research in Rostock. They showed that the world’s longest life expect-



ancy had increased linearly for at least 150 years, with no sign of any slow down in progress. The maximums for men and women for each year from the mid-19th century (O.&V.) are plotted on the graph along with the equivalent Austrian values.

The implications of this paradigm shift for forecasting mortality are obviously immense. In the new perspective, mortality progress is a feature of a system that includes all developed countries, perhaps even the whole world. The experience of each country can be thought of as one path among many that lie within the bounds of the wider system. Thus, rather than trying to understand what drives progress in a particular country, we look at all European countries in order to understand the full dynamics of the process. Key questions immediately spring to mind. How much convergence can be expected? Will age groups be equally subject to convergence? Which countries constitute the most informative set for a system-

atic analysis? By answering such questions we hope to create a more systematic approach to mortality forecasting.

With the benefit of hindsight it is clear that virtually all projections made over the last 50 years have underestimated the extent of gains in life expectancy. In a joint project with Statistics Austria we are looking to learn the lessons of the new paradigm and to assess how best to implement it. The most important difference between the old and new views concerns mortality at old ages; in the new view, there is much greater scope for reducing mortality at high ages than was previously acknowledged. Our research, therefore, focuses especially on mortality reduction among the elderly. We have been carrying out an extensive review of existing methods for mortality forecasting, developing a new approach.

More information

For up to date information on this project please check the VID homepage.

Reconstructing the past

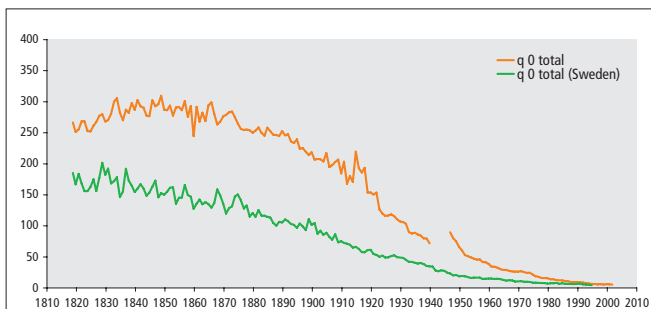
Long run estimates for Austria

To assess the present and forecast the future, we need to understand the past. To this end, we have recently carried a reconstruction of the population of Austria since the 19th century. This enables us to examine the age structure and mortality over the long run; more continuous and consistent estimates of life expectancy, infant mortality and many other indices are now available for the current

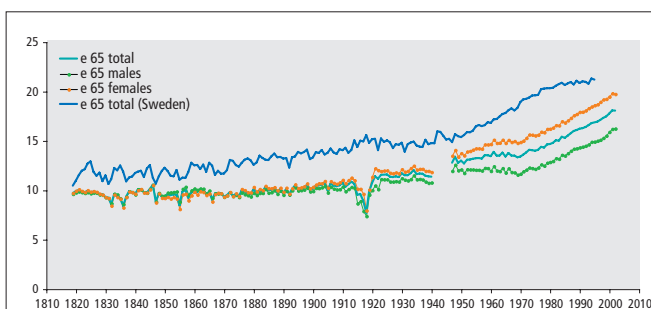
turbulent political history creates many complications. Data that refer to the country's current territory are not readily available until the 1920s. Before 1918, under the Austro-Hungarian Habsburg Empire, "Austria" included huge areas of central Europe, stretching from what is now Croatia to Western Ukraine. Yet the most easterly region of modern Austria (Burgenland) was part of Hungary. Moreover, in the aftermath of both

world wars there were substantial population flows that further complicate matters of statistical continuity. We have been wrestling with these problems, on and off, since the earliest days of the Institute in the late-1970s. Recently we have returned to the topic, and used multistage reconstruction methods to derive con-

tinuous series for the current territory. We make use of reference life tables, vital statistics and census populations to overcome the distortions created by war, territorial changes and forced migration. Our reconstruction has enabled us to calculate the age structure of the population and age-specific rates of net migration and mortality. Some of the results for mortality are shown in the graphs. Life expectancy at birth was more or less constant for the first two-thirds of the 19th century, at a little over 30 years. Steady improvement only began in the later 1870s, after the last of the great cholera epidemics. With breaks in the series occasioned by the two world wars, the increase in life expectancy has been more or less continuous since then, rising by more than 40 years over the last 130 years, a faster rate of increase than for the world's best life expectancy. The pace of improvement has slowed somewhat since about 1950, but is still substantial. Most of the great improvement in life expectancy before the 1950s was due to reductions in death rates at young ages. The graph for infant mortality shows a dramatic decline from rather high levels in the mid-19th century. As late as the mid-1870s, more than one baby in four failed to reach its first birthday; today well over 99% survive the first year of life. At the opposite end of life, mortality gains were modest before about 1970. But since then life expectancy at age 65 has risen sharply, increasing by about five years over the last quarter century. Given that mortality in the first 50 years of life is now very low, mortality reduction at older ages will be the main driver of any future increases in life expectancy.



Infant mortality is now extremely low.



Life expectancy at 65 has risen significantly.

territory of Austria. These provide an invaluable perspective on long-term trends.

Carrying out historical demography for Austria is not an entirely straightforward task. A good deal of census and vital registration information is available from the mid-19th century on, but Austria's

territory. These provide an invaluable perspective on long-term trends.

Our reconstruction has enabled us to calculate the age structure of the population and

More information

For up to date information on this project please check the VID homepage.



Research Group Leader
Dimiter Philipov

Theme and variations

Fertility in Europe

When leading politicians, such as Jose Manuel Barroso, identify “demographic change” as a key challenge for Europe, what they mean is ageing (see the map opposite). And when they look at the causes of ageing and possible ways to reduce it, they see increased fertility as highly desirable. Thus understanding why fertility is at a historic low in Europe has come to be a central theme of demographic research, some would say *the* central theme. Given this importance, and given our small numbers, our research focuses squarely on fertility, mostly leaving alone other aspects of population change.

The scale of the problem facing Europe can be illustrated with some simple numbers. In the 1960s, 70 million babies were born in the EU-25; over the last 10 years (1996-2005), the number was 48 million. Naïve commentary on the declining trend in births often asserts that Europeans no longer want children. However, the evidence from stated fertility desires does not justify this claim; the ideal family size reported in, for instance, Eurobarometer surveys remains at or above replacement level. For the EU as a whole the ideal is 2.1 children per woman, and in only two countries (interestingly for us, Germany and Austria) is the stated ideal below two. In short,

it appears that Europeans would like to have more children, enough in fact to ensure replacement. However, in reality they do not achieve this goal. Understanding why this mismatch

“ We see little evidence to support the view that fertility in Europe is in a tailspin towards oblivion. ”

occurs and how the gap between desires and achieved fertility might be closed represent fundamental challenges for the population sciences.

In getting to grips with this topic, we pursue two related but distinct lines of research, one methodological, the other substantive. The two approaches weave together to form a coherent whole that is both theoretically aware and empirically informed. Our methodological research mostly deals with the aggregate or macro-level, and addresses an apparently simple question: How should fertility be measured? In contrast, our approach

to substantive issues is to focus on childbearing intentions at the individual or micro-level. Here the key questions are: How do people form their fertility intentions and why are these often frustrated?

The issue of how to measure fertility is, to say the least, a matter of long-standing debate in demography. Whether one should study cohorts or periods, and how to take into account the timing of childbearing, are questions of such enduring interest to population scientists that they might almost qualify as old chestnuts. However, they remain at the forefront of methodological debate because over the last 30-35 years everywhere in Europe has seen dramatic changes in both the number of children born and in the timing (or tempo) of fertility. Getting the matter clear is, of course, crucial; there is little point in developing elaborate explanatory models if the dependent variable we are trying to account for is poorly defined. Almost everyone engaged in this debate agrees that the most widely cited indicator, the total fertility rate, is distorted and potentially misleading, but as yet there is no consensus on what should replace it. This is a discussion, which will, as the saying goes, run and run, but we think we can keep pace with it.

In contrast, the study of intentions is a far from well-developed field in demography. Intentions (a predisposition to behaviour) are studied in detail in social psychology, where the theory of planned behaviour (due to Ajzen) has recently become very popular. Our application of this theory contrasts with the conventional approach in demography, which is overwhelmingly empirical.

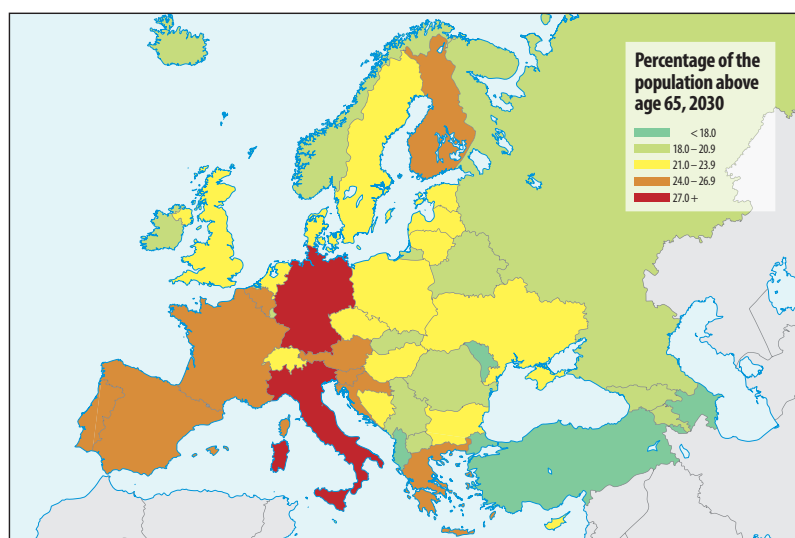
The great majority of previous demographic analysis has been concerned with intentions as a predictor of fertility. Since intentions change through time, they are generally regarded by demographers as unreliable predictors. However, we take a different stand; intentions are not fixed in time because the factors that determine their construction change over time. The more stable these determining fac-

When considering the many factors that might stand between intentions and outcomes, demographers have begun to look seriously at welfare state regimes. The character of welfare arrangements varies across Europe in systematic ways, and these differences shape the way in which micro-level intentions are translated into macro-level trends in fertility. Drawing on the work of the sociologist Gosta Esping-Andersen, we can identify five coherent regions, each with a distinctive welfare regime. There is a *prima facie* relationship between fertility levels and these regimes that encourages us to look more deeply.

