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Distributional Effects of Public Student Grants in Sweden

- a Presentation and an Application of the Dynamic Microsimulation Model Sesim

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ABSTRACT: *Financial, demographic and policy trends increase the demand on governments to better evaluate and improve lifecycle programs for education, health care, pensions etc. Only dynamic microsimulation models can supply both analyses of the distributional effects and sustainability. This paper presents Sesim, a small scale dynamic microsimulation project in the Ministry of Finance, driven by demand and applications, implemented in partnership with Academia. Presently the model consists of a general and open platform with stylized social and demographic processes and more developed modules for education and earnings. Preliminary results from a commissioned study show that public student grants over lifetime redistribute from persons with shorter education to well-educated.*

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[1] The views expressed in the paper are the authors and do not necessary represent those of our employer

Contents

1 Why long term policy dynamic microsimulation ?

Why should anybody in full senses engage in dynamic microsimulation, knowing about the experiences in pioneer projects and the recent assessment of the US National Research Council ?[2]

Experiences from earlier dynamic microsimulation models indicated massive development and computer costs.[3] Especially the lack of data have made it difficult to model social and economic behavior and to reach consensus about how, when and for whom behavior should be changed. Already the basic determinants like demographic development are very difficult to forecast more than 10 or 15 years in the future. The experiences from pioneer projects like DYNASIM (+2), SFB3, CORSIM, MICROHUS, DEMOGEN, NEDYMAS, LIFEPATH DYNAMOD, MOZART and DYNACAN usually show very long development periods before models can be trusted in projections or policy analyses and they often have large maintenance and validation costs.[4]

The question has two simple answers: These models are the only ones that can analyze distributional effects of public programs that redistribute resources between various periods in life. Secondly, the conditions for building such models have improved markedly the last five years.

The by far largest public programs in Sweden and most other OECD countries are lifecycle redistributive, like education subsidies, pensions, old age care subsidies and health care subsidies. For Sweden estimates indicate that more than 60 per cent of the public expenditure for social transfers and services are in fact lifecycle programs.[5] There are many motives for government interventions, for example to strengthen social integration and traditions, to compensate market failures, to improve efficiency etc. In many European countries the most important arguments are related to social justice and equality.

By subsidizing education governments argue that knowledge will be more evenly distributed among the population and the general level will be increased. Children of workers will achieve higher formal education compared to if they have to pay the full costs. Unemployment risk will be more evenly distributed as well as wage and other income. Consequently, education subsidies are viewed having positive long term effects on income inequality and poverty.

Likewise, governments argue that having tax financed public pension programs with some basic guarantee levels will over lifetime redistribute resources from lifetime poor to lifetime rich. Engaging in tax financed public programs for old age care and health will over lifetime redistribute resources from the rich and usually healthy to the poor and often less healthy.

This lifetime typically pay-as-you-go redistribution by the state is founded on delicate social and political contracts between generations. The political preferences are not allowed to

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[2] National Research Council, 1997
[3] See for example Antcliff, 1994, Harding 1999,
[4] For overviews, see Lewis et al, 1990, Merz, 1991and Klevmarken, 1997
[5] Kruse, 1997

change markedly between generations. Programs need to be reasonably financially robust over time.

Therefore, many governments have for a long time developed projection systems for pensions that allow simulations of future financial balance given various assumptions of demography, growth and interest rates, labor market trends and other determinant factors. Usually these models are cell-based and optimized for revenue and cost estimates. Some are based on micro-simulations, as the Swedish Supplementary Pension Model.[6] For other programs like education, old age and health care subsidies, few governments have projection models that reach longer than the election period.

Given the fundamental distributional aims of public interventions one should ask why so few governments have invested in long term models to evaluate present programs and to test new programs. There can be many reasons for this. Policy makers might think that since public programs are designed to promote social justice and equality, they are by definition fair and redistributive. Hence, there is no need for evaluations. Another more probable explanation is the costs and uncertainties attached to long term modeling. To be able to analyze distributional effects, governments need dynamic microsimulation models that replicate behavior. Models must update each attribute for each micro-unit in a sample for each time interval in order to generate coherent and reliable individual lifecycles with heterogeneity.[7] It is not an alternative to wait 50 or 100 years to be able to evaluate real life redistribution.

But now the external pressure on public lifecycle programs is increasing, both in general debate and in research. There is an emerging debate also in Sweden on intergenerational fairness and sustainability in long term programs. Budget constraints and tax level restrictions lead to new questions of the distributional efficiencies of lifecycle programs. Alternative proposals are more often forwarded for these programs, as individual personal accounts, actuarially based and fully funded programs etc. Increasing gaps in annual income focus interest on dynamic policies that may better distribute individual earnings capabilities.

Looking into the near future this pressure will not diminish and certainly not disappear. Rather we expect it to become even more intense due to finance and budget constraints, demographic trends, changing political preferences, increasing social exclusion. These programs derive most of their legitimacy from redistribution capabilities. It is our view that these programs stand a better chance to survive if governments can prove and improve their functionality. They need to evaluate and describe the distributional effects, also considering potential behavioral responses. The only models that capture these dimensions are dynamic microsimulation models.

Fortunately, the conditions and possibilities to construct analytical tools have improved immensely the last five years. One is Zeitgeist ! The model pioneers often met ignorance of the concept of simulation. Nowadays, simulation techniques are expanding in most advanced areas of society. In engineering, agriculture, chemistry, financial markets, education etc. simulation models are used extensively both in research and developments. For example technical agencies in Sweden recently spent SEK 10 million on a 3D-simulation of driving through one car tunnel (that will never be built). Meteorologists spend many millions every

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[6] National Board of Social Insurance, 1994

[7] Caldwell, 1986

year on computer simulation models in order to slightly improve forecasts for the next 3-10 days, even though nobody can stop the rain or wind from coming (but boosting profits for ice-cream producers, beer sellers etc.). Financial institutions invest new resources to improve decision making in complex markets. Not at least, SIMCITY and other entertainment software have made the concept popular.

