The Identification of Incentive Effects of Benefit Exhaustion in Unemployment Insurance Systems

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Abstract

According to economic search theory a UI system with finite benefits duration may result in an increase in search for employment and/or reduction in reservation wage just prior to benefits exhaustion, cf. Mortensen (1977, 1986). This effect, which I will call the motivation effect, is created by the prospect of an income drop when benefits run out. The central econometric problem in empirical studies of this effect is identification of the motivation effect. Often the variable describing time to benefits exhaustion is perfectly colinear with the unemployment duration variable. This colinearity makes it difficult to disentangle the motivation effect from any changes in individuals' employment chances which may occur as the unemployment spell progresses. Different assumptions have been used in order to circumvent this identification problem. Many of which can be questioned.

In this paper I go through the different exclusions restrictions used in the literature in order to identify the motivation effect. Using Danish labour market data from the period 1994-1998 I apply the different exclusion restrictions in order to compare their impact on the estimations of the motivation effect. The Data I use makes it possible to identify the motivation effect with very weak exclusion restrictions. It is therefore possible directly to compare the effect of the more strict exclusion restrictions used in the literature with estimation results using the weaker restrictions.

From the estimations I find that some of the most common exclusion restrictions used in almost all studies of motivation effects actually seem to bias the estimation results towards zero, thereby risking to dismiss motivation effects where they might exist.

Contents

1 Introduction

When characterising unemployment insurance (UI) systems researchers tend to focus on two parameters, the replacement rate and the maximum duration of benefits. The first parameter, the replacement rate, has received substantial attention in economic research over the last two decades in theory as well as empirical studies. The parameter may not, however, be especially important in explaining the differences in the unemployment rate between countries, particularly US and Europe. There is only little difference in the replacement rate between countries and it has furthermore stayed unchanged for long periods. The maximum duration of benefits, however, is very different between countries and it is in this parameter we find the biggest difference between the European and the US UI systems. Where individuals in the US normally can receive benefits for between 26 and 52 weeks, most European systems have maximum benefits durations which are counted in years, cf. Meyer (1990), Carling et al. (1996), Geerdsen (2002), Layard et al. (1991).

According to economic search theory a UI system with finite benefits duration may result in an increase in search for employment and/or reduction in reservation wage just prior to running out of benefits, cf. Mortensen (1977, 1986). This effect, which I will call the motivation effect, is created by the prospect of an income drop when benefits run out. Mainly due to the lack of adequate micro data, empirical studies of the motivation effect did not start to emerge until late 1980'ies. Most studies have been focused on the US UI system, but there has also been studies on Canada, and for Europe, Great Britain, Germany, Sweden and Denmark, see section 4 for references.

The central problem in these studies is the identification of the motivation effect. Often the variable describing time to benefits exhaustion is a function of variables which all have a direct effect on individuals' duration as unemployed. But identification necessitates that at least one of the variables can be omitted from the modelling of individuals unemployment duration (the exclusion restriction). Examples of exclusion restrictions used in the literature is differences in benefits entitlement over regions or between individuals due to previous unemployment, cf. Ham and Rea (1987), Meyer (1990). In order to use this variation to disentangle the motivation effect from other time varying effects, one has to assume that this variation does not on its own have an effect on individuals unemployment duration.

In this chapter I will focus on the identification of the motivation effect in UI systems. I will go through the different exclusions restrictions used in the literature in order to identify the motivation effect. Using Danish labour market data from the period 1994-1998 I will apply the different exclusion restrictions in order to compare their impact on the estimations of the motivation effect. The data I use makes it possible to identify the motivation effect with very weak exclusion restrictions. It is therefore possible to directly compare the effect of the stricter exclusion restrictions used in the literature with estimation results using the weaker restrictions.

In section 2 I briefly describe the theory behind the motivation effect which is commonly referred to in empirical studies of the effect. In section 3 I briefly explain the problems behind the identification of the motivation effect and I describe why exclusion restrictions are necessary for identification. This is in section 4 followed by a description of the different exclusion restrictions and data used in the literature. In section 5 I describe the data which I use for the estimations and I present the different models which I will estimate on the data. In section 6 I present the results of the estimations.

Finally, I conclude in section 7.

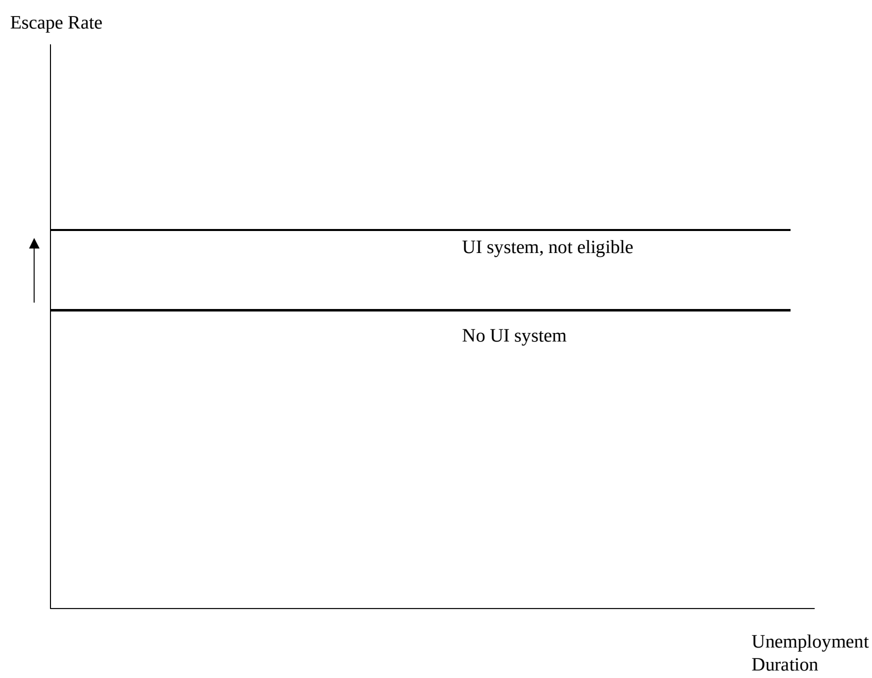
2 The Theory of the motivation effect

The standard job search model seems to be a very good framework for analysis of UI systems. It is used as a theoretical framework in most empirical articles about UI systems and motivation effects, cf. among others Meyer (1990), Rogers (1998). The job search framework gives in its basic form a partial analysis of the labour market focusing on the decision making of unemployed individuals. It is based on a market with imperfect wage information where the job possibilities of an individual worker can be characterised as a distribution on possible wage offers. It is assumed that the distribution is known and that workers search by sampling from this distribution in a sequential manner. The optimal strategy for workers is then to accept the first offer obtained greater than some reservation wage. The reservation wage is the wage that maximises the expected present value of the future earning stream in such a way that the cost of search equals the expected gain in future income attributable to search.

One particular article which is often cited in empirical studies of UI systems is Mortensen (1977). Using standard job search framework with fixed wage offer distribution Mortensen analyses the effects of a UI system where benefits have a finite duration and new entrants or workers who quit jobs do not qualify for UI directly. Mortensen's general finding is that the total effect on the reservation wage and search intensity from the introduction of UI is ambiguous. Still, the analysis gives helpful insight to the behaviour of individuals on the labour market. One important finding is that the introduction of UI splits the labour force into those who do and those who do not have access to benefits, resulting in different labour market behaviour.