The drastic fertility changes in Central and Eastern Europe are of particular interest to us – and not just because of geographical proximity. The sheer scale of

Europe is a large and diverse place, but there are some striking commonalities running through its demography. We aim to explore both theme and

“Understanding why fertility is at a historic low in Europe has come to be a central theme of demographic research.”



tors, the more stable the intentions; inversely, unstable determinants decrease the stability of intentions. The more we know, therefore, about the factors that shape intentions, the better we can understand why they change. The study of the stability of intentions is thus of key importance.

social and economic transformation since the end of the 1980s has few precedents. These countries can be thought of as “natural experiments.” We have developed specific theoretical frameworks, including social capital and social anomie, to explain why fertility is low in that part of Europe.

variations. In general, we are more optimistic than many commentators. We see little evidence to support the view that fertility in Europe is in a tail-spin towards oblivion. This is most obviously true in North-west Europe (the Nordic Countries, the British Isles, Benelux and France), but even in the countries of Southern and Eastern Europe, where fertility is much lower, the most plausible expectation is a modest increase in fertility. However, there is no reason to think that the diversity of experience will end any time soon; the different regions of Europe appear to be creating distinctive fertility regimes. We have no way of knowing yet how enduring these diverse regimes will be. Charting fertility in Europe in the decades ahead promises to be as exciting a business as ever it was.

More information

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Fulfilled or frustrated?

Fertility intentions

Demographers have long had something of a love-hate relationship with indicators of fertility intentions. At one level, common sense suggests that what people intend to do must play some role in determining what they actually do. Yet finding consistent relationships between stated fertility desires and subsequent

“A new consensus is emerging that intentions do, after all, have a lot to tell us about fertility.”

family formation has often been difficult, even impossible. Moreover, there is plenty of scope for reciprocal causation: preferences shape fertility, but actual fertility can also influence intentions; trends in “ideal” family size seem to lag behind observed fertility. As a yet further complication, responses to questions along these lines are likely to be subject to strong normative pressure, more a test of social knowledge than a meaningful inquiry into personal aspirations. Given all this, many researchers probably agreed with Belgian demographer Ron Lesthaeghe when he described measures of intentions as, “rather slippery pieces of information.” So until recently few demographers took the study of intentions very seriously. In

just the last few years this situation has begun to change, and a new consensus is emerging that intentions do, after all, have a lot to tell us about fertility. This more positive view of intentions coincides with developments on the policy agenda. In recent years the European Commission has pointed out the mismatch between stated ideal family size and the observed fertility level, arguing that European governments should shape policies that address the gap. As we shall see, our research suggests that reality may be rather more complex than a simple comparison of aggregate desires and outcomes can show.

The change of attitudes towards intentions among demographers can largely be explained by three developments: the availability of new data, the adoption of new theoretical frameworks and the application of new statistical methods. The new data come in the form of panel surveys. In this design, respondents are interviewed several times, usually at intervals of a few years, to see how their lives (and their intentions) have changed in the meantime. This opens up the possibility of comparing stated intentions in one round of the survey with the out-turn of events recorded at a later interview. The scope for meaningful analysis is greatly increased, as indicated in the diagram on this page. The newer surveys also include questions that allow of more nuanced responses than was attempted in older surveys. For example, respondents are asked if they intend to have a

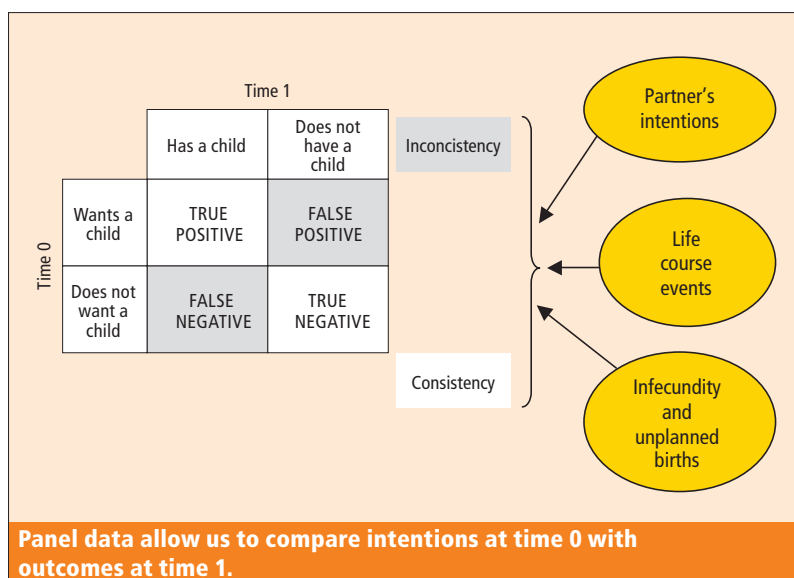
child, soon, later or ever. This form of questioning provides richer information on the determinants of decision-making.

The newly adopted theory is borrowed from psychology: the theory of planned behaviour introduced by Ajzen. Demography is an eclectic discipline, picking up theories from a range of cognate disciplines, mostly from economics, but also from sociology and here from psychology. The need to adopt theoretical frameworks developed elsewhere is made all the more pressing by the general reluctance of demographers to create their own. Ajzen’s theory postulates that intentions are shaped by three interacting factors: attitudes to the behaviour in question, subjective (i.e. internalised) norms towards the behaviour, and the extent to which the

“Reality may be more complex than a simple comparison of aggregate desires and outcomes can show.”

behaviour is perceived as being subject to control. Factors that have an impact on intentions will also have an impact on behaviour.

In our recent work we have looked at panel data from France in one study (with Laurent



Toulemon of INED in Paris) and from Hungary and Bulgaria in another (with Zsolt Speder of the DRI in Budapest and Francesco Billari of Bocconi University in Milan). The results of both studies reveal the potential for insightful analysis of intentions and their link to fertility. Perhaps the two most important observations are that the factors influencing intentions change over the life course, and that the wider societal context plays a very important role. We need to see childbearing not as single process, but rather as an evolving sequence of decisions. The determinants of the first birth can differ substantially from factors central to the decision to have a second. The implications for policy are substantial – it may be hard to influence fertility at all birth orders. Instead, policies attempting to raise fertility may need to be designed to have the most impact on key transitions, especially that from first to second birth. And the significant role of societal context implies that policies need to be specific to each country, perhaps even to each region.

The newer statistical methods can be seen in other recent work (with Leonardo Grilli of the University of Florence). We tried to squeeze more insight from old-style statements of fertility ideals in Eurobarometer data (for the EU-15) than has hitherto been possible. Examining the regional pattern of ideals, we found a marked relationship between the aggregate fertility seen in a region

“It may be hard for policy to influence fertility at all birth orders.”

in the past and the stated ideals of young respondents (20-39) in the survey. In regions where fertility was high 25 years ago, ideal family size is high today. Where fertility was low in the previous generation, ideals are low today. The pattern remains strong after controlling for many potential confounding influences. The past

history of fertility is clearly a key contextual indicator explaining regional differences in fertility ideals. There is thus a strong suggestion of an inter-generational effect. These findings too are rich in implications for policy. If today's low levels are shaping future preferences for fertility, then attempts to raise the level of childbearing significantly in the future may become increasingly problematic. What we are seeing may well be a kind of ideational momentum that locks in low fertility.

A further ideational influence that we have been studying recently is religion. European demographers rarely consider religion as a determinant of contemporary behaviour. To first appearances, Europe is a very secularised place. After all, few people regularly attend religious services. However, we have been able to show that religion can have significant effects on ideals, intentions and behaviour related to childbearing. Fascinatingly, we found that the influence of religion on ideals is more pronounced than its impact on intentions, which is mediated by other social systems.

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Later and lower

Fertility level and tempo

Today Europeans have fewer children and at older ages than during the baby boom of the 1950s and 1960s. This is true throughout Europe, but underlying these general trends are some strikingly different fertility patterns. To understand what is going on, and what the future is likely to hold, we need to be aware of both the commonalities and the variations across Europe.

Lower

In 1964 the most widely cited index of fertility, the total fertility rate (TFR), stood at 2.6 children per woman in the EU-25; over the last 10 years it has been around 1.5. Such a marked decline has led to many gloomy prognostications concerning Europe's imminent implosion. But the angst is certainly overdone. Alternative measures that attempt to take into account the impact of the changes in the timing of births suggest that fertility overall in the European Union is closer to 1.7 children. This dif-

ference seems small; can 0.2 of child really be important? Yes it can. If a long-term target is to ensure that each generation is succeeded by another of roughly the same size, then about 2.1 children per woman are needed. Immigrants can top up a shortfall in births, but the numbers needed if fertility is 1.5 are much greater than at 1.7. The higher fertility level implies that about one net immigrant is needed for every four births (this is roughly what we have seen in Europe over the last 15 years), whilst to ensure replacement at 1.5 there needs to be one immigrant for every 2.5 births. No large country, let alone a grouping of close on 500 million people, has ever sustained so high a rate of net immigration in the long term. Apparently small differences in fertility do matter.