Another change is even more fundamental: new and better data is available. In recent years, research funds and governments have invested large resources in improving datasets of population demographics and economics. In Sweden new longitudinal panels allow researchers to better model social and economic behavior.[8] Microdata from Statistical Agencies are now distributed at fairly low costs to researchers and government projects. Cooperation with other projects concerning data and estimation, as the SVERIGE model, also reduce construction costs.[9]

Thirdly, major improvement in computer software and hardware reduce development costs dramatically. The accumulated experiences of pioneer models can be recycled also to minimize development and maintenance costs.

However, we shall admit that the decision in late 1997 to start a dynamic microsimulation project was not easy, since there were no large funds to be expected. Eventually, it was the demand for long term analysis and projections that made the difference.

2 The Sesim model

The Sesim strategy is a small scale project, driven by demand and applications, implemented in partnership with Academia and open for other users. It is targeted towards program analyses rather than projection and forecasts. The main purpose is to allow policy analysts to evaluate long term effects of present lifecycle programs and compare these with alternative proposals. The project is financed year by year from the Ministry of Finance development funds and presently staffed by two senior analysts.

Sesim is carefully designed to avoid many of the pitfalls and obstacles in pioneer projects. The first step was to construct a general platform for dynamic microsimulation based on a simple straightforward concept. The platform is available for all partners and on Internet for anybody’s test or own development. The base model include a stylized representation of the main socio-demographic processes in Sweden. It is fairly easy to replace these with own models.

Secondly, new or improved modules are developed when needed for analytical purposes. The first task, commissioned by the Budget department and the Ministry of Education, was to construct a projection tool for public student grants that also could be used in policy analyses. The first version of Sesim including these projection facilities was delivered to the Ministry of Education after only 9 months construction work. The model predicts individual loans, repayment, debt reduction and government funds similar to earlier models.[10] It is now

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[8] i.e. LINDA, a new Longitudinal INdividual DAtabase covering income, household and other variables from rich administrative registers for 300 000 persons during 1960-1997
[9] Vencatasawmy, C.P. et al, 1999
[10] Harding, 1993

frequently used in preparing the student grant reform for tertiary students that will be launched in the spring 2000.

The present task to analyze distributional effects of the Public Study Grant program is commissioned by the Expert Group of Public Finance. The question asked is if student grants over the lifecycle benefit the children of workers and low-income families or only the children of well-educated and rich.

Other smaller tasks have been completed as parts of the regular work in the Ministry of Finance. This includes a 40 year projection of demographic expenditure pressure from public childcare, education, health care and old age care, assuming unchanged consumption and expenditure patterns.[11] A projection of future increase of invalidity pensions has also been made using probabilities related to age, sex and education.

2.1 Computer platform

The systems design and choice of programming language is strategic if one should minimize development and maintenance costs and maximize the utilization of the model. Especially important are the interaction between the model and other data sources and the users interface. When considering how to construct Sesim a condition was that the model should be operated in an environment of economists working as advisors to the government, and not in an environment of researchers, programmers and statisticians. It was necessary to have a simple, open and readable source code and an environment where the analysts can run, change parameters, step forward and backward and easily follow what happens. Another criteria is that of efficiency: the turnaround time from problem formulation to results has to be kept to a minimum. With this in mind we decided to:

1. Use Visual Basic as the main programming language. Also considered was SAS/IML, but Visual Basic showed up as faster, easier and more appropriate for constructing an interactive interface. With Visual Basic it is also very easy to interact with programs like Excel, Access etc. Programming languages like C/C++, Delphi etc. were not considered since they do not support the idea of a simple code. After the release of Visual Basic 5, the differences in efficiency are quite small (Microsoft Visual C++ and Visual Basic partly use the same compiler). Since all micro data is delivered as SAS data sets and we have other models in SAS, routines for exchanging data between Sesim and SAS have been constructed.

2. Store all parameters in Excel files. Even a non-programmer should be able change some fundamental parameters.

3. Save annual status and income history for all individuals in an indexed Access-database. The complete history is always available in the calculations.

4. Update the source code automatically when adding or deleting individual/household vectors. The user have to enter the new vector name just once. This is accomplished by a so called ”Visual Basic environment add-in”.

[11] Budget Bill 2000, Appendix 3.

The turnaround time for calculating one year in Sesim with 30000 individuals and 180 individual variables is about 8 seconds. Sesim is scaleable, it is possible to run the model with more than 10 times as many individuals.