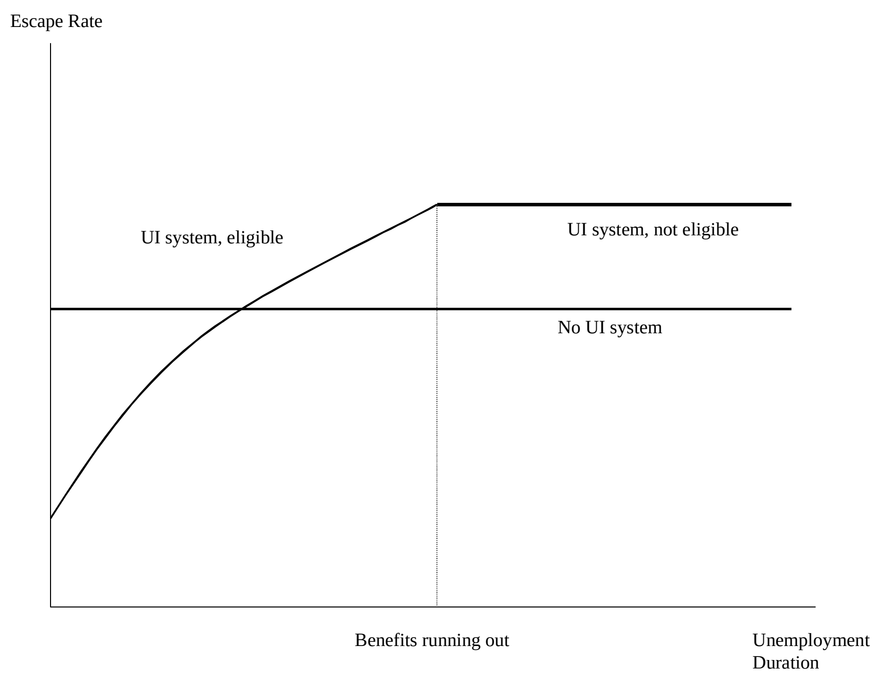
For individuals who are not eligible for benefits, the effect of introducing an UI system is clear in this model. Since access to benefits can only be gained through employment, it is profitable for individuals to accept work at a lower wage rate than without the UI system. Individuals outside the system will therefore reduce their reservation wage as well as increase their job search and hence experience an increase in their escape rate out of unemployment, cf. figure 1.

Figure 1: The escape rate out of unemployment for individuals not eligible for benefits when UI is introduced.



For individuals who are eligible for benefits, there will be two opposing effects. Access to benefits will have the standard disincentive effect on employment (increase in reservation wage and decreasing search intensity). This is because benefits increase the value of staying unemployed and thereby makes it less costly to prolong the search for a high wage job. Since benefits can only be received for a finite period, however, the disincentive effect will be dominating in the beginning of the unemployment spell, cf. figure 2. When individuals approach the end of their benefit period, they will gradually reduce their reservation wage and increase their job search. This is due to the prospect of an income drop which makes future search more costly. On top of that, the fact that eligibility to UI can be regained through employment amplifies the effect on the job search rate and reservation wage as benefits are about to run out.

Figure 2: The escape rate out of unemployment for individuals eligible for benefits when UI is introduced.



Mortensen finds that individuals' reservation wage goes down and search intensity up as they approach benefit exhaustion. In Mortensen's restricted model this results in an increasing escape rate which alternatively would have stayed constant. In a more flexible model where job offer arrival rate and wage offer distribution can fluctuate, the escape rate is unlikely to stay constant over the unemployment spell in the absence of finite benefits. It is therefore not possible to predict whether the escape rate will display an increasing trend over the spell when finite benefits are introduced. Mortensen's result, however, does make it clear that finite benefits will result in a higher escape rate prior to exhaustion than in the absence of finite benefits. This difference is exactly the motivation effect which empirical studies are trying to estimate.

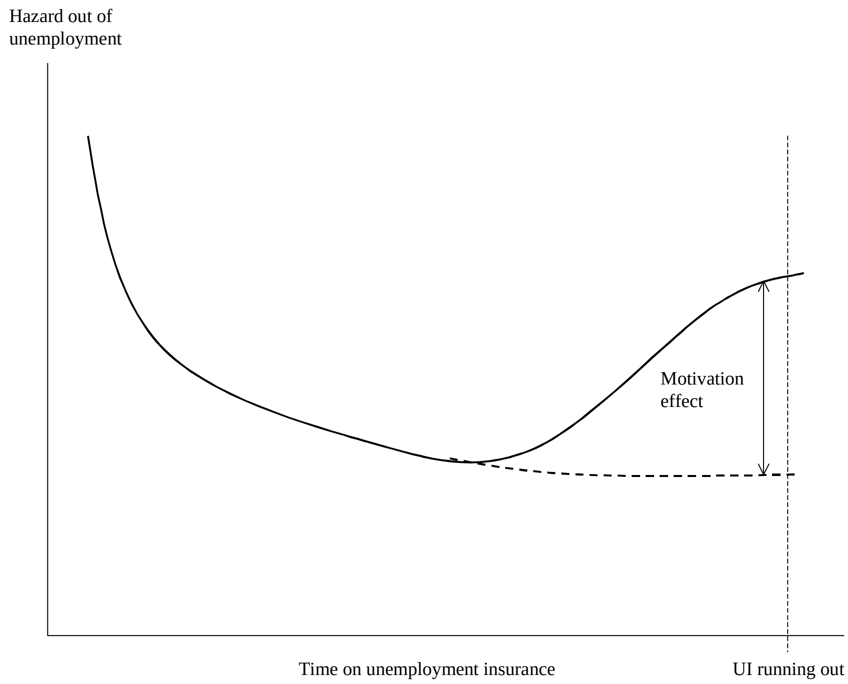
3 Estimating the motivation effect

When estimating the motivation effect of finite benefits, the central question is how individuals would have reacted were they not met with a limited UI duration, cf. figure 3. Comparing the escape rate for individuals prior to benefit exhaustion with the escape rate for identical individuals who are not constrained in their future benefits (the counter factual) will produce an estimate of the motivation effect. This would be possible if identical individuals were met with different benefits durations in the UI system. Only rarely, though, do social researchers have access to social experiments where identical groups are treated differently. It is therefore necessary to use either administrative register data or survey data and apply identifying assumptions in order create an estimator of the motivation effect.

3.1 Modelling the motivation effect

In order to analyse whether the prospect of running out of benefits do indeed have any effect on individuals we have to use an empirical model which can

Figure 3: The hazard rate out of unemployment with and without the threat of finite benefits duration.



link the theoretical findings with the data we have access to. As described by Mortensen (1977) the prospect of running out of benefits will influence the escape rate out of the unemployment. It therefore seems sensible to focus on empirical models which can describe individuals' departure from the UI systems. Most often the movement from unemployment is modelled using the hazard out of unemployment. In this context hazard means the probability of leaving unemployment in a specific time period given that one has stayed unemployed up to that period. The advantage of this conditional probability is that it describes the probability of leaving unemployment at any specific point in time only for the individuals who are left in unemployment.

In order to model the motivation effect we need an empirical model which can 1) describe the hazard out of unemployment in a flexible manner 2) describe the specific effect which the remaining benefits have on the hazard (the motivation effect). In the literature two empirical models are commonly used. One model is the discreet logistic model, cf. Ham and Rea (1987), Rogers (1998), Geerdsen (2002).

$$h(t, X_{it}) = \frac{\exp(y(t, X_{it}))}{1 + \exp(y(t, X_{it}))} = \frac{1}{1 + \exp\{-y(t, X_{it})\}}, \tag{1}$$

where h is the hazard at a given spell length t, y is a linear function of t time in spell and X exogenous variables. In this model the duration effects are specified through the modelling of t. It is possible to specify the duration effect very freely for example with a dummy construct. If the variable component of the model (y) is assumed to be linear, then the effect from both observed and unobserved factors will be constant over the odds ratio of the hazard. This can be seem by differentiating the odd ratio of the hazard,

$$\frac{\delta(\frac{h}{1-h})}{\delta x} = \frac{\delta\left(\frac{\exp(\beta x)}{1+\exp(\beta x)} / \left(1 - \frac{\exp(\beta x)}{1+\exp(\beta x)}\right)\right)}{\delta x} = \frac{\delta \exp(\beta x)}{\delta x} = \beta.$$