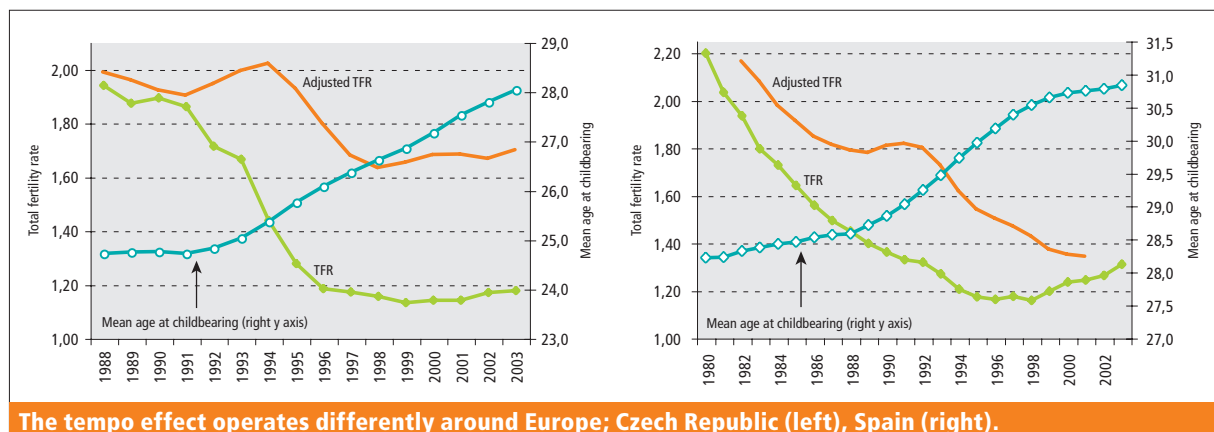
Later

Everywhere in Europe mothers are older today than in the 1960s and 1970s. The age at which women have their first child has risen by 4-5 years or more

in most countries. The phenomenon of postponement is clearly Europewide, and appears to be the outcome of many interconnected social and economic trends, such as increased education and higher rates of labour force participation among women. However, the scale and timing of postponement has var-

“The scale and timing of postponement has varied substantially in the different parts of Europe.”

ied substantially in the different parts of Europe. The nature of the relationship between timing (or tempo) and level (or quantum) are not necessarily obvious. For individuals, the later you wait the lower on average will be your



final family size. However, at the aggregate level, the picture is less clear-cut. For example, women in some countries with very low fertility (e.g. Italy and Spain) start their childbearing at similar ages to women in countries where fertility is much higher (such as France or the Netherlands). Thus, it seems fair to judge that most women can realise their fertility goals, even if they begin family building around age 30. All in all, while postponement has certainly led to lower period birth rates, it does not seem to have been one of the major forces responsible for a downward trend in cohort fertility. Our current research focuses especially on two trends linked with delayed childbearing: the rising fertility rates among women at very late reproductive ages (aged over 40 years) and the increasing impact of assisted reproduction on fertility.

Diversity

In spite of the ubiquity of the trends towards lower fertility and postponement, it is somewhat misleading to speak of European fertility. Rather, we should see Europe as composed of a number of contrasting regions. In much of Northwest Europe (The Nordic Countries, the British Isles, Benelux and France) fertility is not in fact very low. In France, for example, the TFR is scarcely below the replacement level (2.0) and tempo-adjusted indices are above two. The rest of this Northwest group is not far behind. Moreover, in several of these countries (e.g. The Netherlands and France) there is clear evidence that postponement is slowing down. The truth is that in this region low fertility does not pose any immediate and pressing challenge to the fabric of society. The story is very different in Southern and Eastern Europe. The baby bust came later here, but the speed and extent of fertility decline and postponement in countries such as Spain

and Italy in the period 1975-1990, and in the former Communist states after 1990, has propelled them to unprecedented low birth rates. The TFR in most of these countries is below 1.5; in many it is 1.3 or less. Demographers have needed to stretch their lexicography to coin new terms for such low levels, as they are quite outside the range of earlier European experience. Thus fertility below

“We should see Europe as composed of a number of contrasting regions.”

1.3 has been called ‘lowest-low’. However, these are exactly the places where the ‘tempo-effect’ caused by postponement is at its greatest. For example, in the 12 countries that joined the EU in 2004 or 2007, the TFR in 2002 was 1.24, yet the tempo-adjusted figure was 1.63. However, the precise way in which the tempo effect is working can differ substantially, even among countries with similar TFRs. The graphs for the Czech Republic and Spain clearly show such differences. We further explore contemporary regional differences in European fertility in a collaborative project described on page 35. As best we can judge at present, lowest-low fertility is probably a transient phenomenon, although in this case ‘temporary’ might still mean several decades. Finally, the German-speaking countries constitute a third coherent regional grouping within the EU. The timing of fertility decline was similar to the Northwest, but fertility has levelled off a good deal lower: TFR is 1.3 or 1.4. One of the most striking features here is the high level of childlessness. Our recent work shows that also the younger generations of German men

and women stand out in their intended level of childlessness, which is well above that found in other European countries.

Measurement

It is now well known that the postponement of fertility creates a tempo effect, lowering the apparent level or quantum in period measures such as the total fertility rate. In contrast, when cohort fertility is studied, the declines seem rather less dramatic. However, exactly which measure should be used in place of the easily distorted TFR is still under debate. Demographers have been trying to agree on a standard approach for ‘tempo-adjusted’ rates for a decade or more, but there is as yet no definitive consensus. Our view is that fertility is an inherently sequential process and that it must, therefore, be analysed taking birth order (or, as demographers term it, parity) into account. A range of possible indicators, some of which have been in the literature for decades, can do this. Among the most informative measures are ‘parity progression ratios’: the chance of progressing from one parity to the next; from first birth to second, from second to third, and so on. However, there is also a need for an overall indicator analogous to the TFR; there is an understandable preference for a single number that can say what fertility ‘is’. We have proposed a new measure, period average parity, which we believe is the most suitable to date. We present it in more detail on page 34.

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Research Group Leader
Richard Gisser

At the heart of Europe

The VID is not a government institution; as an institute of the Austrian Academy of Sciences we are proud of our intellectual independence. However, the VID is a nationally significant entity: the sole research institute in Austria specifically devoted to demography. Therefore, both the policy-making and scholarly communities, not to mention the wider public and official bodies such as Statistics Austria, look to us to play a variety of national

we act as the Austrian partner in large European research projects and networks. This all means that the scope of work carried out in this Research Group is somewhat more diverse than in the three others. Our research covers all three of the main processes of demographic change: fertility, mortality and migration.

Austria's demographic profile is in many regards similar to that of the European Union as a whole (see table). This similarity means that Austria is a surprisingly suitable test-bed for new methods that might later be applied more widely, for example, our new system for reporting monthly fertility, the birth barometer. We hope to see it employed in other countries soon. "Today, Austria. Tomorrow, ...". Well, if not the world, perhaps at least in the other EU countries with the right data. In another project we are contributing to a coordinated European study of fertility that combines a new level of methodological sophistication with a detailed assessment of relevant policies.

Mortality is becoming a larger component of the VID's research agenda. Of our work to date, one of the most interesting research topics has been that into inequalities in health and mortality. Discovering the reasons for the enduring differentials by educational attainment is an increasingly significant research topic. Another fundamental, yet poorly understood, differential is that

between male and female mortality. This too is a subject that we are just starting to investigate in depth.

A good example of our role as an collaborator in European projects is SHARE, the Survey of Health, Ageing and Retirement in Europe. This panel survey will gather data that delineate the reality of life for the older population, providing both a breadth and a depth of information never previously available across so many countries.

Another of our European collaborations is FEMAGE, an eight-country study of female immigrants using qualitative methods derived from psychological research. The project marks a departure for us, representing a first testing of the water ahead of any decision to immerse ourselves more thoroughly in the flow of migration research.

But to begin, we give an example of the kind of nationally focussed task that we are often called upon to carry out: making projections of the potential demand for university education. Of all Austrian institutions, only VID could perform this task adequately.

In the big context of things, Austria is a small country, with just 8.2 million inhabitants, but we hope we can show you that being small does not imply being parochial, and that serious science can play a valuable national role.

Small is ... representative		
	EU-25	Austria
Population 1 Jan 2005 (millions)	459.5	8.2
Total fertility rate 2004 (children per woman)	1.50	1.42
Adjusted fertility rate 2004	1.67	1.63
Mean age at first birth 2004	27.8	27.0
Life expectancy at birth females 2004	81.2	82.1
Life expectancy at birth males 2004	75.1	76.5
Life expectancy at 65 females 2004	19.7	20.2
Life expectancy at 65 males 2004	16.1	16.9
Percent aged 65+ 2030	24.7	25.1
Percent aged 80+ 2030	7.2	7.3
Old age dependency ratio 2030	40.3	40.8

Source: European Demographic Data Sheet

roles. We offer informed commentary on population trends, we provide advice and one-off research on specific topics, and

The future of universities

Forecasts for the Ministry of Science

Formal education is overwhelmingly age-specific, thus demographic trends play an important part in forecasting demand for university places. The number of people aged 18-25 there will be in Austria in the year 2025 is already reasonably clear, for example. For almost thirty years the Austrian Academy of Sciences has carried out an analysis on behalf of the Ministry of Science every three years, studying recent trends in universities and forecasting likely developments in the decades to come. This work is one of our most important national tasks; it is certainly one of the most visible to the wider public. Some of our estimates from the 2005 report are graphed on this page.