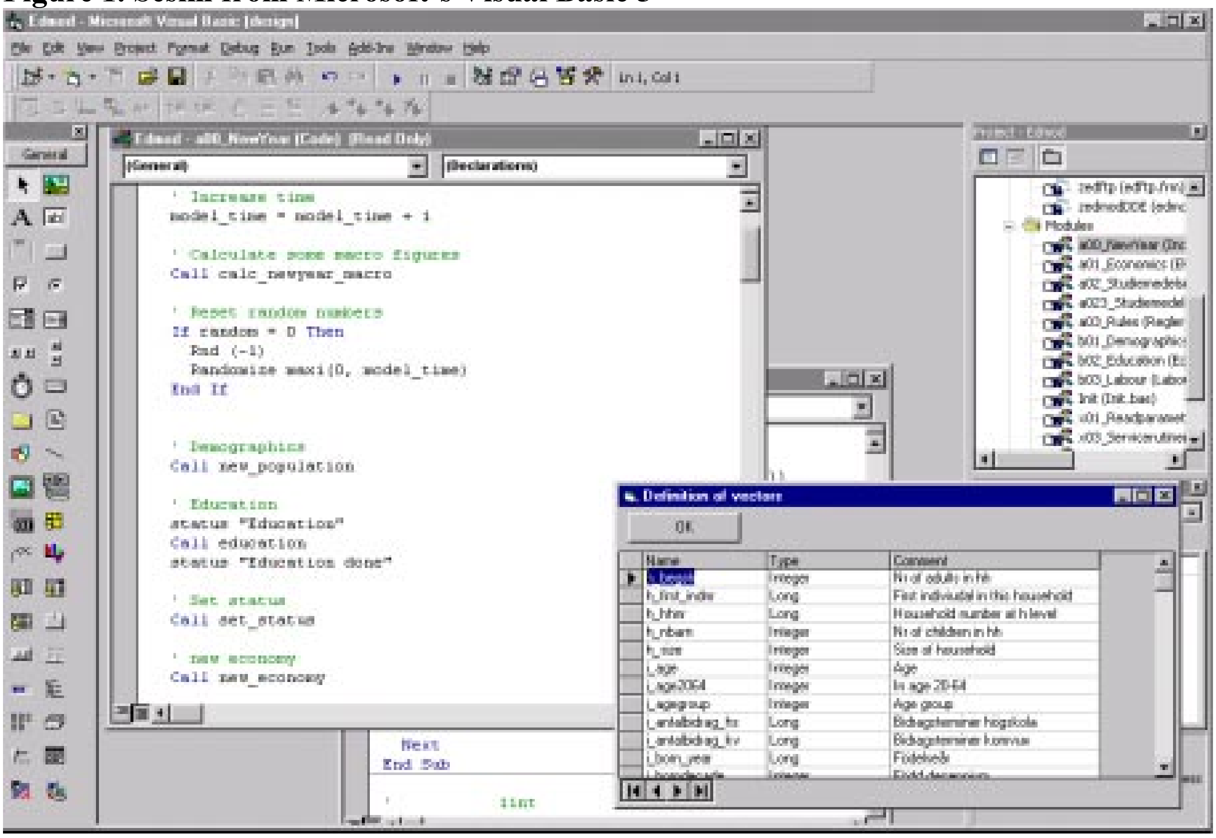
2.2 User interfaces

To meet the demand from different users, Sesim is operational from three environments, or user levels.

1. Source code programming
2. Debug environment in Sesim
3. Report generator in Excel

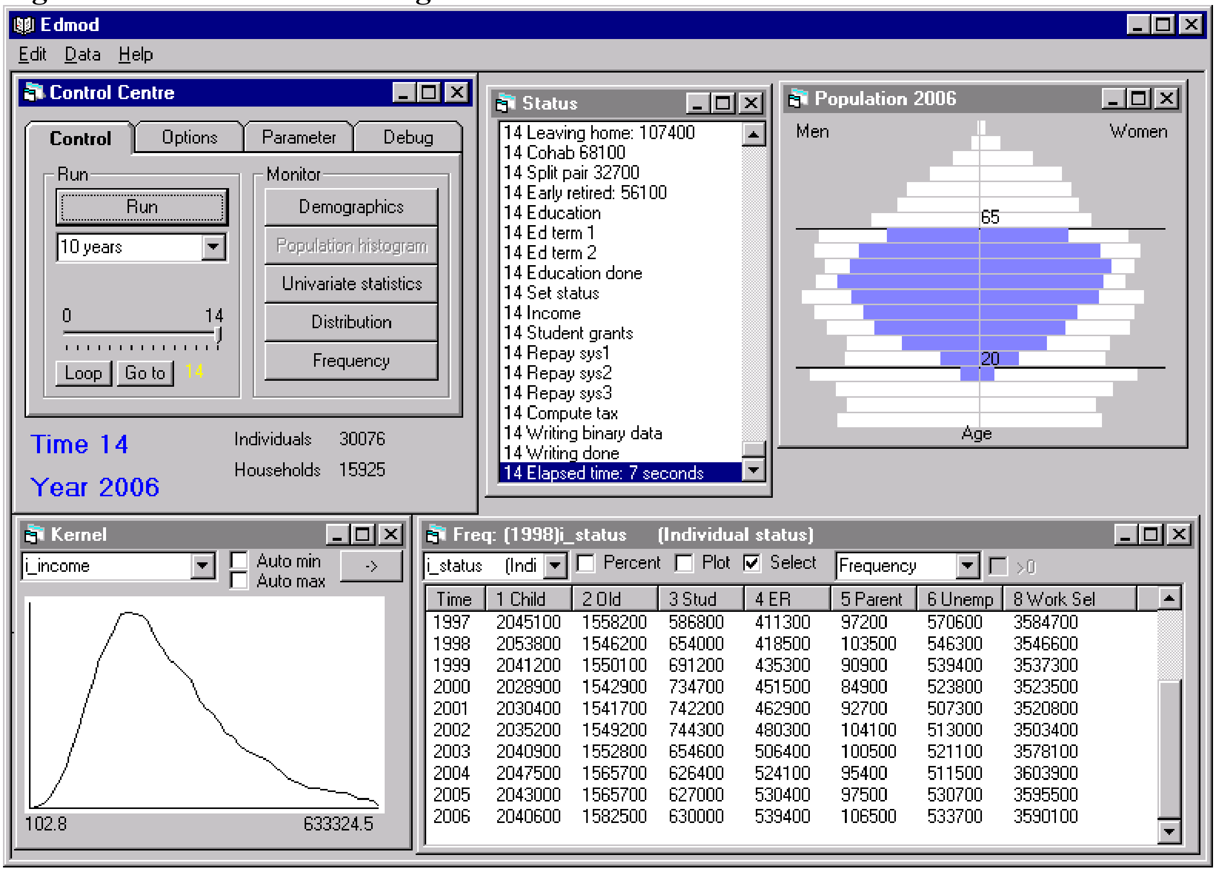
In level 1 the user are programming in Visual Basic utilizing Microsoft's Visual Studio. The environment is shown in Figure 1. The programmer has direct access to the source code and can compile and run the program from the workbench. This level is used to develop the model and for major changes.

Figure 1. Sesim from Microsoft's Visual Basic 5



Level 2 is an environment created with Visual Basic 5 which gives an easy access to simulation results. Descriptive statistics, kernel estimators of densities and frequencies are available for all variables in the model. It is also possible to investigate subgroups of individuals. An example is shown in Figure 2. In the upper right corner a population diagram is drawn. Each segment corresponds to the number of individuals born in the same cohort spanning over five years. An upper and lower limit indicates 65 and 20 years of age, respectively. The shadowed area corresponds to the population with employment. Below the population diagram the frequency of the individual status is followed over time. In the bottom left corner the labor income density is estimated by a kernel estimator. The remaining two boxes appear as default: A control center, where simulations are ordered, and a log window. Until now this level has been used extensively for debugging.