Another model which have been used is the continuos Cox proportional hazard model, cf. for instance Meyer (1990), Katz and Meyer (1990);

$$h(t, X_{it}) = h_0(t) * \exp(y(X_{it})),$$

where h_0 is the baseline hazard and y is a linear function of X. In the Cox proportional hazard the baseline hazard is left unspecified. Only the proportional effects on the hazard of X is estimated. The advantage of this model is that one does not have to impose an assumption of functional form on the duration effect. If the variable component of the model ($y(X_{it})$) is assumed to be linear, then the effect of both observed and unobserved factors on the hazard is constant over the log of the hazard. This can be seen by taking the derivative of the log hazard,

$$\frac{\delta \log h}{\delta x} = \frac{\delta(\log h_0(t) + \beta x)}{\delta x} = \beta.$$

Identification of the motivation effect in these models is done by assuming that any differences we may find in labour market behaviour for individuals who are identical on all other observables is all due to differences in time to benefits exhaustion, or in other words, due to the motivation effect and noise. This is modelled by including a variable which describes individuals' time to benefits exhaustion. In equation 2 and 3 an example is given with the logistic hazard model assuming a simple functional form of the variables. Notice that the motivation effect here is modelled by the inclusion of the variable "benefits remaining" (R) where the parameter δ captures the motivation effect in the model.

$$h(t, R_{it}, E_{it}, X_{it}) = \frac{1}{1 + \exp\{-y(t, R_{it}, X_{it})\}} \quad (2)$$

$$y = \alpha + \beta \exp(t) + \delta R_{it} + \gamma X_{it} + v_{it}, \quad (3)$$

3.2 Identification of the motivation effect

In all empirical studies so far the motivation effect is estimated by including a variable such as remaining months/weeks of benefits (R) in the hazard model. Estimating the motivation effect in this way poses some problems which has to be addressed. Remaining benefits (R) can be described with the following accounting equation:

$$R_{it} = E_{it} - t + RJ_{it}. \quad (4)$$

Here E is benefits entitlement at the beginning of the spell, t is the duration of the unemployment spell and RJ is any changes in the maximum benefits duration which is realised by the unemployed individual while the spell goes on. The variation in remaining benefits (R) will almost always come from one or more of these three right hand side variables. A consequence of this is that identification of the motivation effect necessitates that at least one of the three right hand side variables described above have to be excluded from the hazard model (henceforth denoted the exclusion restriction). If we do not leave at least one of the right hand side variables of equation (4) out of the hazard model, the variable remaining benefits (R) will not contribute with anything to the hazard model and will thus not be identified. However, if we exclude a variable from the hazard model which does have some effect on the hazard out of unemployment, we have the classical "omitted variable" problem as described by among others Heckman and Robb (1985).

Let me give a example. In equation (5) the variable component of the logistic hazard model (equation (1)) is described. Notice that we have assumed that duration of unemployment (t) does have an effect on the hazard out of unemployment but individuals' initial entitlement (E) is left out. If entitlement does posses explanatory power, this variable will appear in the error term, cf. equation 6. We know from the accounting equation (4) above that remaining benefits (R) is a function of entitlement (E). Estimating the motivation parameter δ without including entitlement will result in inconsistent estimates since the estimator will include both the true value of δ as well as the part of the effect from E on the hazard which is correlated with R.

$$y = \alpha + \beta \exp(t) + \delta R_{it} + \gamma X_{it} + v_{it}, \tag{5}$$

$$v_{it} = \log(E_{it}) + \varepsilon_{it} \tag{6}$$

In order to avoid the omitted variable problem we therefore have to be sure that the variation in the variable "remaining benefits" (R) does not come from some variable which should have been included in the model in the first place. In special cases, however, it may still be possible to estimate the motivation effect even though all the right hand side variables of the accounting equation (4) are included in the hazard model. This is possible if the variables (E, t, RJ) are modelled in the hazard model with a functional form which leaves some explanatory power for the remaining benefits variable (R). Let me explain this with an example.

Let us assume that we have access to panel data where there is no variation in individuals' entitlement (E) or realised jumps over time (RJ). Only the duration on benefits changes over time (t). This means that the accounting equation for the variable remaining benefits (R) looks like

$$R_{it} = E - t.$$

In order to ensure identification of the motivation effect (from R) we have to either assume that the variation through the duration of unemployment spell (t) does not have any separate effect on individuals' hazard (exclusion restriction) or that this effect follow a specific functional form known to us prior to the estimation. Assuming no separate effect of the duration (t) would imply that we do not believe that there is any duration dependency in the model. A less strict assumption could be to assume that the duration dependency follows an exponential form ($\exp(t)$) which we will do in this example. Let us now model the hazard out of unemployment with a discreet logistic form:

$$h(t, R_{it}, E_{it}, X_{it}) = \frac{1}{1 + \exp\{-y(t, R_{it}, E_{it}, X_{it})\}}.$$

We choose to write the variable component of the model as

$$y(t, R_{it}, E_{it}, X_{it}) = \alpha + \beta \exp(t) + \delta R_{it} + \gamma X_{it} + \varepsilon.$$

Notice the exponential form of the duration component. Next step is to insert the equation (4) for remaining benefits (R);

$$y(t, R_{it}, E_{it}, X_{it}) = \alpha + \beta \exp(t) + \delta(E - t) + \gamma X_{it} + \varepsilon.$$

But since E is constant for all individuals, this gives:

$$y(t, R_{it}, E_{it}, X_{it}) = (\alpha + \delta E) + \beta \exp(t) - \delta t + \gamma X_{it} + \varepsilon$$

where the motivation effect is identified through δt.

4 Exclusion restrictions used in empirical studies of the motivation effect

As described in the previous section variation in the remaining benefits variable can come from three different variables, entitlement (E), duration (t) and realised shocks (RJ). Different sources of variation in the three variables have been used in the literature, cf. table 1. The main variable of variation is entitlement (E). Almost all studies of the motivation effect[1] have used variation in entitlement in some form as a source of identification. The variation in entitlement can exist for many different reasons in data and not all are equally likely to comply with the exclusion restriction. A common source of variation is different UI history among individuals. Initial entitlement is almost always a function of individuals' employment and unemployment history. If data is sampled without the requirement that all individuals shall have gained or regained the right to a full benefit period, then often individuals have already used some of their allotted benefits in previous spells resulting in different entitlements. Another source can be regional differences in the entitlement rules. Or as a variation, the rules can be

[1] All studies to my knowledge except Moffit (1985).

Table 1: Different sources of variation.

		Source of variation
Entitlement	E	1. Previous unemployment
		2. Regional differences in legislation
		3. Changes in legislation over time
Duration	t	4. Remaining benefits diminishes as time progresses
Realised jumps	RJ	5. Changes in legislation over time

based on, say, regional unemployment thereby creating regional differences in entitlement with the same rules covering all regions. Entitlement can also vary due to legislative changes over time. If the maximum benefits period is changed, then this will result in a change in entitlement for individuals commencing their unemployment spell after the legislative change.

Variation in the variable realised jumps (RJ) can occur if UI legislation is changed and individuals learn about the changes in benefits duration while they are unemployed. If, for instance, the benefits duration is shortened, individuals have to re-evaluate their expectations about how long time they have to benefits exhaustion.

Finally, duration of the unemployment spell (t) itself can also be used as a source of variation. Only rarely, though, do researches assume that duration does not in it self have an effect on individuals hazard out of unemployment. Still, the variation can be used for identification of the motivation effect as explained above. This is possible if researchers are willing to assume that the duration effect follows some specific functional form which is restricted compared to the form of the motivation effect.

In the following I will go through the data used in most studies as well as the applied exclusion restrictions.