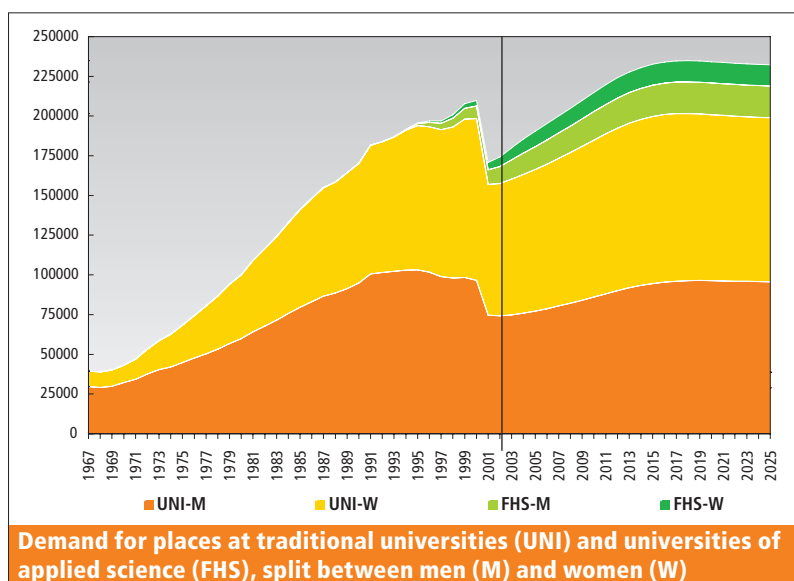
Demographic trends form the bedrock of forecasting demand for university education, but these fundamental forces are strongly modified by other factors, not all of which are very

predictable. Thus our research on the future of Austria's universities takes us into less obviously demographic intellectual terrain. Firstly, we need to consider changes in policy and practice in higher education. For example, in the 1990s the government created a new form of higher education in the shape of universities of applied science (known by their German initials as FHS). A further policy decision was the introduction of tuition fees. In Austria, as in much of continental Europe, there had been a long tradition of free access to universities, so even a relatively modest tuition fee could well have an impact on demand.

A further dimension to consider are the trends in high school graduation and the duration of university study. By convention anyone with a high school diploma (Matura) was entitled to attend university. The creation of the FHS system has been accompanied by the

creation of a new technical equivalent to the Matura appropriate for gaining entry to FHS courses. Quite aside from policy, there is also a steady trend towards higher proportions of people finishing high school, as dropout rates decline. Moreover, the tradition of taking many years to graduate from university (the so-called "perpetual student" complex) is fast disappearing. Equally, the relative attractiveness of different degrees is also always changing, as perceptions of their utility vary. Individual decisions concerning education of this kind inevitably lead to changing demand for places.

European trends provide a further dimension, with a Europe-wide move to a three-degree system (bachelors, masters, doctorate). Moreover, in recent years the European Court has ruled that governments must remove all preference for their own nationals ahead of students from the rest of the EU. The long-run implications of this judgement are hard to gauge; at present the main impact here seem to be limited to a few specific courses. But Austria may be one of the countries most affected in the longer-term; it is a small country that shares a language and an educational tradition with a much larger neighbour (Germany). In sum, there is a lot more involved in forecasting the future of universities than just demography.



More information

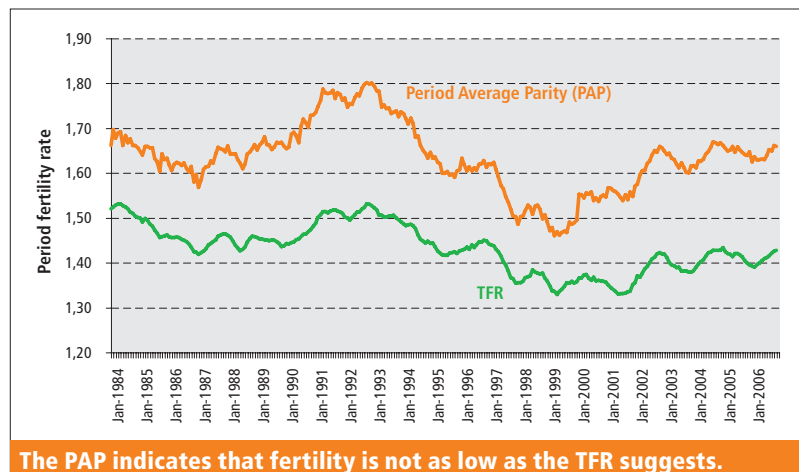
Landler, F. and R. Dell'mour (2006) "Quantitative Entwicklungstendenzen der österreichischen Universitäten und Fachhochschulen 1975-2025." *Forschungsbericht* 29. <http://www.oaaw.ac.at/vid/download/FB29.pdf.zip>

Monitoring monthly fertility

The birth barometer

Fertility in Europe is at an historic low; this much is agreed. But how low? And can we detect the influence of changes in policies that affect it? To answer these questions we need to calculate the most informative measure of fertility and to do so on a month-by-month basis so that any temporal association between fertility and policy changes is more readily visible. We have developed what we think is a very useful tool for this purpose: a system for monitoring monthly trends in fertility that enables us to calculate a carefully defined fertility measure. We term this fertility indicator Period Average Parity (PAP) and the full monitoring system the Birth Barometer. We have developed and applied the system for Austria, but it could be applied in any country with the right data. We hope to begin extending the system to other countries in 2007.

Although the details of the methodology are intricate, the main ideas behind our analysis can be readily grasped. We start out with monthly reports of live births, classified by birth order (or parity) and by single year of age of the mother. For second and subsequent births we also know the date of the previous birth. With this information, we calculate an indicator (PAP) that is largely free from many of the distortions that plague conventional indices of fertility. In particular, although we do not explicitly adjust the data to take into account the well-known 'tempo-effect' caused by the postponement of births to older ages, the PAP, in fact, largely overcomes this problem.



The PAP indicates that fertility is not as low as the TFR suggests.

Certain basic analytical principles underlie the calculations. The first is that fertility must be understood as a sequential process, and thus we must treat each birth order separately. Secondly, we must use measures that relate the occurrence of events to the people who are 'exposed' to the 'risk' of experiencing them. For example, first birth rates must be calculated only for the childless. And thirdly, we should not make any corrections or adjustments that introduce potentially invalid assumptions. These three criteria sound obvious, but it is striking that most, if not all, conventionally calculated indices of fertility do not meet them. The use of exposure-based methods is especially important.

With these principles in mind, we calculate parity-specific measures that take into account both the chance of going on from one birth to the next, and the distribution of intervals between births. We also adjust the monthly data to remove seasonal patterns. Having calculated a series of parity-specific indicators, we can then combine

them to produce a single overall index: period average parity. The figure on this page compares the PAP with the most widely cited indicator of fertility, the total fertility rate (TFR). Both measures can be intuitively understood as indicating the average number of children born per woman in her lifetime. The result could well be described as a happy ending. Fertility in Austria is not as low as conventional indices suggest, nor is it significantly in decline. The PAP suggest that over the last 20 years fertility in Austria has averaged a little over 1.6 children per woman, 0.2 above the TFR. In short, as is often the case with premature obituaries, stories of the end of childbearing in Austria are greatly exaggerated.

More information

See our Barometer webpage: <http://www.oew.ac.at/vid/barometer/index.html>
 Sobotka, T., M. Winkler-Dworak, M. R. Testa, W. Lutz, D. Philipov, H. Engelhardt, and R. Gisser (2005) "Monthly Estimates of the Quantum of Fertility: Towards a Fertility Monitoring System in Austria." *Vienna Yearbook of Population Research* 2005: 109-141.

30 years below replacement

Understanding fertility

In common with much of Western Europe, fertility in Austria (as measured by the total fertility rate) has been below the level of intergenerational replacement since the early-1970s. Clearly, low fertility is not a new phenomenon. Demographers have been considering its causes and implications for decades, but only relatively recently has the matter received wider attention in policy-making circles.

While the TFR remains the “headline” indicator of fertility, we have sought to provide a deeper assessment. As part of a large project coordinated by the Max Planck Institute for Demographic Research in Germany, we recently completed a thorough examination of fertility trends in Austria, and related them to the relevant family-related policies

and economic trends. The overall project consists of 17 country case studies from around Europe, along with several synthesising analyses. The aim has been to provide methodologically rigorous assessments of each country’s fertility, going beyond reportage to investigate key trends and relationships in depth. The result is, we think, both comprehensive and innovative. The systematic attempt to identify the main elements of the policy context is especially novel.

In order to understand the present, we need to see it in the long-term perspective provided by the upper graph on this page. As is well known, the TFR (a period measure) can differ substantially from the experience of birth cohorts when the timing of fertility is changing. During the 1950s and

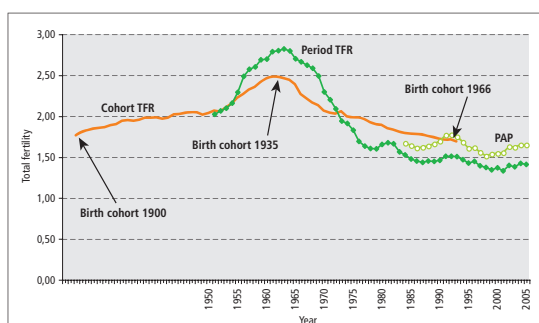
taken place during the lifetimes of these cohorts, the fluctuations in fertility seem modest. From a methodological point of view, we are also encouraged that the period average parity (PAP) seems to splice on to the cohort trends with little discontinuity.