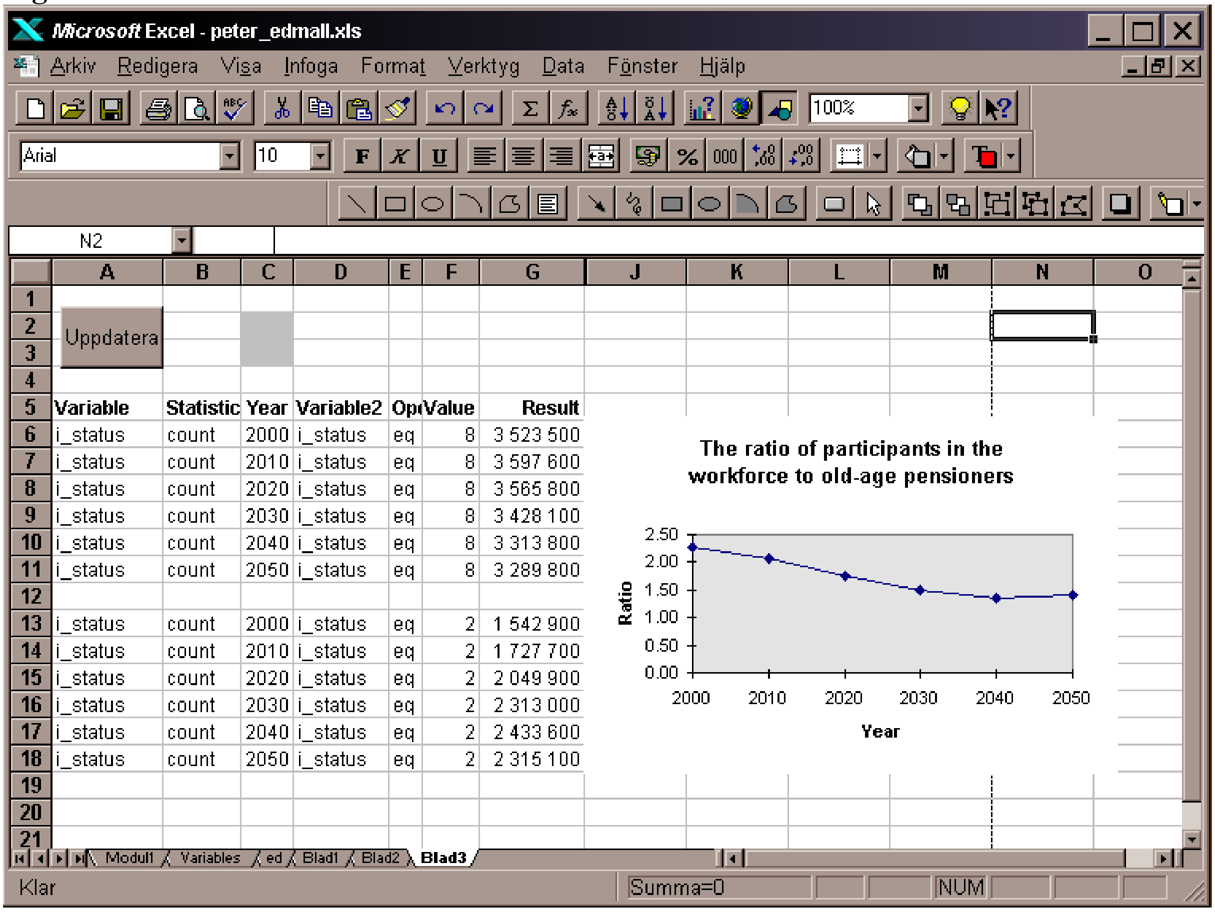
Figure 2. Sesim from the debug environment.



Time	1 Child	2 Old	3 Stud	4 ER	5 Parent	6 Unemp	8 Work Sel
1997	2045100	1558200	586800	411300	97200	570600	3584700
1998	2053800	1546200	654000	418500	103500	546300	3546600
1999	2041200	1550100	691200	435300	90900	539400	3537300
2000	2028900	1542900	734700	451500	84900	523800	3523500
2001	2030400	1541700	742200	462900	92700	507300	3520800
2002	2035200	1549200	744300	480300	104100	513000	3503400
2003	2040900	1552800	654600	506400	100500	521100	3578100
2004	2047500	1565700	626400	524100	95400	511500	3603900
2005	2043000	1565700	627000	530400	97500	530700	3595500
2006	2040600	1582500	630000	539400	106500	533700	3590100

Many applied economists use Microsoft's Excel as a tool for creating reports and to perform statistical analysis. The third level in Sesim is developed for these users. By utilizing the opportunity of writing Visual Basic code in Excel it is made possible to order a simulation from a prepared spreadsheet. In Figure 3 the user has ordered information about the number of employed and the number of old age pensioners every decade between 2000 and 2050.

Figure 3. Sesim from Excel



2.3 Data

One main criticism against dynamic microsimulation models have been that statistical and econometric models often are estimated on old cross-sectional datasets and that models tend not to be in line with modern professional judgments. This is often explained by the lack of microdata, especially the absence of panel data that are crucial to describe dynamic processes. In Sweden, however, the data situation is far better than in most other countries and it has improved the last years.

In preparing the present version of Sesim we have together with Statistics Sweden constructed a new panel dataset, covering 1989-1996, consisting of 30 000 individuals. The dataset is extracted from the annual household income survey, that consists of demographic variables, income and tax variables from tax returns and individual matched administrative data about social transfers, education and study grants. The dataset also has rich survey information, as for example on hours of work.

This new dataset is used both when estimating unknown parameters in models and the probabilities in transition matrices. An extract from 1992 is also the initial population in the simulation process.

