ECONSTOR
Make Your Publications Visible.

A Service of
ZBW
Leibniz-Informationszentrum Wirtschaft
Leibniz Information Centre for Economics

Parsons, Donald O.; Tranaes, Torben; Lilleør, Helene Bie

Working Paper

Voluntary Public Unemployment Insurance

CESifo Working Paper, No. 1010

Provided in Cooperation with:
Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

Suggested Citation: Parsons, Donald O.; Tranaes, Torben; Lilleør, Helene Bie (2003) : Voluntary Public Unemployment Insurance, CESifo Working Paper, No. 1010, Center for Economic Studies and ifo Institute (CESifo), Munich

This Version is available at:
https://hdl.handle.net/10419/76595

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

WWW.ECONSTOR.EU

Mitglied der Leibniz-Gemeinschaft

VOLUNTARY PUBLIC UNEMPLOYMENT INSURANCE

DONALD O. PARSONS
TORBEN TRANÆS
HELENE BIE LILLEØR

CESIFO WORKING PAPER NO. 1010
CATEGORY 4: LABOUR MARKETS
AUGUST 2003

PRESENTED AT CESIFO WORKSHOP ON EMPLOYMENT AND SOCIAL PROTECTION, JUNE 2002

An electronic version of the paper may be downloaded
- *from the SSRN website: www.SSRN.com*
- *from the CESifo website: www.CESifo.de*

CESifo *Working Paper No. 1010*

VOLUNTARY PUBLIC UNEMPLOYMENT INSURANCE

Abstract

Voluntary public unemployment systems are limited to a handful of countries, including Finland, Sweden, and, more substantially, Denmark. A voluntary system has the positive feature of other user-cost schemes, potentially efficient targeting of services. This presumes rational behavior as well as reasonable risk rating of premiums and the absence of worker access to alternative social programs. Using a 10 per cent sample of the Danish population drawn from administrative data, we exploit the voluntary Danish system to explore the structure of unemployment insurance demand. The insurance take-up rate is surprisingly high, 80 percent in 1995, but varies systematically with economic incentives in a way that raises doubts about the targeting value of the current system. Political support for the Danish system may derive instead from the fact that a universal, compulsory system would generate rather modest additional net funds and with a twist--additional revenue would come disproportionately from low-wage workers.

JEL Code: D8, H0, J0.

Donald O. Parsons
Department of Economics
George Washington University
37th and 0 Streets, NW
Washington, D.C.
20057-1036
USA
dopars@gwu.edu

Torben Tranaes
Danish National Institute of Social Research
Herluf Trolles Gade 11
DK-1052 Copenhagen K
Denmark
ttr@sfi.dk

Helene Bie Lilleør
University of Copenhagen
Institute of Economics
Studiestraede 6
Copenhagen
DK-1455
Denmark

Funds for this research were provided in part by the project "The Welfare State: Threats, Problems, and Some Solutions" and EPRU. Parsons' work is part of a project on the Foundations of Unemployment Insurance being conducted at the Research Program in Labor and Social Insurance (Center for Economic Research, Economics Department, George Washington University). The comments and encouragement of participants at conferences on unemployment insurance at EPRU (University of Copenhagen), and the Center for Applied Microeconomics (University of Copenhagen), and at seminars at the Center for Economic Studies (U.S. Bureau of the Census), CESifo, George Washington University, and the University of Helsinki are gratefully acknowledged. We also wish to thank Niels Blomgren-Hansen and Niels Westergård-Nielsen for extended discussions on aspects of the Danish unemployment insurance system; Martin Browning, Michael Burda, Mette Ejernæs, Peter Jensen, Ann-Sofie Kolm, and Bent E. Sørensen for comments on earlier drafts; Tina Kyhl for consulting assistance on social assistance legislation and administration; and Duy Thanh Huynh for research assistance.

I. Introduction

Voluntary public unemployment systems are now uncommon, but were widespread in the early years of public unemployment insurance programs, ILO (1955). Many European countries first intervened in unemployment insurance markets by subsidizing existing trade union programs, both for the obvious administrative convenience and perhaps to encourage the growth of trade unions, Neumann, Pedersen, and Westergård-Nielsen (1991) and Western (1997). Over time the bulk of these countries converted to compulsory systems, leaving only a handful of countries with voluntary systems, including Finland, Sweden, and more substantially Denmark.[1] The ubiquity of subsidized, voluntary public unemployment insurance systems early in the 1900s and their persistence in the Nordic countries raise the possibility that such systems may in fact be efficient under some circumstances.[2]

A voluntary system has, of course, the positive feature of user cost schemes, potentially efficient targeting of use. Governments typically impose compulsory system universally, at least within the range of the administratively feasible, but almost surely this is inefficient.[3] Whether because of temperament, asset position, or family situation, workers may simply not value earnings insurance.[4] The special value of self-selection is, however, a function of (i) the rationality of consumers, (ii) the accuracy of individual risk assessment in premium setting, and (iii) the absence of "free-riding" on other social insurance programs. Clearly understanding selection into the program is critical to assessing the value of a voluntary system, because none of these can be comfortably assumed. Using a 10%

---

[1] Private premiums in the Finnish and Swedish systems are quite modest, essentially covering administrative costs. Sweden adopted a compulsory system during the early 1990s, but the decision was reversed a year later.

[2] The U.S. unemployment insurance system was established later as a compulsory, if not quite universal, federal/state program. See Baicker, Goldin, and Katz (1998) for a fine introduction to the U.S. system and the logic of its origins.

[3] Lower bounds on firm size in compulsory systems have been common in the U.S. unemployment system only firms with eight or more employees were compelled to join, Baicker, Goldin, and Katz (1998). Firm size limits on government compulsion no doubt reflect both the higher administrative costs of mandated programs in small firms and the administrative costs of enforcing the mandate.

[4] Compulsion, properly targeted, permits governments to price their product without concern that they are distorting product purchase or consumption. It is for this reason that Barr (1988) rejects

sample of the Danish population drawn primarily from administrative data, we explore these issues empirically, estimating the worker's demand for unemployment insurance.

The U.S. flood insurance program provides an illustration of the difficulties faced by voluntary public insurance systems.[5] After-the-event pressures to provide aid to flood victims induced the federal government to consider the failure of the private market for flood insurance. Two arguments were especially compelling; that (i) hydrological data were not available to permit proper risk assessment of a structure, and (ii) consumers would not purchase the insurance at full price if flood insurance was available, presumably because of myopia and free rider strategies on other programs.[6] As a consequence, the federal government established the National Flood Insurance Program (NFIP) in 1968, offering communities substantial incentives, including a program of heavily subsidized flood insurance on existing housing, to undertake appropriate flood risk surveys and land management reforms. The insurance program demonstrated, however, that U.S. consumers would not voluntarily buy even heavily subsidized flood insurance:

> … there is evidence which suggests that many individuals will not purchase flood insurance voluntarily even if it is subsidized 90 percent by the federal government.. It appears unlikely that prospective homeowners would purchase flood insurance at actuarial rates unless they required to do so, particularly in view of the incentive to rely on disaster relief. Howard Kunreuther (1973, p.23)

Browne and Hoyt (2000, p.293) report that, "In 1993 the greatest single flood event in the United States occurred…Of the $12 billion in damages, less than $1 billion was covered by federal flood insurance."[7]

Beenstock's attempt to design an appropriate pricing scheme for unemployment insurance, Beenstock (1986). The issue of proper targeting remains.

[5] Anderson (1974) provides an early policy review.

[6] "Some years ago several companies seriously attempted to write specific flood insurance only to learn that there was a very limited market for such coverage, that the peak demand for flood insurance was immediately following a flood, and that property owners generally did not maintain their flood insurance in force after the lapse of several floodless years. These companies also learned that with adverse selection and their inability to get a proper spread of risk they were obliged to charge rates proportionate to the exposure which affected property owners could not or would not pay, American Insurance Association (1955, pp. 172-173).

[7] In response to the limited demand for insurance, the government turned to compulsion, requiring that all structures financed by an institution with a federal government link, which includes most mortgage suppliers in the U.S., must require that the mortgagors purchase Federal insurance. This mandate

This experience echoes that of early unemployment insurance programs. William Franklin Willoughby for the U.S. Department of Labor reviewed early European programs for possible adoption in the United States. One program he described was a voluntary program established in 1893 in Berne, Switzerland that was financed by a combination of membership dues, employer gifts and municipality contributions. In the first full year of operation, payouts exceeded member dues by a factor of seven to one, yet in the second year paid membership shrank, and the plan quickly failed. Recent experience in the United Kingdom with voluntary, heavily subsidized private unemployment insurance of home mortgages suggests that voluntary unemployment insurance remains difficult to sell to workers, Pryce and Keoghan (2001) and Keoghan and Pryce (2001).[8] The take-up rate is low, although modestly related to the premium charge and more substantially to unemployment probability—"a 10 per cent rise in the probability resulting in a 3 per cent increase in take-up," Pryce and Keoghan (2001, p.179).[9]

The Danish system may not suffer from the same myopia concerns--the population is well educated and professionally counseled on government programs—but other problems may remain. Governments rarely follow the missing markets model literally; premium setting is often loosely tied to individual risk, and Denmark's system is no exception. Premiums are the same for all workers, independent of unemployment risk, and the system is heavily subsidized out of general revenues. This reduces concerns about myopia or optimism bias, but at the same time compromises arguments that a voluntary system improves recipient targeting. Charity hazard is also a problem; the social safety net for unemployed workers without insurance coverage is generous.

---

has had surprisingly modest effects, perhaps because of limited efforts to enforce the mandate, GAO (1990).

[8] One unanswered question in their research was the extent of screening of bad risks by insurance sellers.

[9] A related literature on the take-up rate of benefits among unemployment insurance eligibles is also relevant. A long term decline in UI benefit take-up rates has stimulated considerable policy interest, e.g. Corson and Nicholson (1988) and Blank and Card (1991) in the United States and Storer and Van Audenrode (1995) in Canada. McCall (1995) and Anderson and Meyer (1997) stress the sensitivity of UI take-up to replacement rates.

In the next section we describe in detail the Danish unemployment insurance system, which is organized around unemployment insurance funds ("A-kasser" or U-funds). We then introduce in Section III a formal model of the worker's decision to join an unemployment fund; the decision requires consideration of the worker's unemployment risk, the program's premium and expected benefits, and alternative income support programs for the uninsured unemployed. We describe in Section IV the principal data set used in this study, a 10 percent sample of the Danish population, drawn from IDA ("Integret Database for Arbeitsmarkedsforskning" or integrated data base for labor market research) and the tax registry. We then present evidence of the sensitivity of the U-fund membership decision to economic incentives, first in the aggregate data (Section V) and then in the microdata, using a multivariate logit analysis of fund membership (Section VI). Because of concerns about unobserved heterogeneity, we report on efforts to estimate a conditional logit model of the fund membership decision in Section VII.[10] All models appear to tell a consistent story-- the U-fund take-up rate is surprisingly high, but workers are sensitive to the usual economic calculus; low unemployment risk workers and those with access to means-tested alternatives are least likely to join. In Section VIII we consider the redistributive issue, which may hold the key to the political popularity of the voluntary system in Denmark; we estimate the net revenue consequences of making the system universal and compulsory across demographic and economic groups. In Section IX we briefly discuss a few policy implications of our findings.

II. The Danish Voluntary Unemployment Insurance System

The Danish unemployment system is organized around member-controlled, private unemployment funds (U-funds).[11] Historically, the first state-recognized funds were union funds, formally independent of the union organization. In theory it was possible to join the

---

[10] Because of certain data limitations that we discuss at length in Section VII, we are unable to estimate crucial first differences for some covariates.

[11] For a careful discussion of the Swedish unemployment insurance system, see Bjorklund and Holmlund (1991). A broad overview of recent trends in unemployment and labor market policies in Denmark can be found in Westergaard-Nielsen (2001).

fund without joining the respective union; although in practice this was hard and sometimes impossible. In the 1980s, the linkage between union membership and U-fund membership was broken in practice as well as theory.[12] There were 37 state-recognized funds in 1994-5, in principle one fund for each trade, two funds for the self-employed and a general fund for both employers and employees (a Christian U-fund).[13]

All funds are tightly regulated by the government and face identical rules on fund membership procedures, including base membership fees, search and other eligibility requirements, and benefit levels and duration, although plans can and do differ in related services, including search counseling services, which are linked with fee differentials.[14] After January 1, 1994, the following individuals[15] could join the fund linked to their occupation or education (or the Christian U-fund): (1) employees; (2) the self employed; (3) working/helping spouses to the self employed; (4) individuals with occupational or further education of 18 month or more; and (5) individuals serving their military duty.