Table 2: Empirical studies of motivation effect

Study	Data	Model	Source of var. in R		Exclusion restrict.
Ham & Rea (1987)	Canada	Logistic	E	over regions, prev. unempl.	over regions, prev. unempl.
			t		param.dur.model.
Meyer (1990)	US (CWBH)	Cox	E	over regions, prev. unempl., per. extend/short.	 prev. unempl. per. extend/short.
			RJ	per. extend/short.	per. extend/short.
			t		
Jones (1995)	Canada	Cox	E	grandfarthering	grandfathering
			t		
Rogers (1998)	US (CWBH)	Logistic	E	per. extend/short.	per. extend/short.
			RJ	per. extend/short.	per. extend/short.
			t		
Geerdsen (2002)	Denmark	Logistic	E	per. short.	per. short.
			RJ	per. short.	per. short.
			t		

Moffit (1985) Moffit is one of the first to use administrative panel data to analyse the effects of a UI system on individuals' labour market behaviour. The data he uses is UI administrative records assembled in a file called Continuous Wage and Benefits History (CWBH) collected by state UI offices under the supervision of the Department of Labour in the US. The data contains information on all new male UI recipients in thirteen states in the US from 1978-1980 (depending on the state) to March 31, 1983. Since the data is drawn from administrative records, exact information is available on individuals' benefits, their benefits entitlements and the number of weeks individuals collect benefits. The data has one problem with regard to analysis of motivation effect. individuals are not followed after their benefits run out. It is therefore not possible to see whether individuals after benefits exhaustion stay unemployed.

In this data there are several sources of variation but Moffit only takes limited use of them. First of all, entitlement (E) varies between states. Also, individuals have different initial entitlement (E) within states probably due to prior unemployment. In the period analysed by Moffit, supplementary benefits programs on top of the state insurance programs also exist. The extended benefits program (EB) provides up to 13 extra weeks of benefits during cyclical downturn. This also goes for the Federal Supplementary Compensation program which took effect in the Fall of 1982 and provided up to a total of 62 weeks of benefits. These extra benefit weeks were implemented during the sample period and constitute jumps in the remaining benefits (RJ) when individual realise that they are eligible for them.

Moffit finds from Kaplan-Meyer estimates clear evidence of motivation effects. He does not have success, however, to identify the motivation effect in his proportional hazard estimates. He does not apply any of the exclusion restrictions as described above.

Meyer (1990) The data used by Moffit is reused by Meyer (1990). Meyer (1990) states (on p. 763) that there is variability in maximum benefits duration across states (E). Second, benefits were extended through federal programmes in the sample period. This may both result in jumps in the duration of benefits for unemployment spells that are already progressing

(RJ) as well changes in entitlement (E) for individuals who begin their unemployment spell after the extension of the federal programme. Lastly, within states individuals's length of maximum benefits may depend on individuals work history (E). Meyer uses almost all of these sources of variation to identify the motivation effect, cf. table 2. The variation between states in entitlement (E) he conditions out for some of the estimations by assuming state fixed effects.

Rogers (1998) Rogers makes use of the same data as used by both Moffit and Meyer. Roger's focus is to estimate and test different models for unemployed individuals' expectations regarding maximum benefits duration. Roger state that it may be more correct to model individuals' expectation as perfect foresight than no foresight if individuals are capable of predicting the changes in benefits duration due to federal extensions and shortenings of the benefits period which follows the fluctuation of the labour market. Rogers only uses fresh spells which means that differences in entitlement (E) due to previous unemployed is omitted from data. Furthermore, Rogers only uses data from one state (Pennsylvania) thereby omitting inter state variation. Rogers uses a 1 per cent sample of all individuals beginning an unemployment spell between July 1980 and March 1986. All the spells are followed until they end. Rogers ends up with two sources of variation, cf. table 2. The first is realised jumps (RJ) in the benefits duration due to federal extensions and shortenings of the benefit period. In the period between 1980 and 1986 the maximum benefit period varies between 26 and 65 weeks and there are 11 jumps in the maximum duration for the period. Secondly, these jumps in the maximum duration will also inflict on individuals entitlement. Independent of expectation model, individuals who begin their unemployment spell at different times within the 1980 to 1986 time frame will most likely have different entitlement (E) due to the federal changes in maximum benefits entitlement over time.

Ham and Rea (1987) Ham and Rea's study from 1987 is one of the first studies where the motivation effect is actually identified. Their data consist of a random sample of males drawn from the Canadian Employment and Immigration Longitudinal Labour Force File for the period January 1975 to December 1980. The data is weekly observations on the labour market status of workers based on administrative records. Ham and Rea identify the motivation effect by excluding initial entitlement (E) from the hazard model, cf. table 2. The variation comes from three sources. First, the rules on unemployment benefits in Canada for the specific sample period state that the maximum benefit period is a function of the regional unemployment level. This results in differences in entitlement over regions as a function of regional unemployment. Second, entitlement does also vary as a function of individual previous unemployment. Third, the rules on unemployment benefits duration has been changes several times over the sample period resulting in changes in entitlement. The changes in the rules over time may also have resulted in realised jumps (RJ) in the benefits duration for individuals who are receiving benefits when the changes are implemented. Ham and Rea does not, however, describe whether the rules changes are implemented for everybody in on UI or only for individuals entering unemployment after the changes.

Jones (1995) Jones analyses in his study from 1995 the effect of a labour market reform in Canada which was implemented in April 1993. The reform which contained a shortening of the maximum unemployment benefits period was implemented so that it only took effect for individuals who began their unemployment spell after April 1993. This means that the old rules were "grandfathered" for individuals who started their unemployment period before April 1993. The data set is constructed by two sub samples consisting individuals who started their unemployment spell before the legislative change in the first sample and after the legislative change in the second sample. The sampling periods were between January 31 to March 7 and April 25 to June 5 1993. This data set gives Jones a chance to estimate the motivation effect using an exclusion restriction which has not been used in the earlier studies. Jones has variation in the initial entitlement (E). The variation only comes from the legislative change and it is only conditioned on when individuals started their unemployment spell.

Geerdsen (2002) Geerdsen uses Danish administrative register data to look for possible motivation effects of compulsory activation in the Danish UI system. In Denmark the duration of benefits is very long (between 4 and 7 years). Only very few individuals therefore ever reach the end of their benefits period. Instead, the system is divided into a passive period and an activation period. In the latter period individuals have to participate in some sort of activation (job training, education etc.) in order to receive benefits. Geerdsen examines whether the prospect of running out of passive benefits and entering the activation period has a motivating effect on individuals search effort. In the period covered by data (1994-1998) the passive period has been shortened twice from 4 years to 3 years in 1996 and finally to 2 years in 1998. These legislative changes both result in variation in entitlement (E) and realised jumps (RJ). Furthermore, individuals may not have regained their right to a "fresh" benefits period when they begin their unemployment spell. This results in variation in entitlement (E) due to individuals' unemployment history. Geerdsen conditions on individuals' entitlement (E) using a parametric form (log polynomials). The identification of the motivation effect is therefore primarily driven by the realised jumps (RJ), cf. table 2.

5 Data and estimation

5.1 Identification of the motivation effect in the Danish UI system

In Denmark the duration of benefits is very long compared to almost any other country (4-7 years). Instead the system is constructed with a "passive" and "active" period. In the passive period individuals are free to search for employment and are generally not met with any demands from the labour market system. After the passive period is exhausted individuals enter the activation period. Here they have to participate in labour market training[2] in order to receive benefits. It can be argued that the prospect of forced activation without income increase may have an motivating effect on individuals similar to the motivation effect of an income drop as found by Mortensen, cf. Carling et al. (1996), Geerdsen (2002). In the following I will regard the passive period in the Danish UI system just as a finite benefits period analysed in other studies mentioned above.[3]

As described in section 3 in order to identify the motivation effect we need variation in the remaining benefits variable (R) which does not come from

[2] Labour market training can either be education or actual work in either a private or public firm. Individuals can also obtain support for starting their own firm.