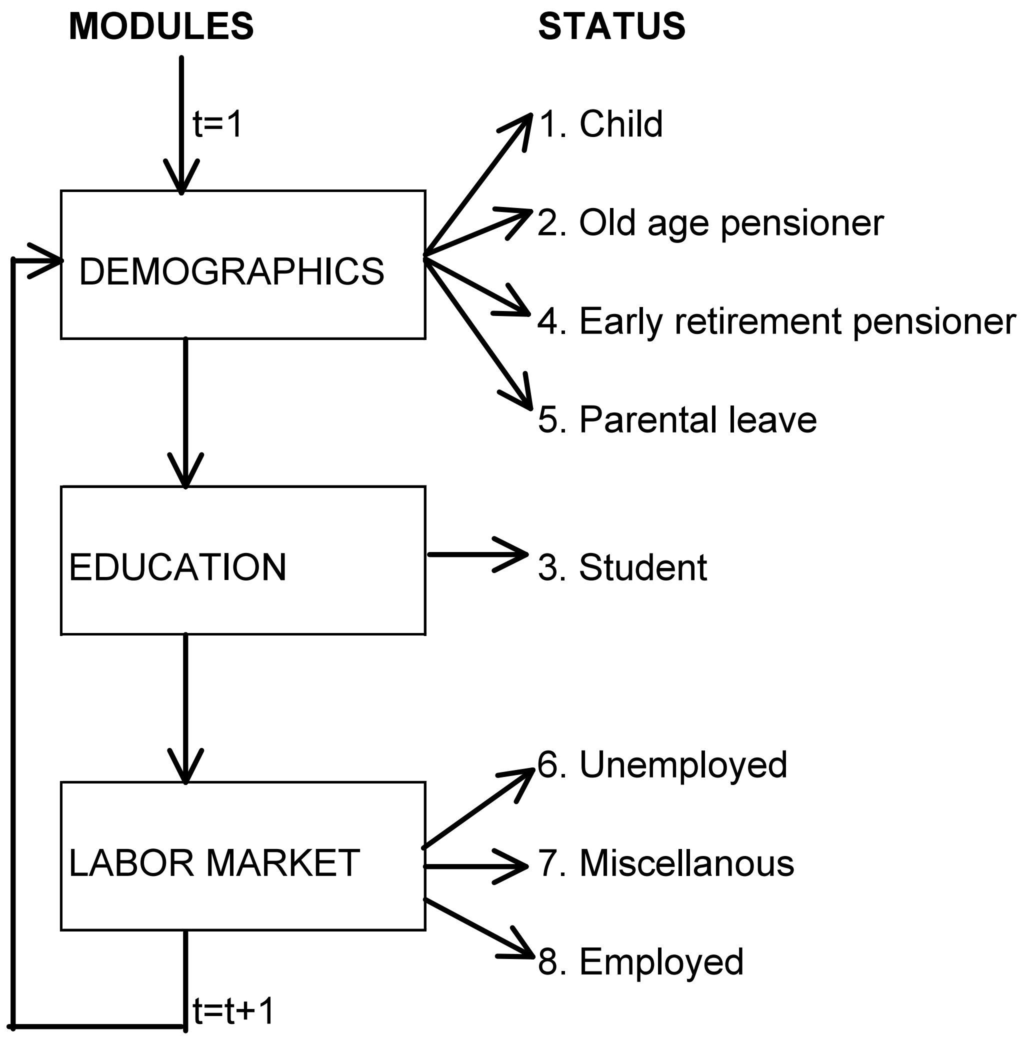
For calibration and validation a larger panel consisting of 300 000 individuals have also been used that contains the same basic variables but no survey information.

2.4 General structure

The structure of the model is traditional in the sense that the variables are updated in a sequence of modules, and the space in time between the updating processes is usually a year. Every year the individuals are assigned a status, reflecting their main occupation during the year. All individuals and households are exposed to different risks in a predetermined order. For example, the risk of dying is prior to the risk of unemployment. Thus, Sesim is a discrete model in contrast to continuos models. Discrete models are most common since the data used in estimation and validation usually are reported on a yearly basis.

Figure 4 shows how the individuals are allotted a status in sequential steps. A student, for example, might receive study grants, study loans, and income from work and capital, as well.

Figure 4. Allocation of a yearly status.



Both transition matrices and more sophisticated models are used to update the individuals' status and other characteristics. For instance, the probability to get a child follows a transition matrix which depends on age, while the schooling decision is modeled by a dynamic probit panel data model. All updating is performed by a stochastic simulation. That is, the stochastic components in a model are added to the predicted value of an individual's income or the probability to attend the university. The household's composition is allowed to change over time.

Currently there are no behavioral response in Sesim but models are being developed for labor supply and consumption.

Until now, most efforts have been put into the development of the education module, which generates students, models for study allowances and income dynamics, that are important when distributing loans and repayment abilities.

2.5 Models and transition matrices

Demography: In this application, the fertility and mortality risks are both decided by transition matrices supplied by Statistics Sweden. The mortality risks are adjusted so that early retired persons encounter a higher risk, and subsequently, the others a lower risk. The family formation and dissolving processes in the current version is very simple. With a transition matrix a number of females are marked to get married in the following year, and a male is chosen among the bachelors. The probability of a bachelor to mate a certain female depends on the age difference. A couple are exposed to a divorce risk every year. The probability to divorce depends on the age.

The demographic module also controls the assignment of five out of eight status according to rules and models.

Status 1: An individual less than 19 years of age is determined to be a child.
Status 2: An individual older than 64 years of age is determined to be an old age pensioner.
Status 4: A discrete model selects a number of early retired pensioners.
Status 5: Given a newborn the mother is determined to be on parental leave the following year

Education: All individuals who have not received a status in the demographic module are at risk to go to school. Initially, the a person get a probability to study at the public adult education. Secondly, probability is assigned to represent the risk, or choice, to study at college or university.

The model used to assign these probabilities is a sequential dynamic panel probit model.[12] The discrete choices of going to adult education or university are assumed to be sequential, the decision depends on previous education, the data utilized to estimate unknown parameters follows the individuals over time which makes it possible to include unobserved heterogeneity in preferences in the model, and finally, the normal distribution is used as the link function. In this study, the number of students are aligned to the forecast by the Ministry of Education. The model serve as a filter to pick out the individuals with the highest probability.