The basic annual membership fee is set administratively at eight times the maximum daily UI benefit. In 1995 the fee was 3660 DKK ($654) for employees and 4071 DKK ($727) for the self-employed.[16] This pricing scheme makes the government's share of U-fund expenditures dependent on the business cycle and implies that the funds are self-supporting when the average unemployment is approximately 3%, ignoring fund-related leave schemes and the early retirement supplement ("efterløn"). Between 1975 and 1995 the average unemployment rate in Denmark was roughly 9%, so member fees covered only one third of direct fund benefit outlays, with the remainder covered by state subsidies and by

---

[12] In 1988 it was made an explicit precondition for state recognition and hence government subsidy that the U-funds not condition U-fund membership on trade union membership. (Direktoratet for Arbejdsløshedsforsikring, 1988).

[13] There is a minimum size limit on funds, so that smaller unions must arrange to join funds operated by larger unions.

[14] Note that there is no longer an implicit risk adjustment. The linkage between premiums and payouts, a crucial part of the early subsidy schemes, has been lost with the high public involvement in both financing and controlling the scheme.

[15] Provided they were between 16-65 years of age and residents of Denmark.

compulsory contributions from employers. In 2001 when unemployment was close to 5%, fees covered almost 75% of the direct unemployment benefit outlays and 1/3 of total expenditures.

To be eligible for benefits in case of unemployment, the typical worker must pay into the U-fund for one year and have worked for at least twenty-six weeks during the three years preceding the date of unemployment. If one joined a U-fund under (4) or (5) above, one can get UI benefits without ever having had paid work. For full benefits, one must be involuntarily released; workers who voluntarily quit forfeit the first five weeks of benefits.

Benefits were 90% of the unemployed worker's prior earnings up to a relatively low ceiling, 135,536 DKK ($24,203) per year in 1994, and 136,709 DKK ($24,412) per year in 1995. Benefit duration is extraordinary by U.S. standards. In the period from which our data were drawn, 1994 and 1995, a covered, unemployed worker was eligible for benefits for seven years, but subject to workfare after four. The seven years could be extended for up to two more years by taking specific training options ("education leave").[17]

Long-term membership in a U-fund also provides substantial early retirement benefits through efterløn. Efterløn pays early retirement benefits beginning at age 60 equivalent to the worker's U-fund benefit for the first 2 1/2 years, after which it pays 82% of the maximum U-fund benefit as a flat rate until the member turns 67, the "normal" retirement age for the pension system. Eligibility requirements are substantial; you must have been a U-fund member for 20 out of the last 25 years at the time you wish to start receiving efterløn benefits.[18] For someone wishing to retire at 60 that means joining the U-fund no later than age 40. Efterløn is extremely popular and few fund members do not expect to receive some payments; among U-fund members between the ages of 60 and 66, approximately 2/3 were on efterløn in 1995.

---

[16] At that time, recently self employed individuals paid a higher fee, 9 times the maximum daily UF-benefits. The self-employment differential was eliminated in 1996. Part-time workers, those who work less than 31 hours per week, have both the fee and benefits reduced by one-third.

[17] By 1999, benefit duration was at most 4 years, with workfare after one year.

The long association of U-fund and union membership raises some question of the worker's degree of choice in joining a fund or not. It remains legal for a union to require that members belong to its unemployment insurance fund, although this practice, once common, is now quite rare. Union membership is itself a voluntary decision in Denmark, and unions seem disinclined to impose ancillary requirements on members that might discourage workers from joining the union. Inquiries with unions and experts on unions uncovered only one national union with a compulsory U-fund, the journalists union, apparently as a way of expressing solidarity with other workers. U-fund membership requirements at the local union level are apparently also rare.

Social pressure to join a fund is also possible, but difficult to document directly. Such pressures are most plausible in manual skill unions, Steen Scheur (personal communication, April 14, 2001). A representative of the largest Danish union, HK, representing white collar workers, reports that formal bylaws compelling fund membership may be found in "some sections of SID", the largest union of unskilled workers, and were previously common among skilled workers in the building trades (Machael Valentin, writing on behalf of John Dahl, Head, personal communication with Niels Blomgren-Hansen, April 6, 2001). However, Lars Brejnrod of the Economics Department of SID reports that, although "only a few thousands out of about 300,000 union members are not members of the associated unemployment fund," it is not compulsory, at least at the national levels. He attributes the high take-up rate among SID members to economic interest rather than social pressure or norms, especially with the addition of efterløn. He also raises an issue that will arise again below, "It is true that public relief may be approximately as high as the unemployment benefit. However you can only get relief if you are "in need", that means that you don't have means yourself and your spouse does not earn enough to support you." (personal communication with Niels Blomgren-Hansen, April 17, 2002). The ratio of fund

---

[18] If one becomes a U-fund member at the age of 43, for instance, one can get efterløn-benefits only between ages 63 and 66.

membership to union members appears to bear out the relative popularity of unemployment funds in low skill unions. Among the five largest unions, the ratio is approximately 100% in SID and KAD (unskilled women), 94% in FOA (public employees), 87% in HK (white collar) and 83% in Metal (skilled, metal industry).[19] In the sensitivity analysis section below, we will partition our primary logit model by industry and occupation to explore behavioral differences that might be attributable to union social pressure.

IV. A Model of The Decision to Join an Unemployment Fund

Ignoring for the moment any fixed costs of entry into the unemployment fund, the membership decision of an economically rational worker reduces to a series of single period optimization decisions. Consider then a rational, risk averse worker, who places no special weight on the source of her income; that is, she is neither myopic nor sensitive to welfare stigma. The insurance decision is a dichotomous one, join the fund or not, because the individual has no choice of extent of coverage, the parameters of which are set by the government.

The ith worker is assumed to have earnings e_i when employed and additional private income A_i (capital income, spouse's earnings, etc.). The worker must pay a fee f_i in order to become a member of the U-fund, and will receive a benefit payment B_i if she becomes unemployed, which occurs with probability θ_l. The benefit parameter would include any increments to early retirement benefits that result from U-fund membership. Finally, if the unemployed worker does not belong to a U-fund, she may be eligible for means-tested social assistance. To a first approximation, these programs are substitutes and an opportunity cost of joining an unemployment insurance fund is the loss of social assistance payments. Denote these means-tested social assistance benefits by $S(\gamma, A_i)$, where γ is a positive shift parameter. S is presumably a non-negative function of other family income A_i, so that $S_1 > 0$ and $S_2 \leq 0$.

---

[19] These statistics are from Danmarks Statistik (1999). Note that these figures may be somewhat misleading because some smaller unions do not have funds of their own, but instead join bigger ones.

It is easily demonstrated that, with an additively separable utility function in consumption and leisure and a dichotomous (zero-one) work choice, the expected value optimizing worker will reveal the following qualitative behaviors:[20]

$$\frac{\partial \Delta}{\partial \theta} > 0;\ \frac{\partial \Delta}{\partial B} > 0;\ \frac{\partial \Delta}{\partial f} < 0;\ \frac{\partial \Delta}{\partial \gamma} < 0;\ \frac{\partial \Delta}{\partial e} > 0;\ \text{with } \frac{\partial \Delta}{\partial A} \text{ ambiguous,}$$

where $\Delta = \{E(U_i) \mid UF = 1\} - \{E(U_i) \mid UF = 0\}$, the ith worker's net gain in expected utility of joining the U-fund. Not surprisingly the attractiveness of U-fund membership is increasing in unemployment risk and U-fund-benefits and decreasing in both the fee, and the generosity of social assistance benefits, indexed by γ. The prior earnings effect is positive because the marginal utility cost of paying the fixed membership fee is decreasing in income, while the asset effect is ambiguous without stronger assumptions on the curvature of the utility function

One Dynamic Consideration. The Danish U-fund has an investment element that make the decision a multiperiod one; it is necessary to pay into the system for one year (and work for at least 26 weeks in most circumstances) before qualifying for unemployment benefits. As a consequence, a short run reduction in membership returns, even a large one, will not necessarily cause a worker to leave the fund, because the worker must purchase a year's membership to become eligible again.

To illustrate the impact of the one-year waiting period on the U-fund decision, consider a *risk-neutral worker*. In the model above, the worker in period *t* would join a U-fund if and only if the expected value of fund benefits in that period exceeds social assistance payments by more than the fund fee:

$$\theta_t(B_t - S_t) - f_t \geq 0 .$$

We are indebted to Niels Blomgren-Hansen for the statistics and the caveat.

[20] This preference structure implies equal consumption across states if insurance is complete and costless.

If however the unemployment probability increases monotonically with age ($\theta' \geq 0$) while all other factors {*B, S, f*} remain constant, the *risk neutral* worker will join the fund in the first time period in which:

$$\theta_{t_c+1}(B-S)-f \geq 0 \text{, and } \sum_{t=t_c+1}^{T} \delta^{t-t_c}[\theta_t(B-S)-f]-f \geq 0,$$

where *T* denotes the length of the work life and t_c the year of first payment into the fund (entry). The net return must be nonnegative in the first protection year and the discounted annual net returns to fund membership must equal or exceed the membership fee--the one year fee payment. Conversely consider the case in which the unemployment probability decreases monotonically with age ($\theta' \leq 0$). In this case it is transparent that the worker, if she ever joins the fund, will do so in the first period. The decision rule for the risk-neutral worker is to join in the first period if and only if:

$$\sum_{t=2}^{\tau} \delta^{t-1}[\theta_t(B-S)-f]-f \geq 0.$$

where τ is the date of exit from the system (the last period in the system). Exit will occur in the first period in which the single period condition holds. A fortiori, the discounted value of all future expected net returns is negative at this point, although it may be negative at an earlier stage as well. The entry and exit algorithms become more complex if, as appears to be the case, net returns to membership vary nonmonotonically over the work life.

V. The Data

Our primary data set is extracted from IDA (An Integrated Data Base for Labor Market Research) and the Income Tax Register, which are maintained by Danish Statistics, the government statistical office.[21] Administrative data from a variety of government sources were compiled for a ten percent sample of the Danish population between the age

[21] The data is available for a fee that is substantial by U.S. government standards. The fee is expected to cover the cost of compiling and maintaining the data set as well as the marginal cost of providing it to the user. For commercial and privacy reasons the data can only be accessed at sites authorized by Danish Statistics.

of 18 and 66 in 1995.[22] The value of using an administrative data set to examine unemployment fund membership is clear; an exact record of the individual's insurance status (U-fund membership) is provided. The involvement of the government in many facets of Danish life means that the data set contains much more demographic and economic data than would be available in U.S. administrative data. Not only do the data contain records of U-fund membership and benefit receipt and social assistance receipt, they contain the usual demographics--sex, age, marital status; presence of children in the household, educational attainment—as well as labor force activity; earnings, income and wealth.

The key unemployment variable, unemployed all of week 48, the fourth week in November, is not the usual survey response, but is an administrative construct and may undercount laid off workers who do not contact public services because they believe they do not qualify for unemployment or social assistance benefits or other related services. Survey evidence of the extent of unreported unemployment is available, and suggests the numbers are relatively small: in 1995 approximately 13,000 individuals (0.45 percent of the labor force) were looking for work, but did not receive unemployment compensation nor were registered at the employment office ("AF-kontor") according to Denmarks Statistiks Labor Force Survey.[23] Conversely the unemployment category includes many individuals who are not unemployed in the usual sense of being available for work if offered.[24]

Unemployment benefits are constructed from program rules. Cash benefits were uniform across plans, with benefits proportional at 90 percent of earnings up to a fairly low maximum, after which benefits remain flat just below 140,000 DK ($25,000):

$$B_i = \min(0.9e_i, 136{,}709) ,$$

---

[22] Although the focus of the analysis is calendar year 1995, to accommodate lagged variables and analyses of behavioral change, the sample was drawn in 1993 and sample members then followed for two years.

[23] This information was provided by Danmarks Statistiks to the Ministery of Finance, Denmark (Personal Communication with Tranæs, 2002).

[24] Pedersen and Smith (1995) find that only some 60% of the individuals receiving unemployment compensation wanted a job *and* were actively searching for one. Denmark's Statistics, Labor Force Survey, has arrived at comparable figures.

and e_i of course denotes pre-unemployment earnings.[25] Benefits are a function of weekly earnings prior to unemployment, so we adjust reported annual earnings for weeks of employment to construct weekly earnings and then the benefit rate, which in turn is converted to an annual figure. Since 1994 these benefits have been taxed as have social assistance benefits, although we do not adjust for taxes here.