A further fundamental aspect of fertility is the decomposition of final family sizes given in the lower figure. Strikingly, the proportion of women who have two children over their lifetime has risen steadily. Two is the most common number of children for all cohorts born since World War II. In contrast, the number of large families (3+ children) has declined rapidly since the baby boom. The proportion of one-child families has shown little trend, but childlessness has changed radically for different cohorts. There has been a steady increase in childlessness for cohorts born since 1945, but the level is still well below that seen for women born at the start of the 20th century.

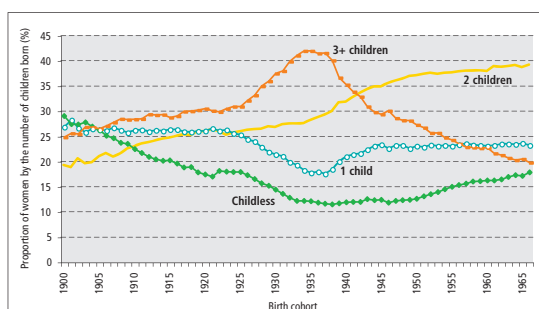
For future fertility, a lot hinges on childlessness. And here there may be an important link to policy. In Austria, the welfare state regime has long emphasised the “male breadwinner” model of the family, with mothers discouraged from working outside the home. Thus for many women, a career and motherhood can be hard to reconcile. Among university-educated women born 1955-1960, for example, childlessness is 30%. Understanding parity-specific effects may be crucial for designing future policies.

More information

Frejka, T., J. Hoem, T. Sobotka, and L. Toulemon (eds.) (2007) *Childbearing trends and policies in Europe* (forthcoming).



A long-run perspective is crucial.



The two-child family is increasingly predominant – cohort parity composition.

1960s the TFR was well above the cohort measures – women had their children at progressively younger ages during the baby boom. In contrast, since the 1970s fertility has been increasingly postponed, generating the now-famous tempo effect. Thus the cohort trend provides a noticeably less dramatic picture of fertility decline since the end of the baby boom. Taking a long view, the average for the cohorts born in the first two-thirds of the 20th century is a little over two, and varies only between 1.7 and 2.5. When one considers the enormous economic, social and political changes that have

Unequal chances

Educational differentials in health and mortality

Educated people live longer, healthier lives than their contemporaries with little or no education. This observation is so widely reported (it has been found in almost every country of the world) that it amounts to a virtual “law of society”. Moreover, the differentials by education usually remain strong, even when other socio-economic factors, such as income, are controlled

“In many countries (including Austria) differentials by educational status are widening.”

for. In most analyses education stands out, its impact placing it head and shoulders above less important factors. And what is more, in many countries (including Austria) differentials by educational status are widening. There could scarcely be a more significant topic for research, literally vital to all of us. However, while education's overall importance is clear, the detailed mechanisms through which it acts are often frustratingly hard to identify. Two key areas in which we

need analysis are cause of death and health-related behaviour. In many respects it seems that life style and “death style” are intimately related.

Our studies of cause-specific mortality have revealed strikingly large inequalities among men for alcohol-associated diseases, followed in importance by digestive and respiratory diseases, stomach and lung cancer, and suicides and injuries. For women a different picture emerges. The largest differentials for women were in diabetes, injuries, stroke, respiratory diseases and ischaemic heart disease. The biggest contributors to the overall differential were lung cancer for men and circulatory disease for women. It is also possible to identify mortality caused by conditions that are, in principle, amenable to medical intervention. Differentials in this case were also significant, in spite of the fact that Austria has a comprehensive social healthcare system. Clearly, we need to understand more about health-related behaviour to make sense of the differential mortality.

Thanks to data from the 1999 Austrian Microcensus, we can look at several aspects of behaviour that can be presumed to underlie the mortality differences. The pattern we see is marked – the lower people's educational attainment, the worse their lifestyle. Differences between educational groups in such matters as smoking, diet,

and physical exercise, are all substantial. There are also significant differentials in directly health-related matters, such as getting periodic vaccinations. In some respects, it is no surprise that mortality differentials exist, given such fundamental differences in lifestyle.

Putting Austria into a wider international context indicates that both the levels and trends that we observe here are seen throughout the developed world. Indeed, the degree of inequality in Austria seems more or less typical for Western Europe, as does the trend to increasing overall differentials over time, especially for males. The detailed picture is less clear-cut, however. When we look at age-specific and sex-specific patterns we see a more diverse situation. The differentials in each country are evidently under a range of local influences, as well as quasi-global trends.

All in all, it seems almost impossible to overstate the importance of education. The more we can understand about the ways in which it affects health and mortality, the more important it seems to be.

More information

Schwarz, F. (2006) The Contributions of Diseases to Increasing Educational Mortality Differential in Austria. *VID Working Paper* 02/2006.

Schwarz, F. (2006) Behavioral Explanation for Educational Health and Mortality Differentials in Austria. *VID Working Paper* 03/2006.

Sex and death

Male-female differentials in mortality

An interest in sex-differential mortality is as old as demography. The work widely seen as inaugurating the quantitative study of population, John Graunt's *Natural and Political Observations* (1662), has a section on the subject. His observations still resonate today. He noted that women are sick more often than men, but still live longer. The reasons for male disadvantage he attributed to lifestyle, although women suffered pregnancy-related deaths. "Men, being more intemperate than women, die as much by reason of their Vices, as women do by the Infirmitie of their Sex."

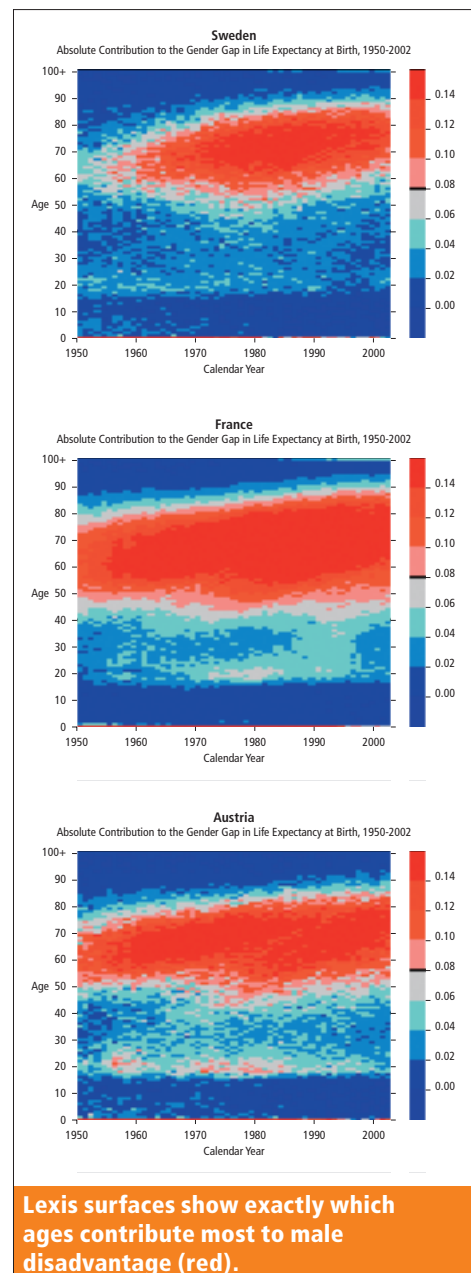
After almost 350 years of study, it might be thought that everything would have been said on this subject. However, in many respects it remains as puzzling as ever. In most European Union countries life expectancy is typically 5-8 years longer for females than males, and the broad outline of age-specific patterns is similar. However, the detailed picture by age and cause of death is surprisingly varied. Moreover, there are some parts of Europe, especially in the former Soviet Union, where male disadvantage is much greater. In Russia, for example, men live 12-13 years less than women. There is still plenty to learn, and we are still at an early stage of our research.

An accurate description is often the first step towards advances in scientific understanding, so we began by simply charting the trends in male-female differentials over time. In this work we were able to draw on the Human Mortality Database, a joint project of

the Max Planck Institute for Demographic Research in Germany and the University of California, Berkeley. This is the most detailed and rigorously comparable body of international mortality data available. We were able to look at male-female differences by single year of age and single calendar years for 26 countries from 1950 on, with four more available for shorter periods. Some of the results are shown in the graphs on this page. This type of graph is known as a Lexis surface, after the 19th century German scholar, Wilhelm Lexis, who proposed a diagram in which results were shown by age, period and birth cohort simultaneously. The Lexis diagram is so famous among demographers that we have used a stylised representation of it in VID's logo. The amount of information presented in such Lexis surfaces is huge, and they enable the researcher to make important observations literally 'at a glance'. Our analysis shows clearly that there are both significant features common to all the countries studied and that many country-specific aspects. The search for the determinants of both is our agenda for further research.

More information

See an award-winning poster "The Phenomenon of Patterns: Gender Gaps in Mortality" Nadine Zielonke, Vienna Institute of Demography; Marc Luy, University of Rostock http://www.oaaw.ac.at/vid/news/events/epc06/abstract_zielonke.shtml



The reality of ageing

The SHARE project

W

What really happens as we get old? Charting the process is the aim of SHARE, the Survey of Health, Ageing and Retirement in Europe, a multi-dimensional, multi-national, multi-round survey. In collaboration with Johannes Kepler University in Linz – the country team leader in Austria – we conduct analyses using SHARE-data for Austria; the project as a whole is coordinated by the Mannheim Research Institute for the Economics of Aging in Germany.