The students receive student grants according to the current program. However, the students have different preferences about loans. From observed behavior some unconditional ratios are estimated, which are used to allocate students in different groups of readiness to loans. This is an important step since the largest predicted public cost in the current program is due to written off debts. If all students were enforced to take say 80 per cent of the maximum loan

[12] This an other models are documented in separate technical memos, available on request.

every semester the aggregate level may be correct, while in the case of written off debts it is more important to get a good representation of the distribution.

Labor market: In the labor market module the remaining individuals are assigned a status. The first model is again a dynamic panel probit model which simulates the probability of becoming unemployed the following year. Individuals not unemployed are then divided into a large group of gainfully employed, and a small group which represent people who voluntarily refrain from paid work. This group consists of housewives, globetrotters, young people who have not yet fully entered the labor market etc. Again, a discrete model serves as a selection mechanism.

Earnings - an example of estimation and validation: In this application individual incomes, along with the education module, are of great importance. To estimate the individuals' capability of repaying their loans the income profile over life is crucial. One of the main reasons to allocate individuals in a yearly status is to enhance the reliability of assigning a yearly income. Depending on the status different rules and models are used to simulate incomes. The following subsection serves as an example of estimation and validation.

The model used to simulate earnings is a random coefficient panel data model. A panel of 7000 employed individuals observed between 1989 and 1995 are used to estimate the parameters in (1),

$$y_{it} = f(X_{it};\beta) + \alpha_i + \eta_{it} \qquad (1)$$

where X is a vector of observed characteristics; age, sex and level of education, β a vector of parameters, α a random variable representing unobserved heterogeneity, and η a traditional error term.

This model is currently validated against descriptive statistics from another panel covering the same period. Initial results are shown in Table 1-2 where simulated incomes are compared to observed statistics.

Table 1 illustrates results from a single simulation for one year. Individuals are grouped by sex and level of education. The model tends to generate lower incomes for persons with tertiary education and the variances are overestimated.

Table 1. Incomes in 1995 by sex and education (1000 SEK)

Sex	Education	Mean		Standard deviation	
		Simulated	Observed	Simulated	Observed
Male	Secondary	226	222	106	97
Male	Tertiary	269	287	136	127
Male	Graduated	345	371	165	149
Female	Secondary	155	155	72	66
Female	Tertiary	180	193	94	72
Female	Graduated	221	247	114	86

Note: Secondary education includes all persons with at most upper secondary school or high school exam (ISCED 03 or less), the class *Tertiary education* includes all persons with less than three years of tertiary education (ISCED 05) and *Graduated* all persons that have at least completed three years of terry education (ISCED 06-07).

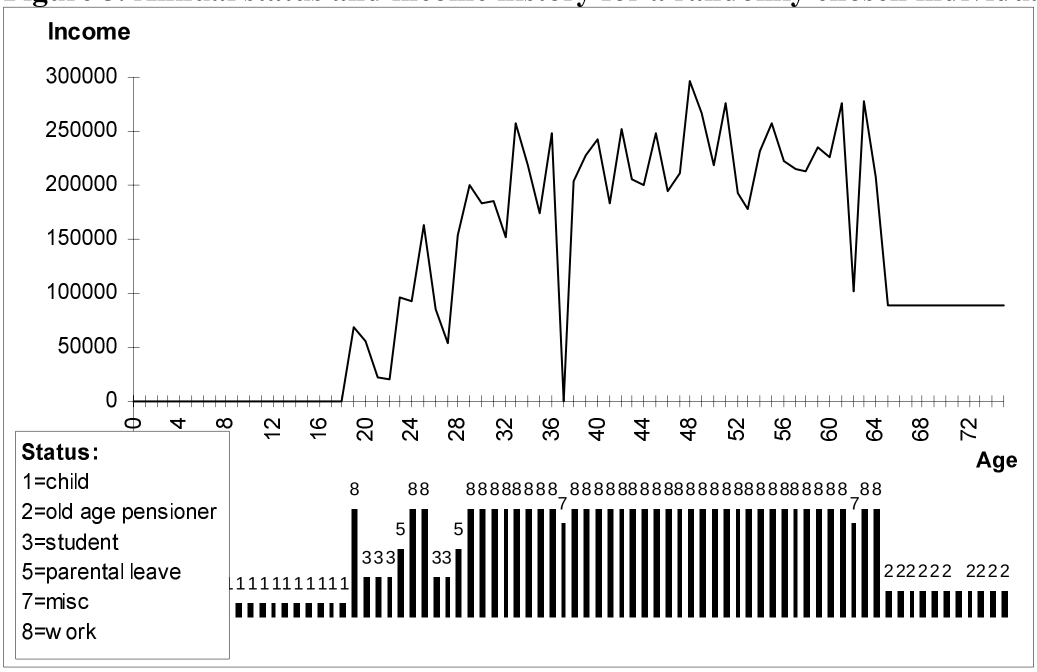
To check the performance of the model to generate lifetime incomes, which are also illustrated in section 3.3, mean values and standard deviations of the simulated earnings in the years 1989-1995 are compared to observed statistics in Table 2.The first row compares the mean value and standard deviation of the individuals' mean incomes during the period, while the second row compares the individuals' income mobility, measured by the standard deviation. The overall performance of the income model seems to be acceptable.

Table 2. Individual incomes 1989-1995 (1000 SEK)

Income	Mean		Standard deviation	
	Simulated	Observed	Simulated	Observed
Mean	206	205	106	96
Standard Deviation	35	31	29	31

The above model is applied on employed individuals. To assign incomes to the other groups the rules in the pension and welfare program are used together with the model (1). For example an early retired person gets 80 per cent of the income generated by the income model up to a maximum level constituted by the government. In Figure 5, the annual status and income history for a randomly chosen individual in Sesim is presented. As seen a large portion of the variance is attributed to changes in the individual's yearly status.

Figure 5. Annual status and income history for a randomly chosen individual in Sesim.



2.6 Development projects

In addition to periodically adjustments to improve Sesim three major projects are in progress.