We can also estimate the social assistance benefits for which the individual would be eligible if she were unemployed and *uninsured*. Welfare counselors are given a non-negligible degree of discretion in the Danish welfare system, so these estimates are not exact, but a similar degree of uncertainty is likely to exist in the mind of the decision-maker, who is after all speculating on her own social assistance eligibility. Unlike unemployment insurance, social assistance is means-tested. The system distinguishes in a modest way between asset income and other family earnings, and it is therefore necessary to partition A_i into these components. Denote asset income and other family earnings by α_i and family wealth by v_i, $A_i = \alpha_i + v_i$. The social assistance benefits for which a married worker would be eligible when unemployed has the following form:

$$S_i = \max\,[0, S_i^* - a_i - v_i^*]$$

where S_i^* is 80% of the maximum unemployment benefit if the family has children, and 60% if it does not, and $v_i^* = \max(0, v_i - 10{,}000)$.

The base fee *f* is essentially constant, varying only with part-time/full-time work and student status (there is a significant student discount).[26] U-funds are free to offer ancillary services, such as job training and counseling, but must pay for them out of fees in excess of those for benefits. We exclude from our sample students and pensioners because of their distinctive circumstances, so that the fee varies only with U-fund service-provision and part-

[25] Benefits are also bounded by zero, which affects those workers with negative incomes in 1995.
[26] A student can become a U-fund member, even though ineligible for benefits while a student. Upon leaving full-time student status, the individual can then begin receiving unemployment benefits while looking for her first post-school job.

time status, and is potentially correlated with other omitted decision factors. We view the impact of fees on membership as not identifiable in our data, and exclude the fee variable.

VI Unemployment Fund Membership in Denmark: Some Aggregate Evidence

Aggregate data reveal much about the nature of the U-fund system and the sensitivity of U-fund membership to economic incentives. The time trend in U-fund membership is graphed in Figure 1 for the 1987-2001 period, along with two measures of the aggregate unemployment rate, the official measure and the OECD standardized measure. The standardized measure is everywhere less than the official measure, which includes some individuals not looking for work. Membership in an unemployment fund approached 80 percent in 1995, a figure that seems exceptionally high in light of the U.S. experience with flood insurance and the U.K. experience with unemployment insurance for mortgagors. The U-fund membership decision, however, is not just an institutional constant, increasing by 10 percentage points between 1987 and 1995, before declining modestly between 1995 and 2001. This flow and ebb in membership rates correspond broadly with the increase and subsequent decline in the aggregate unemployment rate, although the membership increase in the first interval is much larger and enduring than the decline that follows for reasons that will become clear shortly.

Cross-sectional statistics from our primary data set also suggest the importance of economic considerations in the membership decision. With fixed premiums across individuals, a high risk of unemployment should encourage U-fund membership. In Figure 2, we report *age* profiles for (i) the worker's unemployment experience, specifically whether the worker was unemployed all of week 48 (Panel A), and (ii) the worker's U-fund status (Panel B). As one might expect, unemployment rates peak among workers in their early 20s, falling more or less continuously through age 50 before climbing again. Intuitively one might conjecture that U-fund membership would follow the same pattern, first declining and then increasing with age. That does not appear to be the case; fund membership is remarkably flat throughout the bulk of the individual's active work life, Figure 2 Panel B. This surprising constancy of U-fund membership across age can only partly be explained by

age variations in social assistance eligibility; safety net eligibility declines more or less continuously throughout the work life as assets accumulate and the incomes of spouses grow. A major complicating factor is efterløn, the early retirement supplement, which for those working in 1995 required twenty years of service in the 25 years prior to receipt, which can begin as early as age 60. This provides an incentive for all workers over 40 to belong to a fund, and, because of the investment aspect of U-fund benefit eligibility, for younger workers who belong to a fund to remain members despite falling unemployment risk prior to the efterløn pay-in period.

There is strong evidence of the efterløn effect on membership. In 1992; the efterløn eligibility requirement was raised from ten to twenty years. If efterløn is an attractive addition to U-fund membership, one would predict large effects on the U-fund membership in the age 40 to 50 bracket in 1992 and that is exactly what we observe. In one year U-fund membership increased by 10 percentage points for workers in their forties, while remaining stable for almost all other age brackets. The size of this shift can be compared to the stability of the age profile of U-fund membership in the years before (Figure 3A) and after (Figure 3B). Danish workers in their 40s appear quite sensitive to the economic returns to fund membership.

In Figure 4, we report *income* profiles by decile for unemployment rates (Panel A) and U-fund membership rates (Panel B). Unemployment is high in the lower half of the income distribution, especially in the third through fifth deciles, and is essentially nonexistent in the upper deciles.[27] Despite the high unemployment risk, the low U-fund membership rates in the bottom half of the distribution are perhaps not surprising, given the access to means-tested social assistance for this group. The high membership rates in the higher income deciles, at which point unemployment is an extraordinarily uncommon event, remain

[27] In the first two deciles, both unemployment and membership rates are low, no doubt reflecting the limited connections to the labor force of part-time and casual workers.

a puzzle. The figure says much about the redistributional consequences of shifting to a compulsory universal system, an issue we return to below.

VII U-Fund Membership: A Multivariate Logit Analysis

The aggregate data suggest that Danish workers, in deciding whether to insure themselves against unemployment losses, are sensitive to the expected economic factors, including unemployment levels, access to social assistance, and the presence of tie-in programs such as efterløn. In this section we report on a multivariate analysis of individual data to provide more precise estimates of these effects. In Table 1A, we define the variables used in the analysis, in Table 1B we report on their means and standard deviations.

A potentially important complication is that individual unemployment experiences may not be independent of U-fund membership. The usual moral hazard concerns arise—insured workers are more likely to "choose" unemployment if laid off. That concern requires that we undertake a two stage process: in the first step we estimate the worker's probability of being unemployed, using that model to estimate the expected unemployment risk, which is then embedded in the second step estimation of the membership decision. The unemployment risk measure used as a regressor in the second stage is an imputed variable and thus measured with sampling error (the unemployment risk estimates are reported in full in an Appendix available from the authors). We use a procedure proposed by Murphy and Topel (1985) to correct all standard errors in the second stage. The procedure is quite general and has the standard instrumental variable method as a special case (see Murphy and Topel, 1985).

Recall the formal decision model of Section IV. Approximating the expected utility differential Δ by the linear index I and further assuming that the decision to join the unemployment insurance plan is subject to a decision error ε with mean zero, the decision to join the fund can be represented as:

Join an unemployment fund iff:

$$I - \varepsilon \geq 0 \text{, or } I \geq \varepsilon .$$

The probability of joining the unemployment insurance pool is then:

$$P\ (UF=1) = G(I),$$

where *G* is assumed to be the cumulative logistic function. This is a standard logit model, with the indicator function *I* of the form:

$$I = \alpha_0 + \alpha_1 \hat{\theta} + \alpha_2 f + \alpha_3 B + \alpha_4 S + \alpha_5 e + \alpha_6 A + \alpha_7 X ,$$

where the X vector denotes various controls. The X vector presumably includes observables correlated with risk aversion and other unobserved decision factors such as age, marital status, number of children in the family, educational level, asset income, and spouse's earnings.

The unemployment membership fund decision was then estimated using logit techniques and the results are reported in Table 2. In Columns (1) and (2) we present the coefficients and standard errors respectively of a U-fund membership model for 1995 with industry and occupation excluded.[28] We are especially interested in three variables--the unemployment risk measure and the two key "price" variables, potential unemployment benefits and potential social assistance benefits (if unemployed and not a U-fund member). All three coefficients are of the expected sign and highly significant, with unemployment risk and the unemployment benefit level increasing the U-fund membership probability and the potential social assistance benefit reducing it as theory predicts.

The unemployment risk coefficient roughly implies a 0.36 percentage point increase in U-fund membership for each addition percentage point of unemployment risk.[29] Because a much larger share of workers belong to U-funds than are unemployed, this translates into a relatively low elasticity, about 0.04 at the point of means. Similar computations at the point of means for the benefits elasticities suggest (i) a U-fund benefit elasticity of 0.54, and

---

[28] In this model, industry and occupation come into the model solely through their effects on the individual's expected unemployment experience, providing additional identifying restrictions in the estimation.

(ii) a social assistance benefit elasticity of -0.03. The large difference in absolute magnitudes of the two benefit effects—the coefficient on U-fund benefits is 0.280, that on social assistance is -0.045—is not predicted by the theory, which would suggest that the differential between the two should drive behavior, that is, that the two effects should be equal in absolute magnitude, but of opposite sign. Perhaps stigma exists toward social assistance receipt, even in the welfare state. Alternatively it may be that benefits, perhaps social assistance benefits, are poorly measured.[30] In any case the broad conclusion is that the workers in our sample seem sensibly strategic in their U-fund membership behavior.

We also obtain estimates for a wide range of controls, many of which can be interpreted as adjustments for unobserved heterogeneity in risk preferences. Controlling for the incentives to join a fund, those with higher gross income are less likely to join, suggesting reduced risk aversion with income; at the point of means, the income elasticity of membership is –0.09. Wealth also reduces membership *ceteris paribus*, although the wealth effect appears to be relatively small. Controlling for other factors, females, married workers, and those with children join funds disproportionately, which is broadly consistent with risk aversion expectations. Despite their low membership rate, the very young (18-25) apply for membership beyond expectations, while the old (61-66) are disproportionately less likely to be members. Surprisingly, there appears to be little efterløn effect in the age splines; the independent effect of age varies little over the middle years. Ceteris paribus, the highly educated are only marginally more likely to join than those at the lowest level of education attainment, with those with only 12 years and no further vocational education or schooling being least likely to be members, and those with 12 years of schooling *and* vocational training being substantially more likely to be members.

---

[29] The linear approximation to the logit model can be obtained by multiplying the logit coefficient by P*(1-P), where P denotes the probability of being a fund member, or in this case 0.834*0.166=0.138.

[30] Benefits are constructed as the annual benefits for which a worker would be eligible if she were without earnings for the entire year. S is computed according to guidelines, but there is considerable discretion in actual payments.

To explore the sensitivity of model estimates to our identifying restrictions for the unemployment risk instrument, we estimate a second model with the industry and occupation dummies appearing directly in the U-fund logit as well as in the unemployment probability instrument (as before). These industry and occupation dummies could, for example, capture union social pressures to join the U-fund, an issue we will return to below. The results are reported in Table 2, Columns 3 and 4.

The estimated unemployment risk coefficient increases in magnitude in this model by about 30 percent; the linear approximation at the mean membership probability suggests an increase in unemployment fund membership of 0.53 percentage points for each one percent increase in unemployment expectation, with a corresponding increase in the elasticity estimate. The two benefit coefficients are essentially unchanged with the addition of the industry and occupation covariates directly in the U-fund model. A worker in the base industry, agriculture, apparently has the lowest intrinsic likelihood of joining a U-fund controlling for measurable economic incentives, with catering and the low-service sector not far behind. Ceteris paribus fund membership is highest in manufacturing, perhaps reflecting the origins of U-funds and unions, although less "traditional" union sectors, i.e. the high-service sector, also has an unusually high propensity to join a U-fund.

We also estimated the primary models on a variety of subsamples. These estimates, available on request from the authors, suggest that the basic structure of the results is robust to partitioning by gender and by broad industry and occupational groupings. Age partitions had a more substantial quantitative, but not qualitative, effect on the estimates. We partitioned the sample by age and reran the model separately on the age groups 18-34, 35-49, and 50-66. Tables 3. The qualitative structure of the findings remains robust for the three age groupings. All the key variables have strongly significant coefficients of the expected sign. Unemployment risk and the generosity of U-fund and social assistance influence the U-fund decision in strong and predictable ways that are stable across age. Two exceptions are education level and the presence of children in the

household, which affect the insurance decision very differently for young workers and old. For young workers, high education levels are correlated with recent entry into the labor market; for older workers, this consideration is no longer relevant. Concerning children, older people are less likely to be financial responsible for their children and it is not obvious what signs to expect on the children dummies a priori. The magnitudes of the key price coefficients, however, do vary across age brackets, with the membership decisions of the young and the old especially sensitive to unemployment risk, and of the young to social assistance, for which they are more likely to be eligible.

VIII. The U-fund Membership Decision: Conditional Logit Estimates

It is unlikely that we have included all the factors that systematically determine either unemployment risk or U-fund membership, which raises concerns about unobserved heterogeneity in both the unemployment instrument and the U-fund model. In particular, the worker's attitudes towards risk and taste for work are only crudely proxied in our study. Moreover, the degree of risk aversion might influence not just the insurance decision, but also the unemployment risk measure, because risk averse individuals might partially "insure" themselves by their choices of education and occupation. Thus, we want to factor out individual specific fixed effects in both steps, the unemployment risk and the insurance decision estimations. Fortunately we could obtained data for 1993, so that we can estimate a "fixed effects" model of U-fund membership (the 1995 model uses 1994 and 1995 data, so the 1994 model requires 1993 and 1994 data).