Multi-dimensional

SHARE aims to record information about people (mostly aged 50 and older) on a wide range of topics: demography and family life, health and physical capacity, finances and housing, activities and expectations, and more. Having such a breadth of information on the same individuals and households opens up the possibility for much more insightful analysis.

Multi-national

SHARE is a Europe-wide enterprise: ten countries took part in the first wave of data gathering in the summer of 2004, four more joined in at the second wave during the winter of 2006-2007. Creating a truly multi-national survey, applicable in all European countries was a formidable challenge, given the diversity of national institutions and tradi-

tions. Just to give some idea of the detail involved, although gathering the same data, questionnaires were worded differently in the three German-speaking countries: Austria, Germany and Switzerland. Without such subtlety strict comparability could be jeopardised.

Multi-round

SHARE will carry out interviews in rounds of data gathering, every two to three years. Real life is a longitudinal experience. The problems we face, and our solutions to them, change over time. Only data that follow individuals as they age can grasp the reality of ageing. Surveys of this kind are generally referred to as panel surveys.

The huge scientific scope provided by panel data is well demonstrated by the U.S. Health and Retirement Survey (HRS). Since its inception in 1992, the HRS has spawned more than 1,000 scientific papers, many of great relevance to crucial policy questions. However, before any analysis can be carried out, comes the long, and largely hidden, work of data cleaning and organisation. Much of our effort on SHARE in 2006 went into creating a codebook for the whole survey. Such tasks are largely taken for granted once completed, but they deserve their moment in the sun; they are the bedrock of research. Meticulous data examination, reconciliation of conflicting information,

and similar tasks, are always needed to ensure that the scientific work can proceed smoothly in due course. Nor can this work

“Only data that follow individuals as they age can grasp the reality of ageing.”

be made simply routine and delegated to junior assistants. At all stages, the work requires judgement and experience. Most of SHARE's impact lies in the future. Panel surveys of this kind gain scientific significance in an almost exponential way. A second wave of interviews doesn't just add a little to what was collected before, rather it creates the basis for answering questions wholly inaccessible to one-off data. With each additional wave, the possibilities multiply. Having helped at its inception, we hope to reap some of the scientific benefits in the coming years.

More information

For the SHARE project as a whole see <http://www.share-project.org>
For SHARE Austria see
Buber, I., A. Prskawetz, H. Engelhardt, F. Schwarz, and R. Winter-Ebmer (2006) Survey of Health, Ageing and Retirement in Europe. SHARE. First Results for Austria. *Forschungsbericht* 31.
Available at <http://www.oeaw.ac.at/vid/download/FB%2031.zip>

In-depth perspectives

The FEMAGE project

I

Over the last 15 years an average of more than a million net migrants a year have moved into the European Union from the rest of the world. For the EU as a whole, there is now roughly one net immigrant for each four births. With natural increase close to zero in Europe, immigration is now by far the largest component of population growth. Austria is fairly typical; in 2004 there were 5,000 more births than deaths, and 62,000 net immigrants. Within a few years it is more or less certain that natural increase will turn negative for the EU-25, as it already has in most of Southern and Eastern Europe. At that stage immigration will be the only factor preventing population decline.

If Europe is to adapt to this new regime of substantial immigration, then the smooth integration of migrants into the mainstream of society is crucial. In order to make policy recommendations on how to achieve this, you need to know as much as possible about the real problems that face migrants. In-depth studies, based on qualitative methods, can provide crucial insights. As part of the FEMAGE project, which is running in eight EU member states and is coordinated by the German Federal Institute for Pop-

ulation Research (BiB), we are investigating the challenges faced by migrant women who have

“In-depth studies, based on qualitative methods, can provide crucial insights.”

come to Austria. In each country the project team has selected for study the two migrant groups of most interest there. We are working with women in the two largest migrant groups in this country: Turks and Bosnians. The project will help to identify gaps in the knowledge base that feeds into policy decisions. We look in depth at three issues.

1 – The life chances and expectations of immigrant women;
2 – What they need to help them integrate, taking into account the fact that they too age and need social security;
3 – Long-term demand for migrants and the views of the host populations.

The project makes use of three distinct approaches. Firstly, indi-

vidual immigrant women are interviewed in depth; secondly focus groups of migrants, experts and stakeholders will discuss the issues involved, and thirdly we are carrying out statistical analysis of the views of host populations (using data already collected but not previously analysed). In conjunction, these different approaches provide an all-round view of the subject, facilitating a deeper understanding. The interviews were carried out using a biographic narrative method known as the Rosenthal approach. This form of interviewing permits the researcher to look in detail at both key individual experiences and the whole structure of the life course as narrated by the respondent. The migrant could largely determine the content of the interview, but at the end a quantitative questionnaire was also completed.

Migration is already a large phenomenon in Europe; it is likely to be an even larger part of our future. FEMAGE is just one step towards understanding the process and how Europe can best take advantage of it.

More information

See the FEMAGE project homepage
<http://www.bib-demographie.de/femage/>

VID Publications

In-house publications constitute a significant form of self-expression for any research institute. The character and quality of the research that we publish in our own series can be seen as a kind of statement of our view of demography.

Vienna Yearbook of Population Research



The Yearbook is our flagship publication – a substantial collection of articles (around a dozen in each issue) that is sent free around the world and made available online. Although only four years old, our Yearbook has been evolving rapidly and seems to be finding a niche in the literature. It

“There are two fundamental requirements for publication in the Yearbook: quality and interest.”

is, in effect, a journal published once a year. The first issue (2003) consisted mostly of reprints of articles that we felt deserved a wider readership. From 2005 on, however, the Yearbook has included only new articles. As a further experiment, in 2006 we produced a themed issue dealing with fertility postponement based on our 2005 Annual Conference. Each year we put out a call for submissions and also take active steps to encourage specific authors whose work we would like to include.

There are two fundamental requirements for publication in the Yearbook: quality and interest. All submissions are externally refereed to the highest standards so that both authors and readers know the work is comparable with that in the best demographic journals. We are also keen that the Yearbook contains articles that people will want to read and will enjoy reading. Thus, the subject matter needs to be timely and likely to be of wide interest. We also pay a good deal of attention to the quality of the English editing, avoiding if possible some of the more rigid styles of scientific prose. As far as possible, we want the Yearbook to be a good read. In addition, the Yearbook is now easily accessible online. In early 2007 we established a new design for the Yearbook's webpage, with

“A working paper is often the most effective way of publicising ideas and results quickly.”

user-friendly access to each volume, including the full text of all articles, abstracts, and information about the authors.

One aspect of the Yearbook's intellectual liveliness is our commitment to include scholarly debates, presenting several viewpoints on a particular topic. In 2004 we published four contributions on the value of the concept of the Second Demographic Transition. These were originally given as round-table talks at the 2003 European Population Conference in Warsaw, and we felt that the four, taken together, amounted to a valuable assessment of this influential, but still somewhat controversial, idea. In 2005 we gave space to a number of contrasting interpretations of the relationship between population ageing and economic productivity that had originated in our Annual Conference the previous year. The fully themed

issue in 2006 was a natural extension of this desire to provide multiple points of view on one topic.

European Demographic Research Papers



We created this quarterly series of Europe-focussed working papers in 2002. Our aim is to draw attention to research that is of

Europe-wide interest, especially that of a comparative nature. Ideally, the research covers at least three European countries. Working papers of any kind are a sort of halfway house to publication. Authors can circulate an early version of a paper and receive valuable feedback before submission to a journal. Moreover, given the length of time that sometimes elapses between submission and publication in many journals, a working paper is often the most effective way of publicising ideas and results quickly. Equally, a working paper also acts as claim to intellectual precedence, even before formal publication. As far as we know, we are the only institution with a series of this kind specifically devoted to Europe. Research that does not fit the rubric for our

European series can enter the public domain via our *VID Working Papers*.

Demografische Forschung aus erster Hand



VID's main working language is English, and the overwhelming majority of our output appears in English.

However, we still recognise our responsibility to communicate the results of our work to a broad national audience that may not be fluent in English. *Aus erster Hand* is one of our means to fulfil this task. It is a four-page newsletter published quarterly in collaboration with the Max Planck Institute for Demographic Research in Germany. Since many demographic trends are common to both countries, this shared effort enables us to provide wide-ranging information and commentary to the German language audience. We provide one-third of the content and distribute the newsletter widely in Austria. The current mailing list runs to over 1,500 recipients in all walks of life: policy makers (national, regional and local), scholars (of many disciplines), journalists and interested members of the public.

European Demographic Data Sheet



In collaboration with IIASA and the Population Reference Bureau (PRB) in the United States, we published in 2006 some-

thing that we hope will be very visible, literally so, a wall chart of demographic data and analysis on Europe. The PRB has a long history of producing similar data sheets for the United States and for the world. However, this is the first time such a sheet has been published for Europe, and we gave it the theme of, 'The forces driving unprecedented population ageing'. In addition to key demographic statistics on every European country, it also has boxes with discussion and diagrams of key topics: the tempo effect and adjusted TFR, and the range of likely trends indicated by our probabilistic projections for the EU-25. We think the result combines scientific rigour with the visual attractiveness that encourages recipients to display it.

More information

Check our publications page
<http://www.oeaw.ac.at/vid/publications/publications.shtml>

VID Conferences and Colloquia

In early December, demography comes to Vienna. Our Annual Conference, held amid the pre-Christmas swirl, is becoming a fixture on the demographic calendar. If the Yearbook is our flagship publication, then the conference is our flagship event. Each conference addresses a specific theme that is timely in the context of the scientific discourse or the policy debate, hopefully both. Our aim is to stage an event that will appeal both to demographers and scholars in cognate disciplines. With invited speakers from around the world we can ensure a high quality of contributions that naturally leads on to significant publication.