Labor supply: Labor incomes is a mix of labor supply and wages. To be able to model labor supply response to changes in taxes or the welfare programs it is necessary to split this mix into parts. A discrete household labor supply model is developed, along with a wage-equation.

Consumption: With the assumption that labor supply and consumption are separable, a life-cycle consistent consumption is developed. The commodities in the model are by necessity ”very” aggregated. Given the model it is also possible to measure savings and accumulated wealth.

Household formation: Duration models are estimated to better understand the dynamics of leaving home-marriage-fertility-divorce.

3 Distributional effects of public students grants

Using dynamic microsimulation for lifetime distributional analyses has by now a fairly long and successful history, recently reviewed by Nelissen.[13] Most studies focus on effects of social security, transfers and taxes. The advantage of these studies, that they often target combination effects of many public programs, is also a limitation when it comes to policy evaluation. Expected positive effects or unexpected negative effects and their causes can rarely be traced to separate programs.

In this application we analyze one single program, the Swedish student grant program for college and university education. Politicians and student interest organizations usually focus the annual distribution of income. In any given year, the student grant program is progressive since it redistributes income to the students that by conventional measures are economically ”poor”. By rising subsidies, the income gaps are reduced. However, the question is if this is true when taking the whole lifecycle into account?

To isolate the effects of the student grant programs, the simulations are done in a *steady state* world, with toady’s number of students, labor supply, tax systems etc. We assume that there are no growth and no inflation. The interest rate is stylized at two per cent. This allow us to study effects of lifecycle programs in a world with the economic environment of today. Obviously, these calculations are not forecasts of future government expenditure.

3.1 The student grant program

Current program

A student may be eligible for allowances for as many as 12 semesters university and college studies. It is also possible to obtain study allowance for upper secondary school, ”folk high school” or municipal adult education. Study allowances consist of a *grant* and a *student loan* and are awarded for full-time or part-time studies. If the students income during the calendar half-year exceeds certain thresholds, the study allowance will be reduced accordingly. In special cases it is possible to obtain extra study allowance for certain additional expenditures.

Table 3. Amount of grant and study loan 1999 (SEK)

	Grant	Loan	Total
One month	1 973	5 125	7 098
One year (9 months)	17 757	46 125	63 882

Repayment of the student loan begins when the student no longer receive study grants and is income-related. The former student has to pay four per cent of the income per annum. "Income" refers to total income from employment, self-employment and capital as per latest tax assessment. If, for example, repayment starts in 1999, the amount payable will be four per cent of the 1996 income. The length of time it takes to pay off will depend on the amount borrowed, income and on how future interest rates develop. The interest rate is 70 per cent of the market rate, i.e. nearly equivalent to mortgage interest rate after tax reductions.

[13] Nelissen, J.H.M, 1998

Proposed program

The government presently is preparing a study allowance reform. The two main components are:

- The grant part of the total study allowances will be increased.
- The repayment system will be changed to a 25 year annuity scheme. There will however exist a safety net so that the former student doesn't need to repay more than 5 per cent of the current income (after age 50, 7 %).

Table 4. Amount of *proposed* grant and study loan (SEK)

	Grant	Loan	Total
One month	2 449	4 649	7 098
One year (9 months)	22 041	41 841	63 882

3.2 Lifetime incomes

In this application, the lifetime income for the individual is defined as the sum of earnings, sickness, parental and unemployment insurance and invalidity and old age pension. In calculating net lifetime income, this sum is reduced with paid taxes and received net transfers from the study grant program (study grants and written off study loans due to death). The simulated distributions for men and women are described in Figure 6 and 7.

Figure 6. Distribution of net lifetime income for males. Kernel estimates.

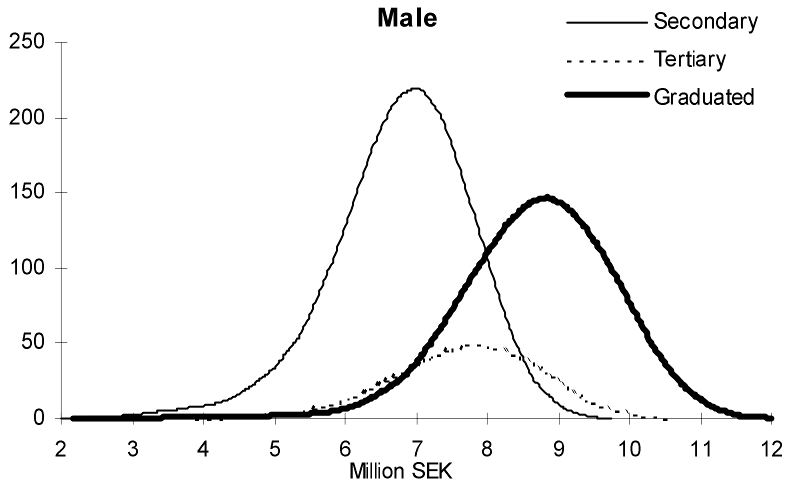
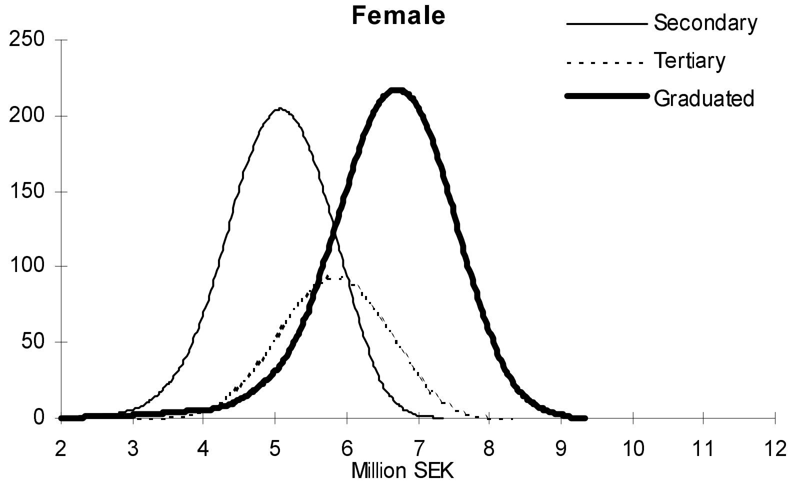


Figure 7. Distribution of net lifetime income for females. Kernel estimates.