[3] See Geerdsen (2002) for a careful description of the Danish UI system and the data used in this analysis.

a source which on its own has an effect on the hazard out of unemployment (the exclusion restriction). The data used in this study makes it possible to use different sources of variation in order to identify the motivation effect. In Denmark since 1994 the duration of the UI period (the passive period) has been shortened twice[4]. Another source of variation is that individuals can have used some of their benefits in previous unemployment spells resulting in different entitlement from the beginning of the spell. Finally there is always the choice of restricting the duration effect to a given functional form. This gives the following identification sources:

1. Realised jumps (RJ) in entitlement of passive UI while individuals are receiving UI due to legislative changes in the duration of the passive period in 1996 and 1998.

2. Variation in entitlement (E) of passive UI due to the same legislative changes as described above prior to commencing an unemployment spell.

3. Variation in entitlement (E) of passive UI due to previous unemployment spells.

4. Variation in duration on UI (t)

The many sources of variation in remaining benefits (R) makes it possible to estimate the motivation effect using different combinations of exclusion restrictions as they are used in the literature. I will estimate four models using the four different set of exclusion restrictions starting with the most restrictive restrictions and ending with least restricted model, cf. table 3. By comparing estimations from a more strict exclusion restrictions with

[4]Actually the passive period has been shortened three times. But the last legislative change lies beyond the period covered by data.

Table 3: The exclusion restrictions applied in the four different models

	Hazard model conditioned on:	Exclusion restrictions:	Construct similar to:
Model I	t in log polynomial form	E RJ t	Ham and Rea (1987)
Model II	t dummy construct	E RJ	Meyer (1990) Katz and Meyer (1990) Rogers (1998)
Model III	t dummy construct E in log polynomial form	E RJ	Geerdsen (2002)
Model IV	t dummy construct E dummy construct	RJ	

an estimate created with the weakest possible restrictions, it is possible to analyse whether the different restrictions influence the estimator of the motivation effect as well as the direction of this influence.

Model I: In this model I have only included the duration variable (t) in the hazard model and it has been restricted to follow a log polynomial form. This means that motivation effect estimated in this model is driven by variation in the variables entitlement (E), realised jumps in duration (RJ) and remaining variation in duration (t). This setup is very close to the setup used by Ham and Rea (1987).

Model II: In Model II I model the duration dependence fully flexible. The duration variable (t) is implemented in the hazard model with a monthly dummy construct. Entitlement (E) is still omitted from the hazard model. This model is therefore based on variation in entitlement (E) and realised jumps in duration (RJ). This setup is very close to the setup used by Meyer (1990) and Katz and Meyer (1990). The model is also very close to the model of Rogers (1998). Rogers only uses "fresh" spells which could be used as an argument why it is unnecessary to condition on entitlement (E) in her estimations. But since maximum benefits duration is changing over her sample period, individuals will experience different entitlement according to when they commence their unemployment period.

Model III: In this model I have implemented entitlement (E) in the hazard model and modelled it with polynomial form. The duration (t) is modelled fully flexible with monthly dummies. The identification in this model is therefore primarily based on variation in realised jumps in duration (RJ) and remaining variation in entitlement (E).

Model IV: In this last model I have modelled both duration dependence (t) and entitlement (E) fully flexible (dummy constructs). This means that identification of the motivation effect (R) is primarily based on the variation in realised jumps in duration (RJ).

5.2 Data

The data used in this study consists of variables which are drawn from several of Statistics Denmark's merged data sets. The data sets are based on administrative register data which in Denmark can be linked for all individuals in the country. This is due to the CPR-number[5] which each individual is given either at birth or when immigrating to the country. The unemployment spells are drawn from a 10 per cent sample of the population between 16 and 67 year of age in Denmark from the period 1980 to 1999. When individuals fall out of the sample due to death or emigration, new individuals are drawn from the population in order to retain the representativeness of the sample. Most of the variables used in this study exist on a monthly basis in the data set. There are also variables which exist on weekly basis and yearly basis.

The period of interest in this study is the years after the labour market reform in 1994. I have chosen to use data from the period 1994 to 1998. The unemployment spells have been constructed by adding time in UI activation schemes with time on passive UI. I have assumed that an unemployment spell is broken if individuals are not on UI for more than 2 weeks in a month. Only a small proportion of individuals in the sample reach the activation period after only one spell. This is due to the long duration of passive UI in Denmark compared to other countries. In order to analyse the motivation effect, it is therefore necessary to include all spells for each persons in the given period. I have only included unemployment spells for individuals who are between 25 and 48 of age in 1994. I have done this in order to avoid mixing up the motivation effect with effects from some of the programs targeted at the very young and old at the labour market[6]

The two primary variables used in the estimations are individuals' use of

[5] CPR stands for Central Person Register.

[6] For individuals under 25 year of age a rule change was introduced in 1997 which resulted in a much stricter UI system for this group than for older individuals on the labour market. In the same period individuals over 50 years were not included in the active labour market policy as such and it is therefore very unlikely that this group will display any motivation effects.

UI and use of activation schemes. The first variable has been created using a Statistics Denmark data set named The Coherent Social Register (SSHS)[7]. The purpose of SSHS is to give a coherent view over the number of people which for each year receives one or several forms of income replacing benefits. Information on activation is collected form a register called Register on Labour Market Measures (AMFORA). This register is primarily used for labour market surveillance by municipalities and ministries. The construction of these administrative registers is described in Geerdsen (2002).

In order to estimate whether activation motivates individuals it is necessary to have reliable information on the timing of the activation period. This we need in order to calculate the number of months of passive UI individuals are entitled to when they begin their unemployment spell. In general the more activation, the more UI and the less employment people have had prior to 1994, the shorter time the unemployed individual is granted in the passive period after 1994. The rules are described in detail in Geerdsen (2002).

5.3 Model

In order to test for the motivation effect, I have modelled the hazard out of unemployment. I have assumed that data can be represented by a discreet logistic model,

$$h(t, R_{it}, E_{it}, X_{it}) = \frac{1}{1 + \exp\{-y(t, R_{it}, E_{it}, X_{it})\}},$$

where h is the hazard at a given spell length t, y is a linear function of t time in spell, R time remaining until passive UI exhaustion, E passive benefits entitlement and X other exogenous variables. In the estimation I condition on gender, family composition and level of education using dummies. The

[7] In the following I will translate the name of the different registres but use the Danish abbreviations, hence the obvious disproportion between the two.

variable capturing the motivation effect, remaining benefits (R) has been modelled with a dummy construct describing [18,13] months to benefits exhaustion, monthly dummies for between 12 month to benefits exhaustion and 12 months into the activation period, and one dummy covering remaining period in the activation period. The duration of UI spell (t) and initial passive benefits entitlement (E) is modelled according to the four models described in the subsection above.

Rogers (1998) argue that the choice of model used to describe individuals' expectations regarding time to passive benefits exhaustion may have an impact on the results when the motivation effect is estimated. In Geerdsen (2002) different expectation models have been tested on data. The model which seems to give the best description of individuals' expectations is a specific variant of no foresight. The variant is called "system foresight II". In this model individuals are assumed not to know about any legislative changes before they are implemented. In other words, individuals ignore announcements of legislative changes and do only react to the actual implementation of legislative changes. Individuals' expectations regarding remaining passive benefits will be modelled according to this expectation model, cf. Geerdsen (2002) for estimation results of different expectation models.