In 2002 we inaugurated the conference with a meeting on the theme of probabilistic projections. Speakers represented all the main schools of thought in this rapidly developing field. It is no exaggeration to say that most of the leading scholars working on probabilistic demographic projections worldwide attended the conference. The resulting papers were published in a themed issue of the *International Statistical Review* in 2004 with the title 'How to deal with uncertainty in population forecasting'.

The 2003 conference dealt with agent based modelling in demography and more widely. There were sessions on ABM in economics and environment science, for example. Again, we can

“ A good conference is the result of many factors, scientific, logistical and contextual. ”

say without doubt that most of the demographers using ABM to study population processes were at the conference. The papers led to the 2006 book *Agent-Based Computational Modelling*.

In 2004 we addressed the theme of ageing and economic productivity, one of the most important issues in population economics today. As Europe (and the rest of the world) ages, so the economic impacts and the best means to respond to them are key topics for researchers and policy makers alike.

The 2005 conference took us into a new scale of operations. So popular was the theme of fertility postponement that we sacrificed our lunch breaks in order to hold poster sessions in the gaps between the presentations of the main papers. The larger number of participants also meant that we had outgrown VID's in-house facilities, and Statistics Austria hosted the event. The papers from the conference formed the basis of our 2006 Yearbook, which dealt with the same theme of postponement.

Finally, in 2006 we covered what might be considered the most fundamental topic of all: causal analysis in the population sciences, the logical underpinning of our attempts to explain demographic phenomena. On this occasion the conference took place at the headquarters of our parent organisation: the Austrian Academy of Sciences.

A good conference is the result of many factors, scientific, logistical and contextual. The recipe for success is not hard to see, but the list of possible problems is long. To adapt Tolstoy's famous words from *Anna Karenina*, we might say that all successful conferences are alike, but every

unsuccessful conference fails in its own way. The programme needs to be interesting, but not so full as to exhaust participants, some of whom are already jet-lagged. The venue needs to be fully up to date, but the technology should be unobtrusive. Such balances need to be struck in every aspect of the conference organisation. Planning has to begin early – we start in January.

Of course, holding a conference in Vienna might be considered almost like cheating; the city's delights are legendary, so few invited speakers or potential attendees are likely to forego the opportunity. But this is a two-edged sword. If the programme is anything other than very interesting, the audience can be expected to drift away from the sessions to enjoy the city's many attractions, especially after

“Holding a conference in Vienna might be considered almost like cheating.”

lunch. We take pride in the fact that little attrition of this kind can be seen at our conferences.

In addition to the annual conference we also stage smaller workshops and symposia (often running over two days) throughout the year. These usually deal with a topic that is a special focus of our current research, and we are again very fortunate that so many invited speakers agree to come. To give some flavour of these events, topics in 2006 included the age dynamics of learned societies and micro-simulations of demographic change and the labour market.

In addition to such special events, we also have a regular seminar series, the VID Colloquium. Speakers need to address a topic of relevance to demography, of course, but we take a broad view of what that embraces. In addition to the set-piece Colloquium, we also stage separate, lower-key, internal seminars at which we can try out our ideas in-house before giving them a public airing.

We gain significantly from all these events. Even in the Internet age, there is still no substitute for face-to-face discussion. Conferences, workshops,

“Even in the Internet age, there is still no substitute for face-to-face discussion.”

colloquia, all provide us with a seemingly endless stream of new ideas and different perspectives. In the weeks following one of these gatherings, the hum of conversation around VID is especially animated, as we try to absorb the new ideas and discuss potential projects. The occasions are also an essential component of our scholarly networking, leading on to numerous research collaborations. Even the organising itself helps build our network, as the events are often jointly organised.

More information

For details of future events see our News & Events page <http://www.oeaw.ac.at/vid/news/news.shtml>

VID Connections

The reputation and impact of a research institute is the result of many factors. Most important of all is the quality of its published research. But this main stream of influence can be enhanced by a wide range of other activities. Links can be strengthened with the rest of the scientific community, and we can reach out to pol-

“The added value that comes from joint research efforts is considerable.”

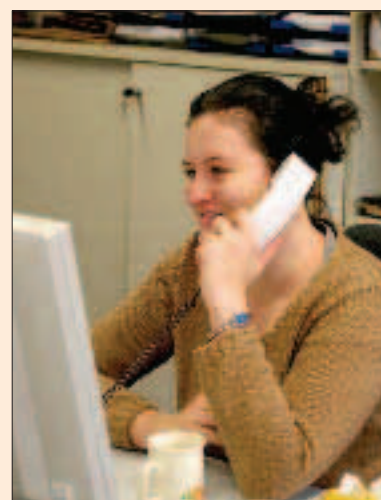
icy makers and (via the media) to the wider public. Thus the institute has become a node in many inter-connected networks, part of a web of personal and institutional connections. On these pages we describe the nature of some of these connections.

Scientific community

Collaborative research constitutes an important element in almost all our work. Many of our publications are jointly authored with colleagues from other institutions, and it is common for projects to be jointly conceived and carried out. Demography is not a particularly large discipline, so the added value that comes from joint efforts is considerable. Given that more or less all of us are actively engaged in

such work, a complete list of the numerous research links over the past five years would fill the several pages. However, some institutions deserve a special mention. Our intimate relationship with IIASA is apparent in many of the descriptions of our research in this booklet, and the institutional underpinning of this extensive cooperation is described on page 47. We also have close links with several of Europe's other leading centres of demographic research, most notably the Max Planck Institute for Demographic Research (MPIDR) in Germany, INED in France, and NIDI in the Netherlands. Within Austria we have close ties with several universities, especially with Vienna University of Technology, and a number of research institutes in cognate disciplines: the Institute for Family Studies, the Institute for Biomedical Ageing Research, and the Konrad Lorenz Institute for Ethology. Our recent work with the Konrad Lorenz Institute on the role of population density in determining demographic trends is a good example of joint research between two units of the Academy.

In keeping with our European ambitions, we are active participants in many projects funded by the European Commission. The various Framework Programmes have given a special emphasis to scientific networking, adding financial incentive to our natural instinct for collaboration. In addition to projects funded under the auspices of the Directorate General for Research, we also carry out research answering specific calls made by other DGs.



Keeping in touch takes time and effort.

And, although not a conventional teaching institution, we participated in a European Research Training Network in demography.

A flavour of our collaborative European research can be gained from some of the projects currently underway. The Survey of Health, Ageing and Retirement in Europe (SHARE) and the FEMAGE project on the needs of migrant women are described in detail on pages 38 and 39. Our expertise in multi-state demographic projections is contributing to the MicMac project, and we are carrying out a project on fertility intentions. In addition to SHARE, we are also working with other Austrian partners in three other European longitudinal projects: the Gender and Generations Project (GGP), the European Statistics on Income and Living Conditions (EU-SILC) and the Community Health Interview Survey (EU-HIS).

In addition to academic institutions, we have close ties to several official bodies. The relationship between VID and Statistics Austria can justifiably be termed symbiotic. In addition to joint projects, we play an advisory role for the demographic statistics division. We also have close working links with the demographic team at EUROSTAT in Luxemburg, and we make regular contributions to the Council of Europe's population work. On the global stage, we are working with both UNESCO and the World Bank to produce multi-state projections of human capital.

A final element of scientific networking comes from our participation at conferences and seminars. We are always well represented on the programmes of the main demographic conferences. These include the Annual Meeting of the Population Association of America, by far the most important yearly event in demography, the biennial European Population Conference, and the four-yearly gathering of the International Union for Scientific Study of Population. Our participation in the scientific sessions is supported by a VID booth in the exhibition hall at all these events. In addition to these massive occasions, with thousands of participants, we also give numerous seminar talks at smaller workshops and conferences. Although VID is not a teaching institution, some of us also give courses at both graduate and undergraduate levels.

All in all, it would be hard for anyone interested in demography (especially in Europe) to miss us.

We are one of the most visible international research centres in the field.

Policy-makers and Media

Academy President Peter Schuster told us at the start of this booklet that scientists have a duty to inform. Policy-makers and the public at large need to be kept abreast of all relevant research findings. We attempt to do this in several ways. We have direct links to policy makers and their scientific advisors, and we use the media to communicate to audiences that we could never reach through our scholarly publications.

As you might expect, our links to policy makers are strongest in Austria. We have close working ties with several Federal ministries and the Federal Chancellor's Office, along with the administrations of several of the constituent states (Laender) and to individual politicians and experts. We also try to keep up good relations with the relevant parts of the European Commission. We have provided advice at the highest level, including directly to Commissioners and we invite representatives from the Commission to participate in our project meetings. Among other national governments, our closest ties are with countries in Eastern and Central Europe for whom we carry out tasks that range from making population projections to helping draft national population policy.

Our most prominent media events are our press conferences. We usu-

ally hold three a year and aim to do so at the completion of each large project. We have been pleasantly surprised by the number of journalists who attend and the

“ We are one of the most visible international research centres in the field. ”

quality and prominence of the resulting coverage. It is not unusual to see a front-page feature in the next morning's serious national daily newspapers. Our newsletter *Demografische Forschung aus erster Hand* (produced jointly with the MPIDR in Germany) is another important part of our public relations strategy. We send it to 1,500 people in Austria. All this implies a lot of work - simply maintaining the mailing list is a non-trivial task. But the result is that we are now a visible presence in Austria; national media organisations increasingly turn to us in the first instance for comment on population-related news items.