Chamberlain's conditional logit model is a natural estimating structure, Chamberlain (1980,1984).[31] The model requires that the sample be limited to status changers only. The dependent variable in the conditional logit is a dummy equal to one if the individual moved from non-membership to membership in a U-fund between November of 1994 and November of 1995 and zero if she moved from membership to non-membership. The probability that an individual makes a transition from membership to non-membership or the

reverse is driven by *changes* in the values of the covariates, so fixed effects (and any time-invariant covariates) are eliminated from the analysis, permitting unbiased estimation of the remaining variables.

Limiting the sample to U-fund changers dramatically reduces the size of our sample. The limited number of insurance status changers arises no doubt in part because of the investment aspect of U-fund membership, that one must belong to a U-fund for one year before becoming eligible for benefits upon entering unemployment. This investment consideration has the effect of limiting U-fund exits, though not entries, and we would expect only a small number of exits from U-fund status in any year. The sample size problem is made more severe when combined with the evidence that model parameters vary by age. Because of these considerations we limit our conditional analysis to the young, estimating the conditional logit on a sample of workers between the ages of 18 and 34, a group dominated by entry into U-funds. This age group, although only 38 percent of our total sample, includes 73% of all U-fund status changers**.** This age group is also likely to be unaffected by efterløn.

The logic of the fixed effects analysis of U-fund decisions applies as well to the worker's unemployment experience—the parameter estimates may be affected by unobservables in that relationship, ones that are perhaps more or less constant from one year to the next for a given individual (like risk aversion, presumably). As a result we undertook a conditional logit analysis of the probability of being unemployment in the 48th week, and use that model to construct the estimated change in unemployment risk necessary for the estimation of the conditional U-fund logit. The details of the unemployment estimation and the parameter estimates of the resulting model are reported in an appendix available from the authors.

We report in Table 4 the estimates of a conditional U-fund logit model, which relies entirely on changes in the covariates between 1994 and 1995. For purposes of comparison

---

[31] Bjorklund (1985) provides an early application to unemployment models.

we also include the levels logit estimates of U-fund membership in 1995 for the same age group, Columns (1) and (2). If fixed effects have not biased the level estimates, the conditional logit estimates should parallel the level parameter estimates, although it is important to note that there is likely to be substantial sampling variation. The levels model is based on 84,318 observations, the conditional logit on only 5,463. The pattern of signs in the conditional logit, Columns (3) and (4) replicates those in the level regressions, although the conditional logit estimates would suggest that unobserved fixed effects seriously bias downwards the positive effects of high levels of education on U-fund membership *ceteris paribus*.

Of special interest to us, the three incentive variable coefficients in the conditional logit replicate the sign pattern of the level regression. Greater unemployment risk significantly increases the likelihood of U-fund membership as do more generous unemployment benefits, while more generous social assistance benefits reduce the likelihood. The absolute magnitudes of the effects are sharply lower than the level estimates, however--by 67 percent, 56 percent, and 45 percent for unemployment risk, unemployment benefits, and social assistance benefits respectively. We are unsure which set of estimates is superior; the conditional estimates are theoretically preferred if "fixed' effects are the only problem with model specification, but these estimates are not as robust as the level estimates based on more than 10 time as many observations. Tests suggest that both models produce consistent estimators.[32] Qualitatively both models signal that workers are sensitive to economic incentives in deciding to join a U-fund.

---

[32] Using a Hauseman (1978) test of the conditional model against the corresponding unconditional model (i.e., the levels model pooled over 1994 and 1995) we cannot reject the null hypothesis of homogeneity (no unobserved heterogeneity): Let ML indicate maximum likelihood and CML conditional ML, Var is the estimated covariance matrix computed for the maximum likelihood estimator β. The test is then based on the chi-squared statistics $(\beta_{CML} - \beta_{ML})'(Var[CML] - Var[ML])^{-1}(\beta_{CML} - \beta_{ML})$, which needs to be large to cast doubt on the hypothesis of homogeneity (the degree of freedom is equal to the number of regressors), and we get a negative number (interpreted as zero). Under the null hypothesis of homogeneity, the conditional estimator is still consistent, it is just not efficient. So our test indicates that both the unconditional and the conditional estimators are consistent. Had we rejected the null hypothesis for the alternative, that would have suggested that only the conditional

IX. The Political Economy of Voluntary UI in Denmark: The Revenue Gains from Compulsion

Union-based, voluntary U-funds lost much of their logic with the transition to a national system of finance that involved no implicit risk rating of premiums by craft or industry. A premium unrelated to unemployment risk is unlikely to induce rational selection across workers. Finland and Sweden have programs that are more voluntary in form than spirit, each with subsidy rates of about 95%. Indeed the Swedes briefly converted to a compulsory system in the early 1990s, although canceling that decision within a year. What could explain the political stability of a voluntary system in Denmark? Our 10 percent Danish sample permits us to estimate the net revenue gains that would result from instituting a universal, compulsory insurance system on Danish workers, while identifying the expected individual gainers and losers from such a transition. In the process we uncover one important reason why the voluntary program remains politically popular.

We assume no behavioral responses to the voluntary/compulsory regime change. The most obvious concern would be the withdrawal of workers from the labor force if compelled to consume earnings insurance that they do not value at cost. This is likely to be a special problem among low-wage workers who did not take up U-fund membership because of the presence of a preferred social assistance alternative. Although high-wage workers compelled to join a U-fund would suffer utility losses from the regime change, the utility effect would likely be small and the impact on labor force participation slight.

The calculation of the revenue gain from universal compulsion is a simple one: for each individual in our sample who is not currently (1995) a U-fund member, we subtract the expected annual benefit payouts from the fee the individual is required to pay, and then sum across all nonmembers:

$$R^* = \sum_{i=1}^{N} R_i^* = \sum_{i=1}^{N} (f_i - \theta_i B_i)$$

---

estimators are consistent (and efficient, then); the unconditional estimators would have been inconsistent.

where R^* denotes the aggregate U-fund revenue gain from universal compulsion, and *N* the number of nonparticipants in the voluntary U-fund. Intuition would suggest that R_i^* is a positive number for all nonparticipants in the unemployment fund; that is that fees should exceed expected payouts, but this need not be the case if nonmembers are myopic, or if they are economically rational but currently rely on social assistance that is more generous than net unemployment benefits.

The revenue gain calculations under compulsion are reported in Column 1 of Table 5, Panel A for the total sample and for various demographic subgroups, adjusted upward by a factor of ten to account for the fact that we are using a ten percent sample. The net gains to the U-fund system are in fact negative; the U-funds would pay out more in benefits than they collected in fees. The net revenue *loss* in 1995 is about 600 million DKK ($107 million) out of a total expenditure of about 25 billion DKK ($4.46 billion), or about 2.4 percent of the budget.

The education breakdowns and perhaps more clearly the income decile breakdowns in Table 5, Panel B, Column 1 point to the social assistance system as the primary reason for the adverse financial consequences of making the system compulsory. Many workers who would find the U-fund financially attractive in expectation do not join, presumably because of the charity hazard. Forcing all workers with a primary education into the U-fund system would impose a net drain on the U-funds of approximately one half a billion Danish crowns! Forcing all workers with some tertiary (post-secondary) education into the system would yield positive revenue, but only about 150 million Danish crowns ($27 million). If it was possible to limit compulsion to the top four deciles of the income distribution, the gains would be only 200 million DKK ($36 million), less than one percent of program expenditures.

In considering the transition from a voluntary to compulsory system, it is important to distinguish the gains (or losses) to the U-funds and to the social assistance program, because, under current Danish administrative rules, eligibility for unemployment insurance preempts eligibility for social assistance, at least as a matter of right. Under this rule, net

revenue gains from compulsion in an integrated approach may be very large indeed, as a modest UI benefit may preempt a more substantial SA benefit. That is not a problem in the current voluntary system because rational workers will not join U-funds if they expect to receive greater benefits under social assistance, but in a compulsory system perverse cases are likely to multiply.

The combined (U-fund plus social assistance) revenue gain from the transition to a universal, compulsory system can be computed as:

$$R^{**} = \sum_{1}^{N} [f_i - \theta(B_i - S_i)]$$

where again S_i denotes the social assistance payment for which the ith uncovered worker is eligible if he or she became unemployed. The results of this computation, in aggregate and by demographic group are reported in Table 5, Panel A, Column 2, and by income decile in Panel B. A shift to compulsory U-fund membership would result in government savings to the combined U-fund and social assistance programs of 2.5 billion Danish crowns ($446 million), approximately 10 percent of U-fund expenditures in 1995.

Any program change whose primary financial gain comes from social assistance savings is likely to have troubling distributional effects and this is clear from the demographic breakdowns in Table 5. About 60 percent of the projected cost saving comes from primary education workers, Table 5, Panel A, Column 2. More than eighty percent of the program revenue gain from compulsion would be extracted from the lowest 30 percent of the gross income distribution, Table 5, Panel B.

To the extent that the shift from a voluntary to a compulsory system is largely at the expense of low-wage workers, these projected revenue gains are perhaps illusory. A potentially more meaningful calculation is the revenue gain to compulsion that arise when the economic well-being of social assistance beneficiaries is protected. Assume for example that unemployment fund benefits cannot be less than the social assistance benefits for which the unemployed worker is currently (1995) eligible *plus* the membership fee.

Denote by R^{***} the aggregate revenue gain when the economic well-being of current social assistance eligibles is "protected," so that:

$$R^{***} = \sum_{1}^{N} [f_i + \theta S_i - \theta \max\{0, (B_i, S_i + f_i)\}].$$

With this benefit protection, the total government saving in the two programs is about one quarter of the combined saving without that protection, or 576 million DKK ($103 million), about 2.3 percent of total U-fund expenditures in 1995, Table 5, Panel A, Column 3. Almost all these savings are generated from social assistance eligibles who do not become unemployed, yet now must pay the U-fund membership fee. The distributional consequences are self-evident. Even with the social assistance benefit protection, almost 40 percent of the revenue gain comes from workers with basic education, Table 5, Panel A, Column 3, and 35 percent from the lowest three deciles of the earnings distribution, Panel B. The unfavorable redistributional aspect may explain why Sweden's experiment in the early 1990s with compulsion was reversed after only a year.

X. Conclusion

The Danish unemployment insurance system, having grown out of trade union programs, is voluntary, although heavily subsidized. This permits us to assess empirically unemployment insurance demand functions. Viewed from the perspective of the small take-up rates of federal flood insurance in the United States and of private unemployment mortgage insurance in the United Kingdom, the 80 percent take-up rate of public unemployment insurance in Denmark is extraordinary. The reasons for this high take-up rate are less clear. The substantial public subsidy can only be part of the answer, flood insurance in the U.S. has also been highly subsidized. Three obvious possibilities come to mind: (i) extreme risk aversion among those in secure jobs, (ii) the tied-in early retirement scheme (efterløn), and/or (iii) worker solidarity. Perhaps participation rate studies for other types of insurance with less obvious social implications may provide an answer to the motivational question.

The potential gain of voluntary programs is from targeting; workers who value this insurance at cost reveal themselves. Selection gain, however, requires that the selection improve efficiency, a requirement that need not hold if (i) workers are myopic; (ii) system prices do not reflect "market" values, and/or (iii) free-riding on other social programs is attractive. The last two problems are surely serious, with U-fund fees the same for all full-time workers in the economy and social assistance generous. The fixed unemployment fund fee and fixed benefits for most workers lead to the hypothesis that fund membership should be sensitive to unemployment expectations, an hypothesis that the data strongly confirm. For those workers below the benefit ceiling, there is a second hypothesis, that those with high replacement rates should join unemployment funds. This hypothesis is also confirmed when we control for a countervailing force among low-wage workers, the impact of the social assistance program; the charity hazard is high in the Danish unemployment insurance system.

The substantial adverse selection in the participation decision would seem to argue for either a compulsory public system or better risk rating of individual workers. What then can explain the long-term political support in Denmark for a voluntary system? The answer seems to lay with the identification of the gainers and losers from converting to a universal, compulsory system. The projected revenue gains from a transition to a compulsory system are modest but not inconsequential. We estimate that the net gain to the unemployment funds (fees collected less expected benefit disbursements) would be on the order of 2.5 billion DKK ($446 million) if the implicit savings from the preempted social assistance payments are included as revenue gains. More interesting is the identity of the losers. A significant share of the increased revenue, about one half, would come from low skilled workers. If we assume that unemployment benefits would be adjusted upward so that social assistance eligibles are made no worse off by the transition to a compulsory system, the redistribution is less stark, but the net revenue gains shrink by 60 percent. Any revenue gain from such a transition is disproportionately derived from the unskilled. It may not be

accidental that voluntary systems remain in place in welfare states with high universal safety nets.