3.3 Return to education

An important criteria of reliability is whether the model is capable to simulate returns to education that are similar to current professional judgment. As seen in Table 5, the wage premium after tax and benefits varies between 5 and 8 percent for an additional year of study. These figures are well in line with other recent estimates.[14]

Table 5. Return to education (1000 SEK). Preliminary Results

	Secondary education		Tertiary education		Graduated	
	Male	Female	Male	Female	Male	Female
Net Life Income	6 909	5 071	7 741	5 816	8 768	6 700
Return, over life			832	745	1 859	1 629
Return/year of study			477	422	328	319
Return/year of study %			6.9	8.3	4.8	6.3

Note: Education classes are explained in Table 1

3.4 Distributional effects

In this study the *distributional effects* of the study grant program is measured in a life accounting perspective: Who benefits from the program and who pays ? It is easy to do accounting on who receives grants, but who pays? There exists no special contribution or tax to finance student grants. The simple assumption in this application is that *every year*, the students´ grants are financed by all tax-payers in proportion to their actual tax. Or for every individual *i*:

$$s_i = \frac{\sum g_i}{\sum t_i} * t_i$$

where

g_i = *received study grant for individual i*
t_i = *paid income tax for individual i*
s_i = *tax contribution for individual i*

The accounting is done for approximately one birth cohort at death in the steady state world. Mean values are presented in Table 6.

Table 6. Redistribution of Student Grants and financing for a birth cohort at death. Mean values in SEK. Preliminary Results

	Secondary education		Tertiary education		Graduated	
	Male	Female	Male	Female	Male	Female
Received grant	4 089	7 196	42 201	39 023	87 853	87 811
Tax contribution	42 070	28 006	51 735	33 240	68 532	40 053
Net	-37 981	-20 810	-9 534	5 783	19 321	47 758
Net with 2% interest	-80 316	-41 413	8 286	42 880	118 933	190 664

Note: Education classes are explained in Table 1

[14] Edin, P-A., Holmlund, B., 1995

The accumulated received student grants and tax contributions for complete lifecycles in the present program are summarized in Table 7. Persons with maximum secondary education, generally children of workers, receive very little grants over the life-cycle, but contribute a lot. Graduated persons, typically children of well-educated, both receive and contribute large amounts. When looking at the net transfers, the most remarkable is perhaps that men with a only secondary education have paid around a billion SEK over the lifecycle. Graduated women have received more than a billion SEK. Obviously, the public student grant program redistributes resources through life from low educated to high educated, and thereby from workers children to privileged children, from men to women. If we also include stylized interest rates in the net calculations, the redistribution is extraordinary. That is due to the fact that grants generally are received when people are young but tax contributions are made later in life. Women are the ”net winners” since they tend to study a lot but later work part-time with lower wages.

Table 7. Current program. Redistribution of student grants and financing for a birth cohort. (Million SEK). Preliminary Results

	Secondary education		Tertiary education		Graduated	
	Male	Female	Male	Female	Male	Female
Received grant	102	137	270	355	1 758	2 028
Tax contribution	1 053	534	331	302	1 371	925
Net	-950	-396	-61	53	387	1 103
Net with 2% interest	-2 009	-789	53	390	2 380	4 404

Note 1: Education classes are explained in Table 1

Note 2: Due to the nature of the simulation model, results are stochastic, outcomes which explains that the ”net” does not sum to zero.

As mentioned, the government is preparing a proposal increasing the level of the student grants. Simulation of this proposal shows that the regressive redistribution over the lifecycle will increase, quite contrary to what is argued (Table 8).

Table 8. Proposed program. Redistribution of student grants for a birth cohort. (Million SEK). Preliminary Results

	Secondary education		Tertiary education		Graduated	
	Male	Female	Male	Female	Male	Female
Received grant	127	170	335	440	2 182	2 517
Tax contribution	1 306	662	410	375	1 702	1 248
Net	-1 179	-492	-76	65	480	1 369
Net with 2% interest	-2 494	-979	66	484	2 953	5 466

Note 1: Education classes are explained in Table 1

Note 2: Due to the nature of the simulation model, results are stochastic, outcomes which explains that the ”net” does not sum to zero.

4 Comments

The results show that already with a conventional and straightforward microsimulation model the analyses of lifetime distributional effects of public programs may produce unexpected and fairly controversial results. Sensitivity analyses indicate that the preliminary results are rather robust since they rely on mainstream education returns and detailed rules.

As in all similar research, the findings depend on the relations found in the datasets used. The education returns or wage premiums are estimated for the period 1989-95 covering both a short period of a booming economy and the worst crises since the 1930´s. Most education programs have been expanded strongly in the 1990´s. The estimated wage premiums are assumed stable for the future but they may be reduced as a consequence of supply effects, or increased due to higher demand of well educated. Thus, the results are not a projection of the expected future, rather a description of how the present program works when assuming stable behavioral and other relations during lifetime of a Swedish cohort.

Of course, the effects of the public student grant program probably are wider than described by this lifetime accounting. For example, if generous public student grants should decrease the social selection among students in tertiary education, this may also have distributional impact. However, our own evaluation, still to be published, shows no positive effects from the recent reforms that made the programs more generous. The very strong social selection remained unchanged in spite of increased government subsidies. It might be the availability and quality of education rather than the benefits that influence social selection.

Generous government subsidies could also affect the efficiency in the education system. They could contribute to an increased share of students in post-graduate programs, to that more students test different courses before deciding or to extra semesters more for joy than for career. Such effects on students´ behavior may also influence the distribution. Unfortunately, there are very few empirical evidence of how subsidies affect the efficiency.

Ideally you would like to know how education, lifetime income and wealth would be distributed in Sweden if there were less government subsidies. By developing the model further with labor supply, savings and consumption behavior etc. such analyses might be within reach.

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