6 Empirical results

In table 4 the estimated parameter values of the demographic variables are presented. The four different exclusion restriction models have been applied. It appears that the four models produce relatively similar results. The estimation results are generally as one would expect. The hazard out of the UI system is lower for single individuals than for individuals with families and

Table 4: Estimation values of demographics using the four diffierent exclusion restriction models

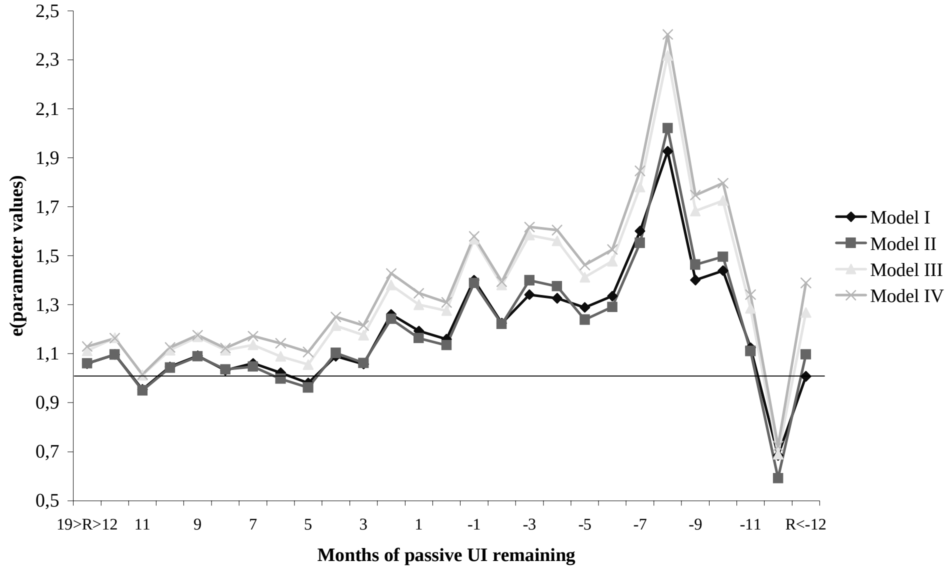
	Model I	Model II	Model III	Model IV
Single no kids	-0.1208	-0.1209	-0.0041	-0.1170
	(0.0111)	(0.0111)	(0.0153)	(0.0111)
Single w.kids	-0.1167	-0.1168	0.1151	-0.1199
	(0.0155)	(0.0155)	(0.0155)	(0.0155)
Fam.w.kids	0.0559	0.0559	0.1710	0.0523
	(0.0100)	(0.0100)	(0.0140)	(0.0100)
Male	0.0690	0.0691	0.0706	0.0707
	(0.0080)	(0.0080)	(0.0080)	(0.0080)
Primary	0.1862	0.1866	0.0140	0.1820
	(0.0203)	(0.0203)	(0.0188)	(0.0203)
Vocational	0.2523	0.2525	-0.1720	0.2427
	(0.0199)	(0.0199)	(0.0257)	(0.0199)
Shorter univ.	0.2504	0.2502	0.0787	0.2390
	(0.0246)	(0.0246)	(0.0184)	(0.0246)
Bachelor	0.2700	0.2701	0.0762	0.2570
	(0.0248)	(0.0248)	(0.0234)	(0.0249)
Master	0.1744	0.1745	0.0962	0.1625
	(0.0257)	(0.0257)	(0.0236)	(0.0258)
No educ.inf.	0.0393	0.0398	-0.1316	0.0396
	(0.0208)	(0.0208)	(0.0194)	(0.0209)

families with children have higher hazard out of UI than families without children. When it comes to the effect from education, the estimations indicate that the more education, the higher the hazard out of unemployment. One exception is individuals with a master degree.

In figure 4 the parameter values of the dummies for remaining benefits (R) are described for the four exclusion restriction models. The motivation effect kicks in aproximately 5 months prior to the end of passive period and increases from there on. The peak in the motivation effect is found 8 months into the activation period. The effects starts with a hazard increase somewhere between 10 and 30 per cent and peaks with a hazard increase between 110 and 140 per cent. At first sight it may seem odd that the motivation effect does not peak before well into the activation period which is supposed to the motivating factor. The reason for this is that individuals, when they enter the activation period, in many cases do not enter an activation program directly. First, they have to have made an action plan which in detail describes the activation programmes which they will participate in. Secondly, the case worker has to find an opening for the person. These things often takes time, and it is therefore most likely that the large majority of individuals do not face compulsory activation before at least 8 month into the activation period. In Geerdsen (2002) figures indicate that it is not before 10 months into the activation period that full activation has been reached.

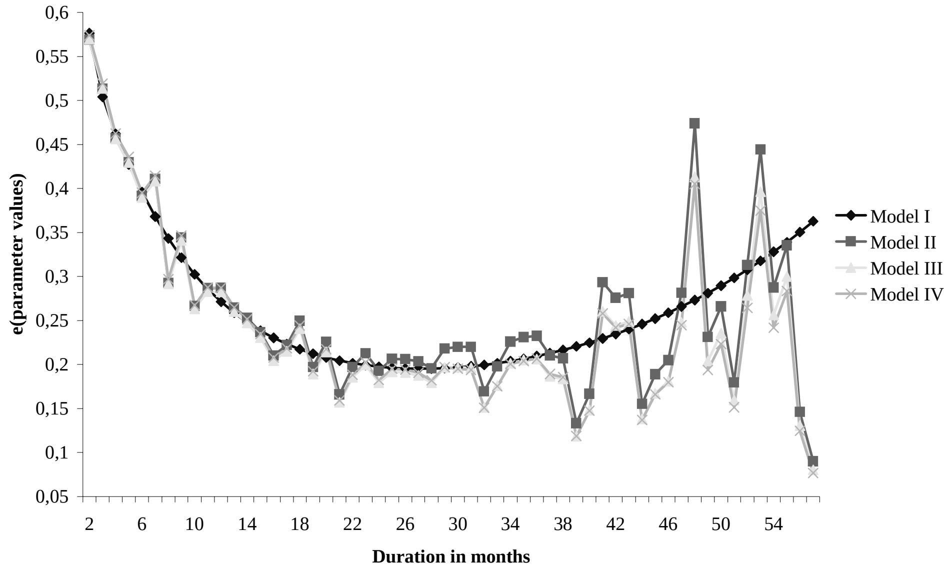
The four different exclusion models in figure 4 seem to produce results which place the models in two groups. Model I and II produce very similar estimation results which are smaller than the estimation values from model III and IV. The difference between model I and II and model III and IV, respectively, is that the two first models have excluded entitlement (E)

Figure 4: Estimation results of remaining benefits using four different exclusion restrictions



from the hazard estimation. Apparently, this exclusion restriction results in weaker estimation results of the motivation effect. One reason for this could be that 1) entitlement does indeed have an effect on individuals' hazard out of unemployment, and 2) individuals who have short time to benefits exhaustion due to a past of long term unemployment may react less to the prospect of entering the activation period. The estimation results indicate that it is not of great importance whether the variables entitlement (E) and duration (t) are modelled freely with dummy constructs or parametrically. In model I the duration variable (t) has been model with a log polynomial and in model II it has been modelled with a dummy construct. The results are almost similar. The same goes for model III and IV where entitlement (E) has been modelled with polynomials in model III and with a dummy construct in model IV. It is interesting to note that the model with the

Figure 5: Estimation results of duration variables using the four different exclusion restriction models.