The apparent economic illogic of the Danish voluntary public system does not discount the potential value of public voluntary systems in other contexts, especially in less developed economies. What is required are (i) reasonable coverage of the industrial work force by craft-linked trade unions or labor organizations, (ii) limited public pooling of risk across funds, and (iii) the absence of generous means-tested social programs for workers who do not join a fund. These conditions were apparently common at the turn of the last century in Europe, and could well exist in developing countries today. A voluntary system with reasonable individual risk-rating may be optimal more generally.

REFERENCES

American Insurance Association, Studies of Floods and Flood Damage 1952-1955, New York: American Insurance Association, May 1956.

Anderson, Dan R., "The National Flood-Insurance Program—Problems and Potential," Journal of Risk and Insurance," 41(4) (December 1974): 579- 600.

Anderson, Patricia M.; and Bruce D. "Unemployment Insurance Takeup Rates and the After-Tax Value of Benefits," Quarterly Journal of Economics v112, n3 (August 1997): 913-37

Atkinson, Anthony B. and Micklewright, John. "Unemployment Compensation and Labor Market Transitions: A Critical Review." Journal of Economic Literature 29 (December 1991): 1679-1727.

Baicker, Katherine, Claudia Goldin, and Lawrence F. Katz, "A Distinctive System: Origins and Impact of U.S. Unemployment Compensation," in Bordo, Michael D., Claudia Goldin, and Eugene N. White, eds. The Defining Moment: The Great Depression and the American Economy in the Twentieth Century, Chicago: University of Chicago Press, 1998. 227-263.

Barr, Nicholas, "The Mirage of Private Unemployment Insurance," Suntory Toyota International Centre for Economics and Related Disciplines, Welfare State Program No. 34, 1988.

Beenstock, Michael, and Valerie Brasse, Insurance for Unemployment, London, Allen & Unwin (Publishers) Ltd, 1986.

Bjorklund, Anders, "Unemployment and Mental Health: Some Evidence From Panel Data," Journal of Human Resources 20(4) (1985): 469-483.

Bjorklund, Anders, and Bertil Holmlund, "The Economics of Unemployment Insurance: The Case of Sweden," in Bjorklund, Anders, Robert Haveman, Robinson Hollister, and Bertil Holmlund, eds., Labour Market Policy and Unemployment Insurance, Claredon Press: Oxford, 1991, 101-178.

Blank, Rebecca M.; and David E. Card, "Recent Trends in Insured and Uninsured Unemployment: Is There an Explanation?" Quarterly Journal of Economics v106, n4 (November 1991): 1157-89.

Browne, Mark J., and Robert E. Hoyt, "The Demand for Flood Insurance: Empirical Evidence," Journal of Risk and Uncertainty, 20(3), (May 2000): 291-306.

Burchhardt, Tania, and John Hills, "From Public to Private: The Case of Mortgage Payment Insurance in Great Britain." Housing Studies, 13(3), (1998): 311-323.

Chamberlain, Gary. "Analysis of Covariance with Qualitative Data," Review of Economic Studies, 47 (January 1980): 225-238.

Chamberlain, Gary. "Panel Data," Handbook of Econometrics, Vol. II, Amsterdam: North Holland, 1984.

Corson, Walter, and Walter Nicholson, "An Examination of Declining UI Claims during the 1980's," Unemployment Insurance Occasional Paper 88-3, Washington, DC, U.S. Department of Labor Employment and Training Administration, 1988.

Government Accounting Office, "Flood Insurance: Information on the Mandatory Purchasing Requirement," GAO/RCED-90-141FS, August 1990.

Hausman, J., "Specification Tests in Econometrics." Econometrica 46 (1978): 1251-1271.

International Labour Office (ILO), Unemployment Insurance Schemes, Studies and Reports, New Series, No. 42, Geneva International Labour Office, 1955.

Keoghan, Margaret, and Gwilym Pryce, “Unemployment Insurance for Mortgage Borrowers: Is it viable and does it cover those most in need?” mimeo, Department of Urban Studies, University of Glasgow, 2001.

Kunreuther, Howard, Recovery from National Disasters: Insurance or Federal Aid, Washington, DC: American Enterprise Institute, 1973.

McCall, Brian P., “The Impact of Unemployment Insurance Benefit Levels on Recipiency,” Journal of Business and Economic Statistics v13, n2 (April 1995): 189-98.

Murphy, Kevin M., and Robert H. Topel, "Estimation and Inference in Two-Step Econometric Models" Journal of Business and Economic Statistics v3, n4 (October 1985): 370-79

Neumann, George, Peder J. Pedersen, and Niels Westergård-Nielsen, "Long-Run International Trends in Aggregate Unionization," European Journal of Political Economy 7 (1991): 249-274.

Pedersen, Peder J., ”Union Growth in Denmark, 1911-1939,” Scandanavian Journal of Economics 84 (4) (1982): 583-592.

Pedersen, Peder J., and Nina Smith (1995): “Search Activity Among Employed and Unemployed Members of the Workforce,” in G. V. Mogensen (ed.): Work Incentives in the Danish Welfare State. Aarhus.

Plovsing, J., Socialpolitik. Handelshøjskolens Forlag (in Danish), Munksgaard 1994, 1996.

Pryce, Gwilym, and Margaret Keoghan, “Determinants of Mortgage Protection Insurance Take-up,” Housing Studies 16 (2): (2001): 179-198.

Storer, Paul, and Van Audenrode, Marc A., “Unemployment Insurance Take-Up Rates in Canada: Facts, Determinants, and Implications,” Canadian Journal of Economics v28, n4a (November 1995): 822-35

Westergaard-Nielsen, Niels, “Danish Labour Market Policy: Is it Worth It?” Center for Labour Market and Social Research, Working Paper 01-10, November 2001.

Western, Bruce, Between Class and Market: Postwar Unionization in the Capitalist Democracies, Princeton, NJ: Princeton University Press, 1997.

Willoughby William Franklin, “Insurance Against Unemployment,” Political Science Quarterly, Vol. 12, No.3. (September 1897): 476-489.

Arbejdsministeriet, Arbejdsmarkedspolitiks Årbog, (in Danish), various years.

Danmarks Statistik, IDA-En Integret Database for Arbejdsmarkedsforskning Hovedrapport, (IDA- An Integrated Data Base for Labour Market Research Main Report), (in Danish) Udgivet af Danmarks Statistiks, Copenhagen, 1991.

Danmarks Statistik, Ti-årsoversig 1999 (in Danish).

Direktoratet for Arbejdsløshedsforsikring, “Bekendtgørelse om optagelse I en statsanerkendt arbejdsløshedskasse for lønmodtarere,” of August 19, 1998. *Lovtidende A* 1988 (77).

Table 1

Panel A
Variable Definitions

U	A zero-one dummy, with one indicating the worker was unemployed all of week 48 (4th week of November).
U-fund	A zero-one dummy, with one indicating the worker was a member of an unemployment fund.
$\hat{\theta}$	The probability a worker is unemployed all of week 48, derived from the unemployment logit reported in the data appendix to this paper.
B	The projected annual unemployment fund benefits the worker would qualify for if unemployed for one year (in 10,000 DKK).
S	The projected annual social assistance benefits the worker would qualify for if unemployed and without unemployment benefits for the calendar year (in 10,000 DKK).
FEMALE	A zero-one dummy, with one indicating the worker is female.
AGE18-25 SP	Age in years for those 18 to 25, 25 for all others.
AGE26-30 SP	Zero if age less than 26, one to five for those age 26 to 30, five for all others.
AGE31-35 SP	Zero if age less than 31, one to five for those age 31 to 35, five for all others.
AGE36-40 SP	Zero if age less than 36, one to five for those age 36 to 40, five for all others.
AGE41-50 SP	Zero if age less than 41, one to ten for those age 41 to 50, five for all others.
AGE51-60 SP	Zero if age less than 51, one to ten for those age 51 to 60, five for all others.
AGE61-66 SP	Zero if age less than 61, one to six for those age 61 to 66.
ED1	A zero-one dummy, with one indicating the worker's highest grade completed was 7.
ED2	A zero-one dummy, with one indicating the worker's highest grade completed was 9 or primary education.
ED3	A zero-one dummy, with one indicating the worker's highest grade completed was 10 or 11 with very short vocational training.
ED4	A zero-one dummy, with one indicating the worker's highest grade completed was "gymnasium," (12 years).
ED5	A zero-one dummy, with one indicating the worker's highest grade completed was "skilled by vocational training."
ED6	A zero-one dummy, with one indicating the worker's highest grade completed was short term tertiary education.
ED7	A zero-one dummy, with one indicating the worker's highest grade completed was medium-term tertiary education.
ED8	A zero-one dummy, with one indicating the worker's highest grade completed was long-term tertiary education.

UNSK	A zero-one dummy, with one indication the worker's occupation is unskilled worker in week 48.
SKLD	A zero-one dummy, with one indication the worker's occupation is skilled worker in week 48.
CLER	A zero-one dummy, with one indication the worker's occupation is clerical.
MNGR	A zero-one dummy, with one indication the worker's occupation is manager in week 48.
DIR	A zero-one dummy, with one indication the worker's occupation is director.
SE	A zero-one dummy, with one indication the worker's occupation is self-employed in week 48.
LEAVE	A zero-one dummy, with one indication the worker's occupation is "on leave in week 48."
STUD	A zero-one dummy, with one indication the worker's occupation is student.
PEN	A zero-one dummy, with one indication the worker's occupation is "on pension in week 48."
OLF	A zero-one dummy, with one indication the worker's occupation is "on pension" or out of the labor force in week 48.
AGRIC	A zero-one dummy, with one indicating the worker's industry of employment is agriculture in week 48.
MANUF	A zero-one dummy, with one indicating the worker's industry of employment is manufacturing in week 48.
CONST	A zero-one dummy, with one indicating the worker's industry of employment is construction in week 48.
WHOLE	A zero-one dummy, with one indicating the worker's industry of employment is wholesale in week 48.
RETAIL	A zero-one dummy, with one indicating the worker's industry of employment is retail in week 48.
CATERING	A zero-one dummy, with one indicating the worker's industry of employment is catering in week 48.
TRANS	A zero-one dummy, with one indicating the worker's industry of employment is transport in week 48.
FINANCE	A zero-one dummy, with one indicating the worker's industry of employment is finance in week 48.
SERV-LOW	A zero-one dummy, with one indicating the worker's industry of employment is low skilled service in week 48.
SERV-HG	A zero-one dummy, with one indicating the worker's industry of employment is high skilled service in week 48.
PUBLIC	A zero-one dummy, with one indicating the worker's industry of employment is public sector in week 48.
U-YR	The fraction of the year unemployed.
UF/SA	A zero-one dummy, with one indicting receipt of either unemployment benefits or social assistance or both in the calendar year.

GROSSINC	Gross annual income (in 10,000 DKK)
WEALTH	Physical asset wealth (in 10,000 DKK).
MARRIED	A zero-one dummy, with one indicating the worker is married.
CHILD0	A zero-one dummy, with one indicating the worker has no children living in the household.
CHILD1-3	A zero-one dummy, with one indicating the worker has one to three children living in the household.
CHILD4+	A zero-one dummy, with one indicating the worker has four or more children living in the household.
PART-TIME	A zero-one dummy, with one indicating the worker worked less than 30 hours at his job or was insured part-time and unemployed in the survey week.

Panel B

Summary Statistics For Unemployment And U-fund Logits, 1995

Variable	Mean	Std. Dev.		Variable	Mean	Std. Dev.
U	0.092	0.289		MANUF 94	0.186597	0.389588
U-fund	0.834	0.372		WHOLE 94	0.055134	0.228242
$\hat{\theta}$	0.092	0.178		CONST 94	0.053994	0.226007
FEMALE	0.454703	0.497945		RETAIL 94	0.04727	0.212217
AGE18-25 SP	24.56723	1.346462		CATERING 94	0.016314	0.126679
AGE26-30 SP	4.048787	1.826346		TRANS 94	0.061427	0.240113
AGE31-35 SP	3.356326	2.228995		FINANCE 94	0.030693	0.172485
AGE36-40 SP	2.698218	2.386		SERV-LOW 94	0.056128	0.23017
AGE41-50 SP	3.451506	4.273387		SERV-HIGH 94	0.035701	0.185544
AGE51-60 SP	1.068683	2.572314		PUBLIC 94	0.300824	0.458617
AGE61-66 SP	0.069959	0.5083		U-YR 94	0.099895	0.236988
ED2	0.097269	0.296324		U 94	0.078939	0.269645
ED3	0.110177	0.313111		UF/SA 94	0.348217	0.476406
ED4	0.039438	0.194635		B	11.68272	3.464545
ED5	0.412877	0.492352		S	3.581108	4.278343
ED6	0.067725	0.251273		GROSSINC 94	19.71557	14.09665
ED7	0.095662	0.294127		WEALTH 94	8.520886	102.1688
ED8	0.05112	0.220244		GROSSINC	20.89638	14.08703
SKLD 94	0.122945	0.328375		WEALTH	9.272337	105.0801
CLER 94	0.231801	0.421984		MARRIED	0.523167	0.499464
MNGR 94	0.239783	0.426952		CHILD1-3	0.386778	0.487013
DIR 94	0.005839	0.07619		CHILD4+	0.006706	0.081616
SE 94	0.008127	0.089785		PART-TIME	0.0723104	0.2590017
LEAVE 94	0.020732	0.142484				
STUD 94	0.007033	0.083568				
PEN 94	0.001594	0.039889				
OLF 94	0.020495	0.141688				
Number of Observations						220,245

Source: Danish Statistics. Note: All variables refer to 1995 unless otherwise noted.