It takes time to build a network of connections in both the scientific and wider communities, and both nationally and in Europe. There was no magic wand to wave that could make us a major player in the field overnight. However, step-by-step, we think we are getting somewhere. As one of European contacts told us, “You are on the map.” We will be making lots of effort to stay on it.

VID Visitors

Our research visitors help make VID the place it is. They bring us new ideas and perspectives, along with a dose of enthusiasm and energy. As Academy President Peter Schuster pointed out at the start of this portrait, science is possibly the most international of all activities. Coming from all corners of the earth, and staying for periods that range from a few days to a whole year, our visitors make us realise that we are part of a community of ideas. We feel a sense of intellectual companionship; we share a set of research interests and values. But quite aside from lofty thoughts of scientific endeavour, we get something else from our visitors – they make the place so friendly. It is so refreshing to be with people who are obviously enjoying being here.

The benefits we receive from their presence are clear, but what do they get from us? In preparing this booklet we asked some of them for their impressions. Their replies were without exception so positive that we couldn't resist including a few. To spare their blushes, all are anonymous.

One of the things that everyone commented on was the atmosphere here at VID. As one American visitor put it, there is an "intellectually exciting atmosphere", and "an attitude of intellectual generosity and collaboration". Another U.S.-based colleague found our research "important and eye-opening". Our readiness to discuss research is also appreciated. One French visitor noted that, "It is so easy to

get comments on your ideas, both at seminars and less formally in conversation." A crucial dimension is language; English is the main means of communication at VID. People who stay for some months especially appreciate this. As one longer-term visitor said, "The general use of English facilitates integration. You don't feel like an immigrant. You might want to practice a bit of German to help with your life in the city, but that can come after you are fully integrated into VID life."

Of course, how any visitor sees VID depends a lot on what they

bureaucracy. However, not all our visitors come from large research centres. Demography is a fairly small discipline and many of our research collaborators find themselves in universities where population specialists are in a small minority. As one British visitor observed, "Coming from an institution where demographers are an endangered species, it was rather overwhelming to find such a concentration of demographic talent in one place."

And finally, we have to admit that being located here in Vienna is a non-trivial factor for many



We benefit tremendously from our visitors.

are comparing us with. Colleagues coming from large research centres always seem to appreciate our organisational compactness. One European visitor told us that, "Compared with my home institution VID is small. But small is beautiful. Administrative issues are so easy to deal with at VID." Beauty is in the eye of the beholder, but we certainly are able to avoid too much

visitors. Living here, we can get blasé about it, but the quality of life is certainly high. Vienna regularly comes near the top in surveys of the most desirable cities for expatriates to live in, for example. As one European visitor said, "VID is a generous and friendly place, and wonderfully located near the centre of Vienna."

VID and IIASA

V

ID's closest institutional relationship is with the International Institute for Applied Systems Analysis (IIASA). VID Director, Wolfgang Lutz, is also the head of IIASA's World Population Program, and two other VID researchers have joint appointments. The close collaboration has benefited both partners; by working together the two teams constitute a more significant presence in demography than either could be alone. Together we form a widely recognised, Vienna-centred demographic community.

The key to the relationship is our related but distinct research agendas. The methodological core of demography is shared, but the substantive focus of each team reflects its place in a wider context. VID focuses on Europe and Austria, and operates mostly within a broad social-science perspective. In contrast, IIASA's demographers deal more with worldwide trends and address a scientific audience concerned with global change. This leads to interaction with scholars in many fields: environmental science, technology, energy, and systems methodology, as well as social sciences. Thus demography comes to influence many scientific communities.

IIASA has a record of innovative and important contributions to demography that goes back to 1974. In the 1970s and early 1980s Andrei Rogers, a leading migration specialist, pioneered multi-state demography while at IIASA, and from 1984 to 1994 Nathan Keyfitz, one of the world's most illustrious mathematical demographers, advanced IIASA's expertise in demographic forecasting and population-environment links. Wolfgang Lutz has led IIASA's demographic research



IIASA's palatial home

since 1994, with a primary focus on global issues that is reflected in the departmental name: the World Population Program. Since 2002 VID has been able to draw on this long-established expertise and international experience.

The institutional arrangements that underpin the beneficial scientific collaboration reflect IIASA's unusual, possibly unique, constitution. Founded in 1972 as a joint initiative of the U.S. and Soviet governments, IIASA's existence was based on the recognition at the highest levels that some problems are so important, and common to all developed countries, that they must be addressed by the very best scientists, whatever the political orientation of their governments. With the end of the Cold War, the explicit East-West dimension no longer applied, and IIASA's governing Council modified its remit to embrace global change and North-South issues. Today IIASA's research covers a wide range of innovative and interdisciplinary topics connected with global change in its widest sense.

In a remarkably enlightened step given the Cold War background,

IIASA was set up in a way that minimised political interference. IIASA's Council is composed of National Member Organisations (NMOs) who provide its core funding; these are national academies of science or similar bodies, rather than government agencies. 18 countries from around the world are now members. The Austrian NMO is the Academy of Sciences, VID's parent body. When IIASA was seeking a home in the years before 1972, neutral Austria offered the then recently restored Habsburg palace of Laxenburg, 20 km south of Vienna. Thus the Academy has been closely involved with IIASA throughout its existence. The contacts between the two teams of demographers thus form part of the wider relationship between IIASA and its host NMO. In a 2001 agreement the Director of IIASA and the President of the Academy settled what might be called the rules of engagement for VID-IIASA collaboration. So far, we think that everyone is satisfied with the way this creative collaboration is working. Long may this remain so.

More information

See IIASA's homepage
<http://www.iiasa.ac.at>

The future of VID

Over the last five years VID has grown and evolved in an organic fashion. Amid the changes that are inevitable accompaniments of growth, we have tried to maintain a continuity of style and purpose. Our main hope for the future is to continue this form of steady development, gradually improving and fine-tuning our *modus operandi*. What we do not want to do is to expand our numbers significantly. We think that it would be hard to maintain our informal and inclusive habits of organisation if we were to get bigger than about 25 research staff. In March 2007 we moved into larger premises, just around the corner from our previous location. The new space should provide scope for a modest expansion of numbers. With this in mind we are considering a partial reorganisation of some of the Research Groups. However, what is certain not to change is our commitment to European demography. Since 2002 we have tried to establish a niche for ourselves as a specifically Europe-oriented research centre; this can be seen in our publications, our conferences, our contribution to international projects and, above all, in our recruitment. We are Europeans.

These are exciting times for science in Europe, as we move step by step towards a single European research area. The founding of the European

Research Council and the steady increase in research funding that is allocated on a European, rather than on a strictly national, basis, are pointers towards quite fundamental change that lies ahead. It is hard to know exactly what the European scientific scene will look like in five or ten years' time, but it seems certain that the institutional possibilities will change substantially in the coming years. In this context, we aspire to be a focal point for European demographic research.

All in all, we hope that the near future will be quite a lot like the recent past, only more so. We like to think that VID has been evolving in promising directions; and having done things well so far, we want to do them better in future. We know that there can be no resting on our laurels. As Robert Louis Stevenson put it, "To travel hopefully is a better thing than to arrive, and the true success is to labour." His words could be a motto for all research. In this booklet we have eschewed clichés of the "state of the art" or "cutting edge" variety. Such self-proclamations of brilliance are all too easy to make. Instead we have tried to let our actions over the last five years speak for themselves. Our impression is that serious people take us seriously. If this can continue to be true in the future, we'll be happy with that.

List of Staff

2002–2006



The following people worked at VID during the five years covered by this portrait.

Belinda Aparicio Diaz
 Sigrid Bayrleitner
 Dieter Bichlbauer
 Isabella Buber-Ennser
 Caroline Berghammer
 Silvia Dallinger
 Dalkhat Ediev
 Henriette Engelhardt-Wölfler
 Gudrun Exner
 Gustav Feichtinger ^{1, 2}
 Thomas Fent
 Katrin Fliegenschnee
 Inga Freund
 Alexia Fürnkranz-Prskawetz
 Richard Gisser
 Anne Goujon ¹

Christiane Gruber
 Birgit Heider
 Jungho Kim
 Frank Kolesnik
 Frank Landler
 Gustav Lebhart ³
 Wolfgang Lutz ¹
 Landis MacKellar ¹
 Marija Mamolo
 Maria-Christina Maschat
 Ani Minassian
 Gerda Neyer ³
 Florian Pauer
 Dimitar Philipov
 Elke Pscheiden
 Werner Richter

Sergei Scherbov ¹
 Peter Schimany
 Franz Schwarz
 Tomáš Sobotka
 Irene Tazi-Preve
 Maria Rita Testa
 Sylvia Trnka
 Maria Winkler-Dworak
 Nadine Zielonke

¹ also affiliated with IIASA while at VID

² also affiliated with Vienna University of Technology while at VID

³ on leave 2002–2006

VID Numbers

10 Number of research staff
2002 (Full-time equivalents)

18 Number of research staff
2006 (Full-time equivalents)

154 Number of refereed
publications 2002–2006

94 Percentage of refereed
publications in English 2002–2006

38 Percentage of women in research
staff (post-doc and above) 2002–2006

39 Median age of research staff
(post-doc and above) January 2007



Vienna Institute of Demography

- Founded 1976
- A European leader in demographic research
- Population economics
- Population dynamics and forecasting
- Comparative European demography
- Demography of Austria
- www.oeaw.ac.at/vid



Austrian Academy of Sciences

- Founded 1847
- A learned society
- Austria's largest non-university institution for basic research
- 65 research units
- Innovative and interdisciplinary research
- Outstanding scientists from Austria and around the world
- www.oeaw.ac.at