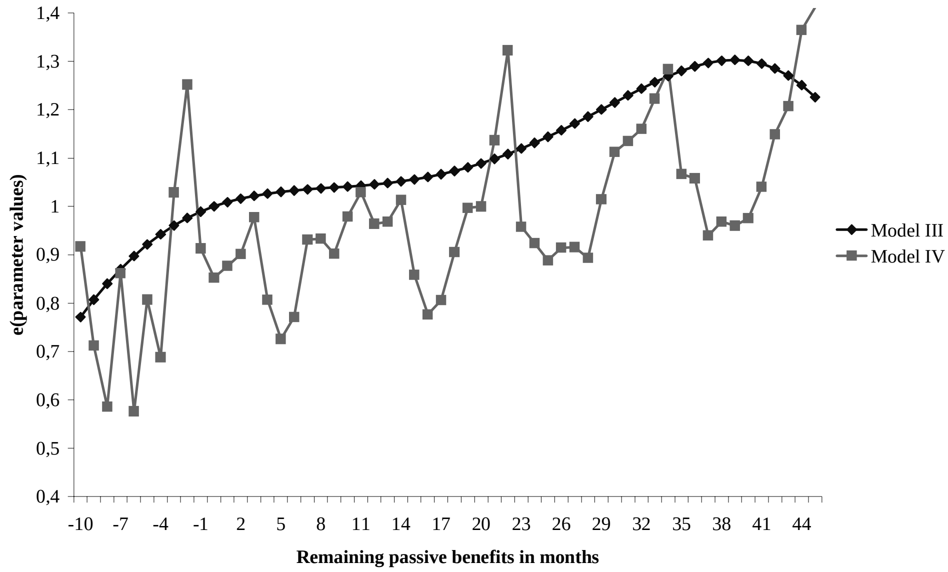


weakest exclusion restrictions, model IV, also estimates the strongest motivation effects. This indicates that applying stronger exclusion restrictions may result in an under estimation of the motivation effect.

In figure 5 the estimation results of the duration variable (t) is presented for the four models. The parametric form used in model I gives a relatively good fit of the duration effect up to about 38 months into the unemployment spell. There after the effect becomes very volatile. Still, the parametric form seems to catch the trend of the duration effect overall and from these results it does seem plausible that a parametric modelling of the duration effect is not problematic for the estimation of the motivation effect.

In figure 6 the estimation values of the entitlement variable (E) is presented. The parametric form of this variable does not seem to fit as well as with the duration variable. The dummy values reveal a lot of fluctuation

Figure 6: Estimation results of entitlement using the two exclusion restriction models which condition on this variable.



peaking close to the months which have been a common entitlement (E) for individuals who have gained or regained the right to a "fresh" UI period. The parametric form does indicate that there is an increasing trend where individuals with higher entitlement also have a higher hazard out of unemployment. This supports the finding that omitting entitlement (E) from the hazard estimation actually bias the estimated motivated effect downwards.

7 Conclusion

In this paper I have examined the different assumptions which have been applied in the literature in order to identify the motivation effect of benefits exhaustion. And I have tested the different assumption on a common data set. From the estimations I find that two things seem to be important when estimating the motivation effect in a UI system.

1. Assuring identification by excluding entitlement from the hazard model seems to bias the estimation results towards zero. Thereby risking to dismiss motivation effects where they might exist.

2. Polynomials or log polynomials appear to give a sufficiently flexible form when it comes to model duration and entitlement. In cases where degrees of freedom are limited it may therefore be a better solution to use these parametric forms instead of modelling the variables fully flexible with dummies.

A large share of the literature in this field have chosen to omit entitlement from their hazard models of unemployment, cf. Meyer(1990), Katz and Meyer (1990) Rogers (1998). According to the estimation results presented above this may result in under estimation of the motivation effect[8]. It is therefore not unlikely that benefits exhaustion actually has an even stronger motivating effect on individuals' hazard out of unemployment than found in these studies.

[8]Rogers (1998) only uses "fresh" spells which means that all individuals have regained the right to a full benefits period when they enter unemployment. Still, the entitlement period changes in the sample period and may therefore influence individuals' hazard out of unemployment.

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A Estimate results from the 4 models

Table 5: Estimation results from Model I.

Variables	Parameter	St.error		Parameter	St.error
ln(t)	-1.3664	0.0438	R=1	0.1764	0.0548
$\ln(t)^2$	1.1312	0.0625	R=0	0.1482	0.0576
$\ln(t)^3$	-0.4903	0.0290	R=-1	0.3366	0.0449
$\ln(t)^4$	0.0690	0.0043	R=-2	0.2033	0.0516
18>R>12	0.0578	0.0173	R=-3	0.2937	0.0540
R=12	0.0929	0.0411	R=-4	0.2824	0.0592
R=11	-0.0471	0.0438	R=-5	0.2540	0.0649
R=10	0.0454	0.0430	R=-6	0.2892	0.0689
R=9	0.0883	0.0432	R=-7	0.4710	0.0698
R=8	0.0313	0.0446	R=-8	0.6556	0.0719
R=7	0.0595	0.0444	R=-9	0.3373	0.0886
R=6	0.0215	0.0467	R=-10	0.3642	0.0951
R=5	-0.0196	0.0496	R=-11	0.1176	0.1120
R=4	0.0863	0.0489	R=-12	-0.3789	0.1527
R=3	0.0564	0.0525	R<-12	0.0073	0.0936
R=2	0.2318	0.0511	Constant	-1.0899	0.0215

Table 6: Estimation results from Model II.

	Parameter	St.error		Parameter	St.error
t2	-0.5637	0.0118	t44	-1.8632	0.1998
t3	-0.6671	0.0131	t45	-1.6672	0.2197
t4	-0.7837	0.0146	t46	-1.5858	0.2311
t5	-0.8449	0.0158	t47	-1.2683	0.2473
t6	-0.9384	0.0176	t48	-0.7468	0.2732
t7	-0.8898	0.0186	t49	-1.4646	0.3129
t8	-1.2290	0.0219	t50	-1.3251	0.3153
t9	-1.0666	0.0234	t51	-1.7164	0.3853
t10	-1.3227	0.0272	t52	-1.1617	0.3421
t11	-1.2490	0.0281	t53	-0.8112	0.3365
t12	-1.2485	0.0296	t54	-1.2470	0.4178
t13	-1.3289	0.0321	t55	-1.0926	0.4530
t14	-1.3753	0.0348	t56	-1.9235	0.7389
t15	-1.4413	0.0377	t57	-2.4076	1.0265
t16	-1.5602	0.0413	18>R>12	0.0583	0.0173
t17	-1.5047	0.0426	R=12	0.0920	0.0412
t18	-1.3883	0.0423	R=11	-0.0509	0.0439
t19	-1.6245	0.0479	R=10	0.0426	0.0432
t20	-1.4896	0.0492	R=9	0.0856	0.0434
t21	-1.7960	0.0584	R=8	0.0355	0.0450
t22	-1.6245	0.0570	R=7	0.0458	0.0457
t23	-1.5477	0.0577	R=6	-0.0023	0.0482
t24	-1.6470	0.0634	R=5	-0.0386	0.0512
t25	-1.5777	0.0652	R=4	0.0982	0.0504
t26	-1.5799	0.0676	R=3	0.0604	0.0542
t27	-1.5916	0.0716	R=2	0.2168	0.0531
t28	-1.6315	0.0771	R=1	0.1518	0.0569
t29	-1.5229	0.0794	R=0	0.1264	0.0599
t30	-1.5139	0.0851	R=-1	0.3283	0.0460
t31	-1.5142	0.0900	R=-2	0.1999	0.0530
t32	-1.7756	0.1030	R=-3	0.3361	0.0553
t33	-1.6202	0.1027	R=-4	0.3188	0.0610
t34	-1.4879	0.1007	R=-5	0.2144	0.0682
t35	-1.4652	0.1073	R=-6	0.2556	0.0724
t36	-1.4586	0.1149	R=-7	0.4400	0.0735
t37	-1.5597	0.1197	R=-8	0.7039	0.0746
t38	-1.5747	0.1335	R=-9	0.3808	0.0929
t39	-2.0159	0.1631	R=-10	0.4029	0.1003
t40	-1.7916	0.1571	R=-11	0.1053	0.1205
t41	-1.2261	0.1412	R=-12	-0.5243	0.1722
t42	-1.2879	0.1542	R<-12	0.0927	0.1151
t43	-1.2701	0.1592	Constant	-1.0889	0.0215

Table 7: Estimation results from Model III.