Table 2

Logit Estimates of Unemployment Fund Membership 1995

	Model 1		Model 2	
Variable	Coefficient	Std. Error	Coefficient	Std. Error
	(1)	(2)	(3)	(4)
$\hat{\theta}$	2.594243***	0.06429	3.845259***	0.074934
B	0.279975***	0.00359	0.312545***	0.003972
S	-0.04522***	0.00187	-0.0439***	0.001942
GROSSINC	-0.02659***	0.000611	-0.02802***	0.000647
WEALTH	-0.00037***	0.000089	-0.00039***	9.33E-05
FEMALE	0.66949***	.01574015	0.781186***	0.017024
CHILD0				
CHILD1-3	0.14878***	.01848531	0.116941***	0.019047
CHILD4+	-0.16831**	.07849333	-0.19418**	0.082455
MARRIED	0.240546***	.01887382	0.250253***	0.019465
Age18-25 SP	0.321181***	.00732899	0.305019***	0.007814
Age26-30 SP	0.013901*	.00794063	0.01615**	0.008318
Age31-35 SP	-0.02408***	.00782443	-0.02281***	0.008108
Age36-40 SP	0.013167*	.00716846	0.020675***	0.007382
Age41-50 SP	0.032111***	.0035263	0.032414***	0.003612
Age51-60 SP	-0.06321***	.00394188	-0.06585***	0.004033
Age61-66 SP	-0.23621***	.01249516	-0.22382***	0.012816
ED1				
ED2	-0.14077***	.03015247	-0.19264***	0.031626
ED3	-0.2332***	.0292469	-0.2876***	0.030713
ED4	-0.72793***	.03567602	-0.66069***	0.037895
ED5	0.51691***	.02430515	0.377743***	0.026282
ED6	-0.08978***	.03337736	-0.10964***	0.036347
ED7	-0.29054***	.0294539	-0.19999***	0.034042
ED8	-0.19239***	.03478706	-0.04136***	0.038965
UNSKLD 94				
SKLD 94			0.528514***	0.029622
CLERICAL 94			0.239094***	0.021923
MANAGER 94			0.069257***	0.024987
DIRECTOR 94			-0.11098	0.07964
SE94			-0.42055***	0.070608
LEAVE94			2.072799***	0.087222
AGRIC 94				
MANUF 94			1.305716***	0.030955
CONST 94			0.86827***	0.040939
WHOLE 94			0.721987***	0.038887
RETAIL 94			0.614465***	0.039176
CATERING 94			0.097785**	0.055549
TRANS 94			0.407894***	0.035225
FINANCE 94			0.387412***	0.046474
SERV-L 94			0.528653***	0.0368
SERV-H 94			0.723818***	0.043745
PUBLIC 94			0.4211***	0.027231
PART-TIME	-1.04454***	.02837495	-0.73833***	0.030243
CONSTANT	-9.22885***	.16275027	-10.0482***	0.174938

Log likelihood	-74798	-72623
LR χ^2	48540	52892
P-value of χ^2	0.0000	0.0000
Pseudo-R^2	0.2450	0.2669

Source: Danish Statistics. The dependent variable is UF95. The sample size is 220,245. The base group is single males with no children, only basic education, and (for model (2)) working in agriculture as an unskilled laborer. A coefficient is significant at level 0.01 when marked by ***, at level 0.05 when marked by **, and at level 0.10 when marked by *. The standard errors are Murphy-Topel corrected.

Table 3

Logit Results By Age Group, Unemployment Fund Membership
1995

	Age Intervals					
	18-34		35-49		50-65	
Variable	Coefficient	Std.Error	Coefficient	Std.Error	Coefficient	Std.Error
$\hat{\theta}$	2.612***	0.110	1.263***	0.115	4.922***	0.174
B	0.296***	0.0062	0.229***	0.0065	0.351***	0.0098
S	-0.060***	0.0029	-0.037***	0.0030	-0.020***	0.0056
GROSSINC	-0.037***	0.0017	-0.028***	0.0009	-0.018***	0.0014
WEALTH	-0.001**	0.0004	-0.000	0.0001	-0.0004***	0.0001
FEMALE	0.512***	0.0247	0.704***	0.0266	0.554***	0.0493
CHILD0						
CHILD1-3	0.274***	0.033	0.087***	0.026	-0.195***	0.050
CHILD4+	-0.151	0.155	-0127	0.092	-0.595	0.569
MARRIED	0.461***	0.036	0.278***	0.029	0.089*	0.049
Age18-25 SP	0.296***	0.008				
Age26-30 SP	-0.014	0.009				
Age31-35 SP	-0.015	0.012				
Age36-40 SP			0.022***	0.008		
Age41-50 SP			0.026***	0.005		
Age51-60 SP					-0.093***	0.005
Age61-66 SP					-0.226***	0.013
ED1						
ED2	0.366***	0.065	0.163***	0.051	-0.033	0.081
ED3	0.351***	0.065	0.048	0.049	-0.596***	0.074
ED4	-0.089	0.070	-0.452***	0.063	-0.762***	0.111
ED5	1.230***	0.064	0.516***	0.038	0.296***	0.040
ED6	0.943***	0.081	-0.191***	0.048	-0.309***	0.065
ED7	1.033***	0.079	-0.286***	0.044	-0.787***	0.048
ED8	1.060***	0.085	-0.074	0.052	-0.920***	0.065
PART-TIME	-1.856***	0.056	-1.150***	0.049	-0.237***	0.063
CONSTANT	-9.156***	0.185	-0.649***	0.102	-1.694***	0.141
Sample Size	84,318		86,738		49,189	
Log likelihood	-29,621		-27,709		-16,347	
LR χ^2	30,116		7,904		9,410	
P-value of χ^2	0.000		0.000		0.000	
Pseudo-R^2	0.337		0.125		0.223	

Source: Danish Statistics. The dependent variable is UF95. The sample size is 220,245. The base group is single males with no children, only basic education. A coefficient is significant at level 0.01 when marked by ***, at level 0.05 when marked by **, and at level 0.10 when marked by *. The standard errors are Murphy-Topel corrected.

Table 4

Level and Conditional Logit Estimates Of Unemployment Fund Membership
Workers Age 18 to 34, 1994 and 1995

	Model 1		Model 2	
	Levels Logit 1995		Conditional Logit 1994-1995	
Variable	Coefficient	Std.Error.	Coefficient	Std.Error
	(1)	(2)	(3)	(4)
$\hat{\theta}$	2.612***	0.110	0.792***	0.195
B	0.296***	0.0062	0.125***	0.016
S	-0.060***	0.0029	-0.032**	0.013
GROSSINC	-0.037***	0.0017	0.0212**	0.009
WEALTH	-0.001**	0.0004	0.0013	0.004
FEMALE	0.512***	0.0247		
CHILD1-3	0.274***	0.033	0.339*	0.179
CHILD4+	-0.151	0.155	-1.056	1.537
MARRIED	0.461***	0.036	0.145	0.223
AGE18-25 SP	0.296***	0.008	0.373*	0.198
AGE26-30 SP	-0.014	0.009	-0.031	0.193
AGE31-35 SP	-0.015	0.012	0.0158	0.206
ED2	0.366***	0.065	-0.211	0.909
ED3	0.351***	0.065	-0.572	0.8261
ED4	-0.089	0.070	-1.051	0.843
ED5	1.230***	0.064	2.753***	0.823
ED6	0.943***	0.081	2.491**	1.002
ED7	1.033***	0.079	3.361***	1.220
ED8	1.060***	0.085	4.674***	1.362652
PART-TIME	-1.856***	0.056	-2.284***	0.164
Sample Size	84,318		5463	
Log likelihood	-29,605		-1869	
LR χ^2	30148			
P-value of χ^2	0.0000			
Pseudo-R^2	0.337			

Data Source: Danish Statistics. The dependent variable is UF in Model 1 and dUF in Model 2, where dUF is a dummy variable equal to one if the worker entered a U-fund and a zero if she exited a U-fund. All independent variables in Model 2 are first differences. For the construction of $\Delta\theta$, the change in unemployment risk, see the Appendix. A coefficient is significant at level 0.01 when marked by ***; at level 0.05 when marked by **; and at level 0.10 when marked by *. The standard errors have been Murphy-Topel adjusted for the presence of an instrument.

Table 5

Panel A
Potential Revenue Gains Of Compulsory U-Fund Membership:
Denmark 1995 (In Mill. DKK)

	Number of Nonmember (10% Sample)	U-fund Savings R^{*}	U-fund/SA Savings R^{**}	U-fund/ Limited SA Savings R^{***}
		(1)	(2)	(3)
TOTAL	43,905	- 598	2542	576
MALE	22,717	- 303	1452	410
FEMALE	21,188	- 296	1090	167
PRIMARY ED	21,392	- 551	1463	246
SECONDARY	11,646	- 144	406	113
SHORT TERT.	2,622	29	68	50
MEDIUM TERT.	4,456	81	122	102
LONG TERT.	2,959	45	81	62

Panel B
Potential Revenue Gains Of Compulsory UI
By Population Gross Income Deciles
Denmark 1995 (In Mill. DKK)

Income Decile	Max Gross Inc. (in DKK)	Nonmembers Of a U-fund (10% Sample)	U-fund Savings R^{*}	U-fund/SA Savings R^{**}	U-fund/ Limited SA Savings R^{***}
			(1)	(2)	(3)
1	117,352	16054	- 362	1910	202
2	145,105	5437	- 216	196	13
3	167,960	3447	- 113	47	7
4	188,147	2358	-57	24	12
5	206,461	1927	-30	26	18
6	225,410	1782	-10	25	22
7	248,290	1980	6	38	35
8	279,412	3877	37	66	64
9	341,592	3213	52	80	78
10	7,053,389	4830	95	128	126

Note: (5.6 DKK= $1 US in 1995) The raw numbers in the 10% sample are reported in the second column, while the cost estimates have been expanded by a factor of ten to reflect population values. The alternative models are defined more completely in the text.

Figure 1

Unemployment Fund Membership and Official and Standardized Unemployment Rates, Denmark 1987-2001

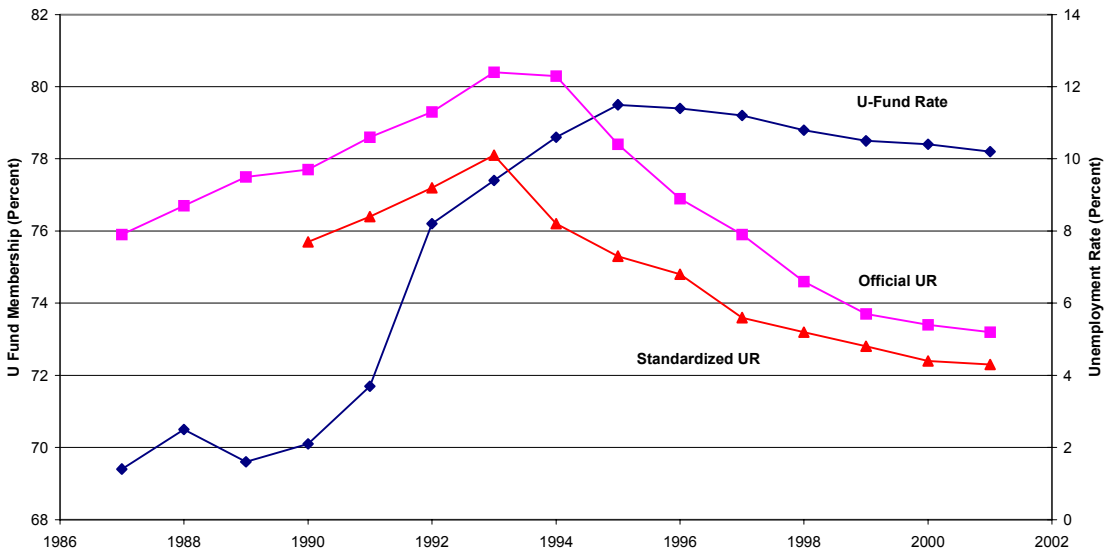
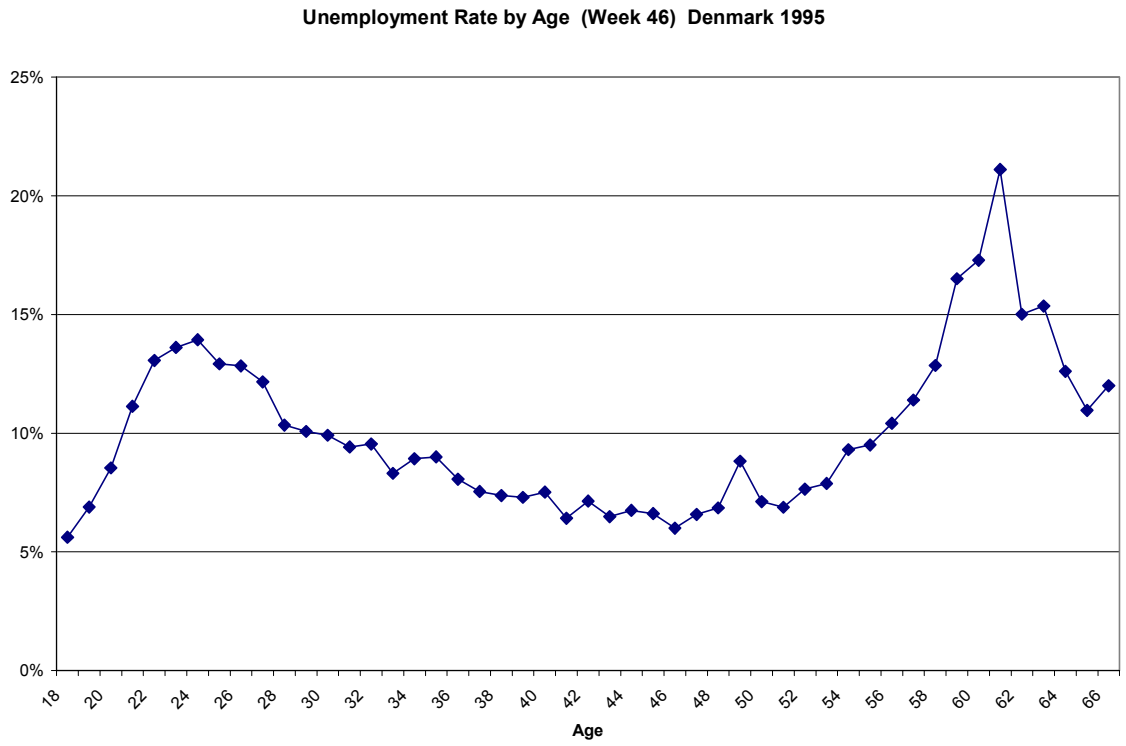


Figure 2

2A



2B

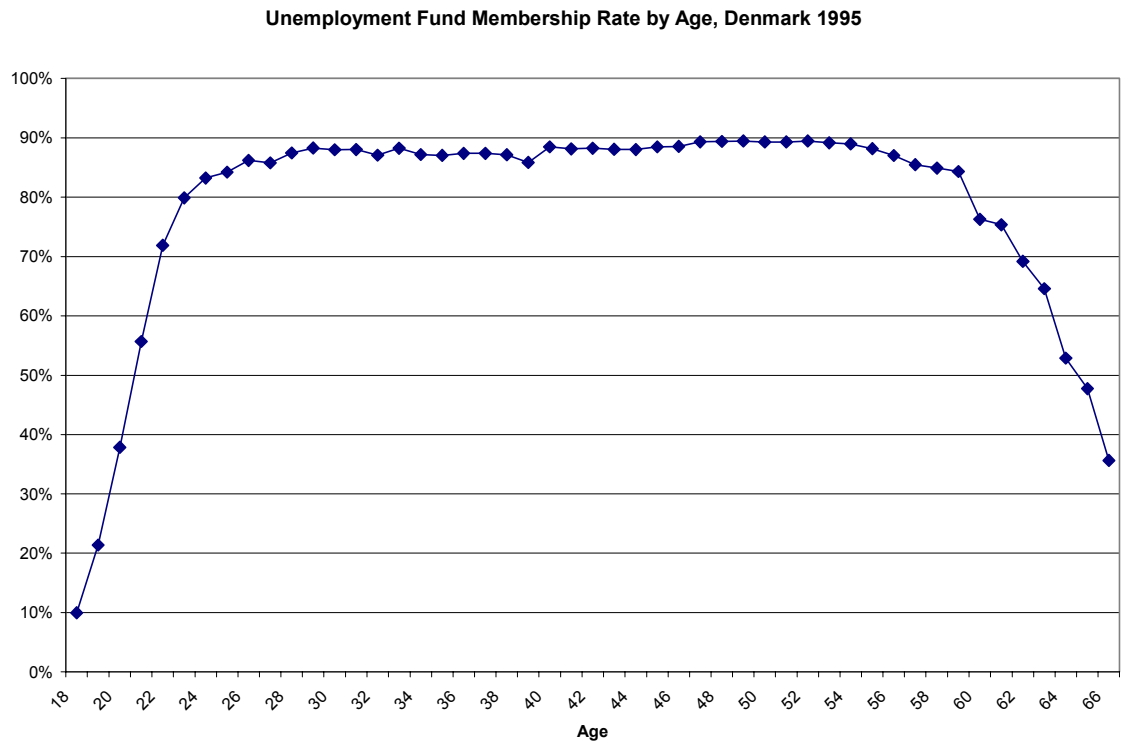
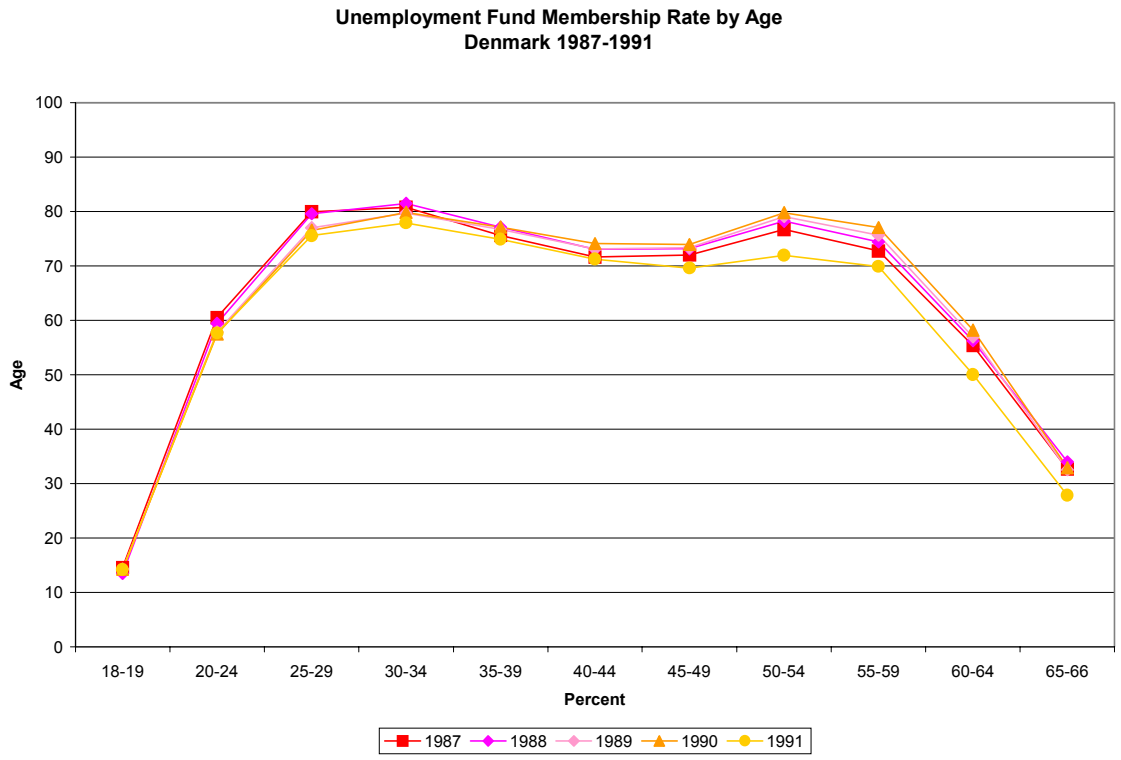


Figure 3

3A



3B

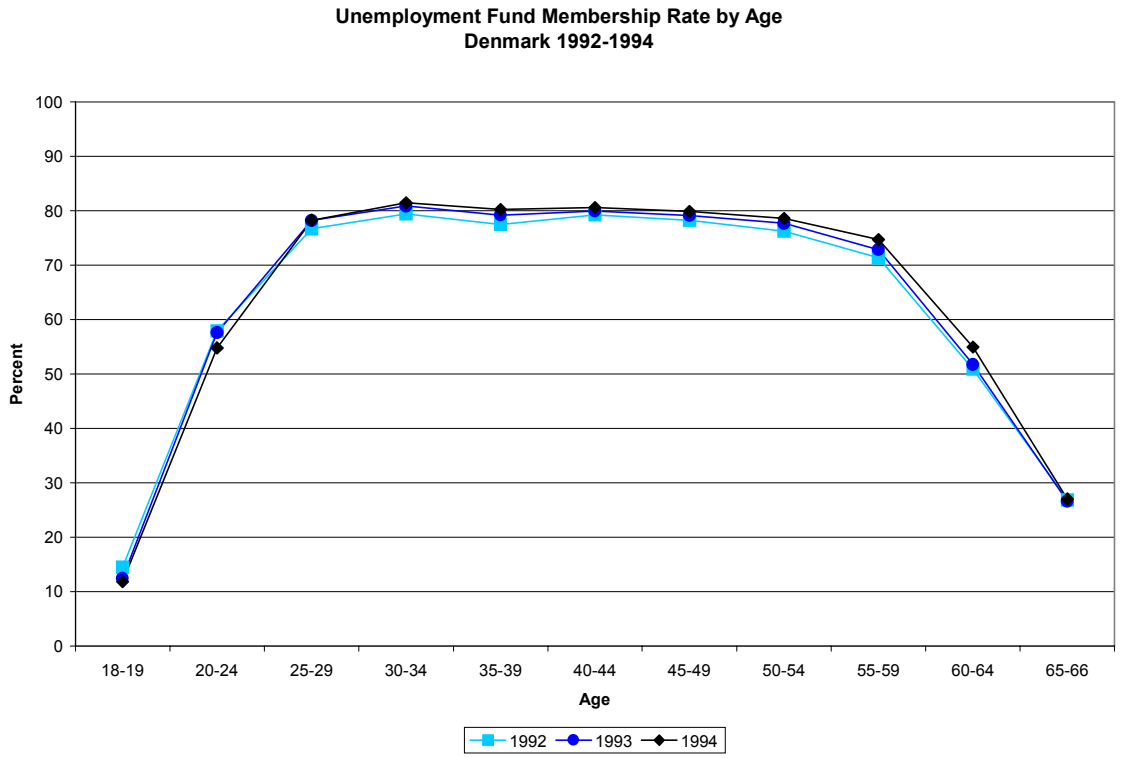
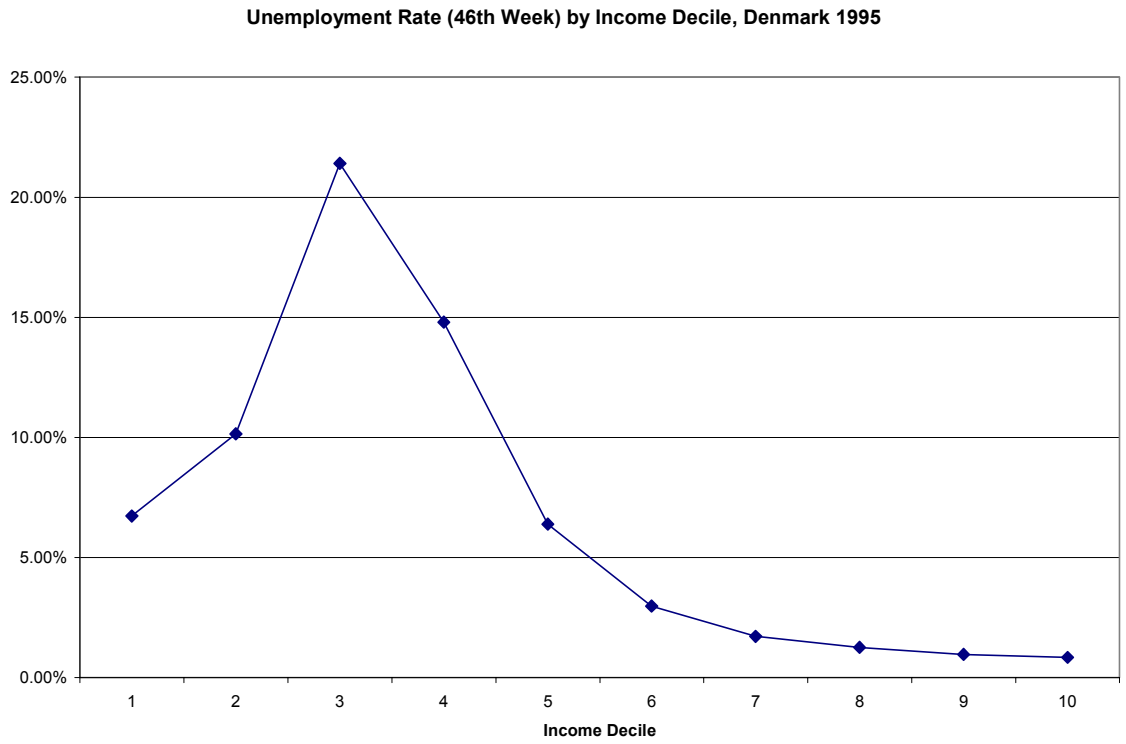
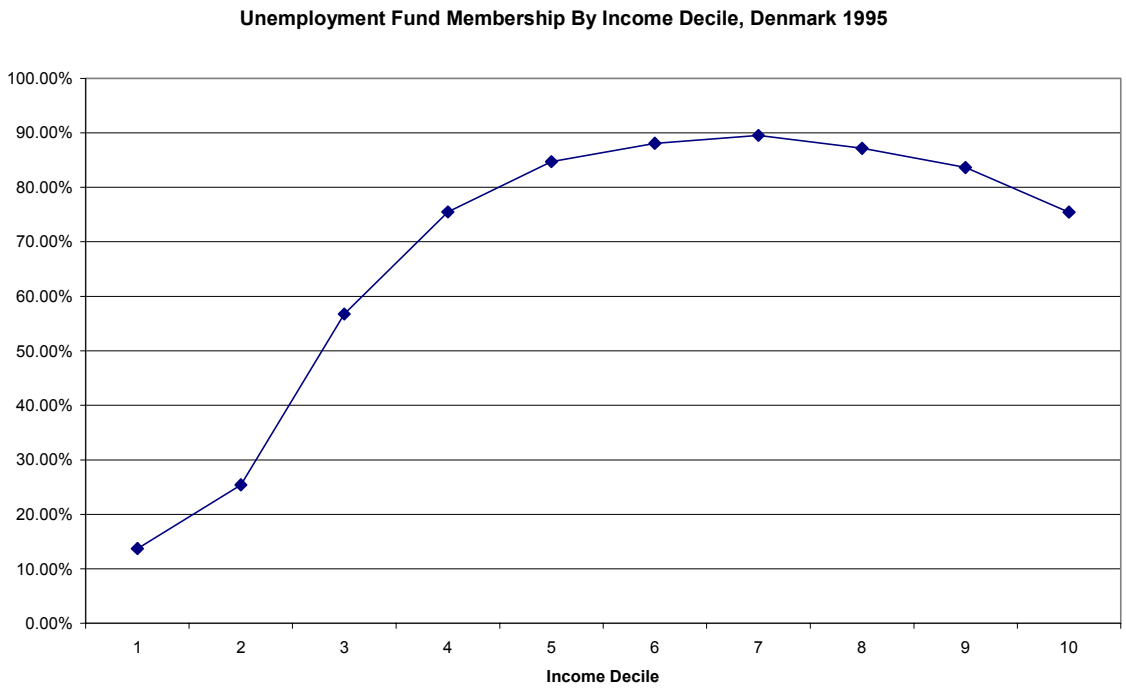