	Parameter	St.error		Parameter	St.error
t2	-0.5657	0.0119	t45	-1.8009	0.2228
t3	-0.6684	0.0131	t46	-1.7369	0.2343
t4	-0.7844	0.0147	t47	-1.4185	0.2511
t5	-0.8470	0.0159	t48	-0.8744	0.2793
t6	-0.9437	0.0177	t49	-1.5807	0.3204
t7	-0.8953	0.0187	t50	-1.4397	0.3229
t8	-1.2353	0.0220	t51	-1.8306	0.3915
t9	-1.0767	0.0236	t52	-1.2753	0.3491
t10	-1.3362	0.0274	t53	-0.9242	0.3436
t11	-1.2632	0.0283	t54	-1.3602	0.4236
t12	-1.2656	0.0298	t55	-1.2053	0.4583
t13	-1.3505	0.0325	t56	-2.0361	0.7422
t14	-1.3982	0.0352	t57	-2.5200	1.0289
t15	-1.4706	0.0381	18>R>12	0.0802	0.0197
t16	-1.5923	0.0418	R=12	0.1377	0.0427
t17	-1.5388	0.0431	R=11	0.0027	0.0454
t18	-1.4277	0.0430	R=10	0.1037	0.0449
t19	-1.6665	0.0487	R=9	0.1568	0.0453
t20	-1.5410	0.0502	R=8	0.1165	0.0470
t21	-1.8525	0.0594	R=7	0.1406	0.0480
t22	-1.6851	0.0582	R=6	0.1060	0.0507
t23	-1.6137	0.0590	R=5	0.0792	0.0539
t24	-1.7215	0.0648	R=4	0.2283	0.0536
t25	-1.6547	0.0667	R=3	0.1961	0.0575
t26	-1.6609	0.0692	R=2	0.3492	0.0568
t27	-1.6779	0.0733	R=1	0.2576	0.0613
t28	-1.7234	0.0789	R=0	0.2675	0.0664
t29	-1.6349	0.0817	R=-1	0.4068	0.0528
t30	-1.6357	0.0875	R=-2	0.3044	0.0595
t31	-1.6411	0.0926	R=-3	0.4449	0.0621
t32	-1.9069	0.1054	R=-4	0.4370	0.0678
t33	-1.7540	0.1052	R=-5	0.3680	0.0744
t34	-1.6182	0.1034	R=-6	0.4041	0.0794
t35	-1.5822	0.1100	R=-7	0.5974	0.0802
t36	-1.5920	0.1179	R=-8	0.8539	0.0818
t37	-1.6579	0.1224	R=-9	0.5215	0.1008
t38	-1.6891	0.1361	R=-10	0.5678	0.1074
t39	-2.1320	0.1653	R=-11	0.2709	0.1283
t40	-1.9145	0.1596	R=-12	-0.3877	0.1846
t41	-1.3710	0.1442	R<-12	0.2173	0.1339
t42	-1.4294	0.1573	E	-0.0328	0.0035
t43	-1.4164	0.1623	ln(E)	-0.4544	0.0824
t44	-2.0032	0.2025	$\ln(E)^2$	0.2189	0.0271
			Constant	-0.8852	0.0856

Table 8: Estimation results from Model IV.

	Parameter	St.error		Parameter	St.error
t2	-0.5555	0.0119	R=-1	0.4570	0.0512
t3	-0.6556	0.0131	R=-2	0.3321	0.0577
t4	-0.7716	0.0147	R=-3	0.4810	0.0599
t5	-0.8309	0.0159	R=-4	0.4728	0.0654
t6	-0.9287	0.0177	R=-5	0.3802	0.0722
t7	-0.8808	0.0188	R=-6	0.4226	0.0765
t8	-1.2144	0.0220	R=-7	0.6134	0.0776
t9	-1.0604	0.0235	R=-8	0.8771	0.0791
t10	-1.3192	0.0274	R=-9	0.5584	0.0967
t11	-1.2462	0.0283	R=-10	0.5859	0.1040
t12	-1.2476	0.0298	R=-11	0.2936	0.1236
t13	-1.3293	0.0325	R=-12	-0.3250	0.1738
t14	-1.3808	0.0352	R<-12	0.3288	0.1211
t15	-1.4501	0.0381	E-9	-0.0867	0.6752
t16	-1.5705	0.0418	E-8	-0.3391	0.4699
t17	-1.5218	0.0432	E-7	-0.5346	0.3996
t18	-1.4096	0.0431	E-6	-0.1485	0.3281
t19	-1.6486	0.0488	E-5	-0.5515	0.2687
t20	-1.5260	0.0503	E-4	-0.2144	0.2227
t21	-1.8380	0.0595	E-3	-0.3740	0.1971
t22	-1.6703	0.0583	E-2	0.0284	0.1621
t23	-1.5974	0.0591	E-1	0.2246	0.1341
t24	-1.7015	0.0649	E0	-0.0910	0.1010
t25	-1.6348	0.0668	E1	-0.1595	0.0976
t26	-1.6391	0.0693	E2	-0.1312	0.0939
t27	-1.6583	0.0735	E3	-0.1038	0.0932
t28	-1.7039	0.0791	E4	-0.0229	0.0824
t29	-1.6250	0.0818	E5	-0.2146	0.0856
t30	-1.6342	0.0876	E6	-0.3205	0.0752
t31	-1.6402	0.0927	E7	-0.2599	0.0740
t32	-1.8917	0.1054	E8	-0.0713	0.0723
t33	-1.7419	0.1052	E9	-0.0693	0.0689
t34	-1.6064	0.1034	E10	-0.1030	0.0687
t35	-1.5895	0.1099	E11	-0.0214	0.0645
t36	-1.5772	0.1175	E12	0.0286	0.0642
t37	-1.6652	0.1222	E13	-0.0364	0.0599
t38	-1.6831	0.1358	E14	-0.0323	0.0595
t39	-2.1303	0.1649	E15	0.0134	0.0581
t40	-1.9130	0.1591	E16	-0.1530	0.0555
t41	-1.3549	0.1436	E17	-0.2531	0.0535
t42	-1.4188	0.1566	E18	-0.2156	0.0551
t43	-1.4031	0.1614	E19	-0.0996	0.0527
t44	-1.9879	0.2015	E20	-0.0033	0.0540
t45	-1.7950	0.2213	E21	-0.0001	0.0522
t46	-1.7161	0.2327	E22	0.1280	0.0461
t47	-1.4075	0.2487	E23	0.2797	0.0348
t48	-0.9038	0.2745	E24	-0.0431	0.0515

Table 8: Continued.

	Parameter	St.error		Parameter	St.error
t49	-1.6413	0.3155	E25	-0.0791	0.0474
t50	-1.4989	0.3179	E26	-0.1183	0.0462
t51	-1.8877	0.3873	E27	-0.0893	0.0410
t52	-1.3302	0.3445	E28	-0.0880	0.0382
t53	-0.9814	0.3390	E29	-0.1126	0.0359
t54	-1.4198	0.4198	E30	0.0145	0.0353
t55	-1.2606	0.4549	E31	0.1066	0.0333
t56	-2.0829	0.7400	E32	0.1265	0.0305
t57	-2.5667	1.0273	E33	0.1484	0.0279
18>R>12	0.1220	0.0208	E34	0.2012	0.0234
R=12	0.1519	0.0441	E35	0.2495	0.0138
R=11	0.0153	0.0467	E36	0.0646	0.0364
R=10	0.1182	0.0460	E37	0.0561	0.0338
R=9	0.1617	0.0464	E38	-0.0622	0.0310
R=8	0.1158	0.0481	E39	-0.0321	0.0293
R=7	0.1583	0.0488	E40	-0.0407	0.0252
R=6	0.1334	0.0513	E41	-0.0248	0.0240
R=5	0.1019	0.0545	E42	0.0393	0.0232
R=4	0.2234	0.0546	E43	0.1388	0.0225
R=3	0.1948	0.0583	E44	0.1882	0.0204
R=2	0.3564	0.0574	E45	0.3110	0.0199
R=1	0.2981	0.0613	E46	0.3447	0.0173
R=0	0.2698	0.0645	Constant	-1.1602	0.0221

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