Figure 4

4A



4B



CESifo Working Paper Series

(for full list see www.cesifo.de)

---

944 Albert Banal-Estañol, Inés Macho-Stadler, and Jo Seldeslachts, Mergers, Investment Decisions and Internal Organisation, May 2003

945 Kaniska Dam and David Pérez-Castrillo, The Principal-Agent Matching Market, May 2003

946 Ronnie Schöb, The Double Dividend Hypothesis of Environmental Taxes: A Survey, May 2003

947 Erkki Koskela and Mikko Puhakka, Stabilizing Competitive Cycles with Distortionary Taxation, May 2003

948 Steffen Huck and Kai A. Konrad, Strategic Trade Policy and Merger Profitability, May 2003

949 Frederick van der Ploeg, Beyond the Dogma of the Fixed Book Price Agreement, May 2003

950 Thomas Eichner and Rüdiger Pethig, A Microfoundation of Predator-Prey Dynamics, May 2003

951 Burkhard Heer and Bernd Süssmuth, Cold Progression and its Effects on Income Distribution, May 2003

952 Yu-Fu Chen and Michael Funke, Labour Demand in Germany: An Assessment of Non-Wage Labour Costs, May 2003

953 Hans Gersbach and Hans Haller, Competitive Markets, Collective Decisions and Group Formation, May 2003

954 Armin Falk, Urs Fischbacher, and Simon Gächter, Living in Two Neighborhoods – Social Interactions in the LAB, May 2003

955 Margarita Katsimi, Training, Job Security and Incentive Wages, May 2003

956 Clemens Fuest, Bernd Huber, and Jack Mintz, Capital Mobility and Tax Competition: A Survey, May 2003

957 Edward Castronova, The Price of 'Man' and 'Woman': A Hedonic Pricing Model of Avatar Attributes in a Synthetic World, June 2003

958 Laura Bottazzi and Marco Da Rin, Financing Entrepreneurial Firms in Europe: Facts, Issues, and Research Agenda, June 2003

959 Bruno S. Frey and Matthias Benz, Being Independent is a Great Thing: Subjective Evaluations of Self-Employment and Hierarchy, June 2003

960 Aaron Tornell and Frank Westermann, Credit Market Imperfections in Middle Income Countries, June 2003

961 Hans-Werner Sinn and Wolfgang Ochel, Social Union, Convergence and Migration, June 2003

962 Michael P. Devereux, Measuring Taxes on Income from Capital, June 2003

963 Jakob de Haan, Jan-Egbert Sturm and Bjørn Volkerink, How to Measure the Tax Burden on Labour at the Macro-Level?, June 2003

964 Harry Grubert, The Tax Burden on Cross-Border Investment: Company Strategies and Country Responses, June 2003

965 Kirk A. Collins and James B. Davies, Measuring Effective Tax Rates on Human Capital: Methodology and an Application to Canada, June 2003

966 W. Steven Clark, Using Micro-Data to Assess Average Tax Rates, June 2003

967 Christopher Heady, The 'Taxing Wages' Approach to Measuring the Tax Burden on Labour, June 2003

968 Michael P. Devereux and Alexander Klemm, Measuring Taxes on Income from Capital: Evidence from the UK, June 2003

969 Bernhard Eckwert and Itzhak Zilcha, The Effect of Better Information on Income Inequality, June 2003

970 Hartmut Egger and Josef Falkinger, The Role of Public Infrastructure for Firm Location and International Outsourcing, June 2003

971 Dag Morten Dalen and Trond E. Olsen, Regulatory Competition and Multi-national Banking, June 2003

972 Matthias Wrede, Tax Deductibility of Commuting Expenses and Residential Land Use with more than one Center, June 2003

973 Alessandro Cigno and Annalisa Luporini, Scholarships or Student Loans? Subsidizing Higher Education in the Presence of Moral Hazard, June 2003

974 Chang Woon Nam, Andrea Gebauer and Rüdiger Parsche, Is the Completion of EU Single Market Hindered by VAT Evasion?, June 2003

975 Michael Braulke and Giacomo Corneo, Capital Taxation May Survive in Open Economies, July 2003

976 Assar Lindbeck, An Essay on Welfare State Dynamics, July 2003

977 Henrik Jordahl and Luca Micheletto, Optimal Utilitarian Taxation and Horizontal Equity, July 2003

978 Martin D. D. Evans and Richard K. Lyons, Are Different-Currency Assets Imperfect Substitutes?, July 2003

979 Thorsten Bayindir-Upmann and Frank Stähler, Market Entry Regulation and International Competition, July 2003

980 Vivek Ghosal, Firm and Establishment Volatility: The Role of Sunk Costs, Profit Uncertainty and Technological Change, July 2003

981 Christopher A. Pissarides, Unemployment in Britain: A European Success Story, July 2003

982 Wolfgang Buchholz, Richard Cornes, and Wolfgang Peters, On the Frequency of Interior Cournot-Nash Equilibria in a Public Good Economy, July 2003

983 Syed M. Ahsan and Panagiotis Tsigaris, Choice of Tax Base Revisited: Cash Flow vs. Prepayment Approaches to Consumption Taxation, July 2003

984 Campbell Leith and Jim Malley, A Sectoral Analysis of Price-Setting Behavior in US Manufacturing Industries, July 2003

985 Hyun Park and Apostolis Philippopoulos, Choosing Club Membership under Tax Competition and Free Riding, July 2003

986 Federico Etro, Globalization and Political Geography, July 2003

987 Dan Ariely, Axel Ockenfels and Alvin E. Roth, An Experimental Analysis of Ending Rules in Internet Auctions, July 2003

988 Paola Conconi and Carlo Perroni, Self-Enforcing International Agreements and Domestic Policy Credibility, July 2003

989 Charles B. Blankart and Christian Kirchner, The Deadlock of the EU Budget: An Economic Analysis of Ways In and Ways Out, July 2003

990 M. Hasham Pesaran and Allan Timmermann, Small Sample Properties of Forecasts from Autoregressive Models under Structural Breaks, July 2003

991 Hyun Park, Apostolis Philippopoulos and Vangelis Vassilatos, On the Optimal Size of Public Sector under Rent-Seeking competition from State Coffers, July 2003

992 Axel Ockenfels and Alvin E. Roth, Late and Multiple Bidding in Second Price Internet Auctions: Theory and Evidence Concerning Different Rules for Ending an Auction, July 2003

993 Pierre Salmon, The Assignment of Powers in an Open-ended European Union, July 2003

994 Louis N. Christofides and Chen Peng, Contract Duration and Indexation in a Period of Real and Nominal Uncertainty, July 2003

995 M. Hashem Pesaran, Til Schuermann, Björn-Jakob Treutler, and Scott M. Weiner, Macroeconomic Dynamics and Credit Risk: A Global Perspective, July 2003

996 Massimo Bordignon and Sandro Brusco, On Enhanced Cooperation, July 2003

997 David F. Bradford, Addressing the Transfer-Pricing Problem in an Origin-Basis X Tax, July 2003

998 Daniel Gros, Who Needs Foreign Banks?, July 2003

999 Wolfram Merzyn and Heinrich W. Ursprung, Voter Support for Privatizing Education: Evidence on Self-Interest and Ideology, July 2003

1000 Jo Thori Lind, Fractionalization and the Size of Government, July 2003

1001 Daniel Friedman and Donald Wittman, Litigation with Symmetric Bargaining and Two-Sided Incomplete Information, July 2003

1002 Matthew Clarke and Sardar M. N. Islam, Health Adjusted GDP (HAGDP) Measures of the Relationship Between Economic Growth, Health Outcomes and Social Welfare, July 2003

1003 Volker Grossmann, Contest for Attention in a Quality-Ladder Model of Endogenous Growth, August 2003

1004 Marcel Gérard and Joan Martens Weiner, Cross-Border Loss Offset and Formulary Apportionment: How do they affect multijurisdictional firm investment spending and interjurisdictional tax competition ?, August 2003

1005 Burkhard Heer, Nonsuperneutrality of Money in the Sidrauski Model with Heterogeous Agents, August 2003

1006 V. Anton Muscatelli, Piergiovanna Natale, and Patrizio Tirelli, A Simple and Flexible Alternative to the Stability and Growth Pact Deficit Ceilings. Is it at hand?, August 2003

1007 Reto Foellmi and Josef Zweimüller, Inequality and Economic Growth: European Versus U.S. Experiences, August 2003

1008 James S. Costain and Michael Reiter, Business Cycles, Unemployment Insurance, and the Calibration of Matching Models, August 2003

1009 Marco Runkel, Optimal Contest Design when the Designer's Payoff Depends on Competitive Balance, August 2003

1010 Donald O. Parsons, Torben Tranaes and Helene Bie Lilleør, Voluntary Public Unemployment Insurance, August 2003