

Getting out of debt: Attachment of wage in whose interest?

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Abstract

Attachment of wage as a way for creditors to enforce payment by unwilling or insolvent debtors is not very successful in several countries. Based on a dynamic model of debtor behaviour, this paper explores two alternatives of reform. One is to reduce the rate of attachment, which at present amounts to 100 percent of the wage income exceeding the subsistence level, thus probably destroying incentives to work. According to model simulations, reducing the attachment rate is likely to result in an increase of labour supply but a decrease of attachment revenue per period. Second, the introduction of a debt release would have an ambiguous effect on labour supply. While resulting in a partial loss for creditors, it would permit debtors to get out of debt. A Pareto improvement thus does not seem to be possible. When taking the taxpayers as an involved third party into account, however, a potential Pareto improvement appears attainable.

JEL classification:

D91, J22, K29

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1 Introduction

In recent years the number of recovery proceedings in Switzerland has been increasing at an alarming rate. In 1990, 1.43 mn. notices to pay were delivered. In 1996 their number was already 1.83 mn, an increase of about 28 percent.¹ For 1996 it can be estimated that 350,000 to 400,000 people (of a population of some 7 mn.) were afflicted by recovery proceedings.² One third of the notices to pay are settled more or less immediately. In another third of the cases, an attachment procedure is initiated. Due to a lack of assets, an attachment of wage occurs in 80 percent of all cases. However, in 70 percent of cases (a ratio that also applies to Germany), the value of the attachment is not sufficient to cover the outstanding debt.³ The same number is calculated for Germany. Thus, there are some 100,000 individuals whose wage income is insufficient to pay back their debt. When compared to 400,000 to 700,000 poor, estimated by *Leu et al.* (1997), this number suggests that inability to get out of debt and poverty may be related to an important degree.

Since the attachment procedure frequently fails to satisfy the claims of the creditor while keeping the debtor in debt there have been proposals for reform. In order to evaluate these proposals this paper analyzes the behaviour of a household whose wage is attached. The reaction of its labour supply to changes of exogenous parameters such as the value of the subsistence level or the value of the debt is studied. In the beginning a static two-period model will form the theoretical background, which will be generalized to a dynamic multi-period model. Later on these models are simulated to judge the likelihood that the two major proposals will result in a Pareto improvement, being in the interest of both creditor and debtor. This could be the case if the debtor enjoys an increase in consumption by increasing his labour supply, which in turn would provide more revenue per period to the creditor. The first proposal to be evaluated in this way is a reduction of the attachment rate, which at present amounts to 100 percent for the part of income which exceeds the subsistence level. The other proposal is a release of debt as is customary e.g. in the anglo-saxon countries.

2 Survey of literature

In the social science literature, excessive debt and bankruptcy of private households and its consequences are frequently investigated.⁴ Economists seem to have ignored this topic in the past. This is astonishing, as saving behaviour has received a great deal of attention in the economics literature. There is some work dealing with the behaviour of households and firms under bankruptcy risk, see

1) *Bundesamt für Statistik* (1998).

2) A sample of data collected at Swiss bankruptcy offices indicated that a debtor had 5 notices to pay per year, on average.

3) See *Bundesamt für Statistik* (1998) and *Bundesverband Deutscher Inkasso-Unternehmen*, 1997 [Union of German debt collecting agencies].

4) See e.g. *Lea et al.* (1995, 1993) and *Tokanuga* (1993) who studied the psychological background of individuals in high debt.

e.g. *Dutta* (1994) and *Sethi et al.* (1997). However, these papers analyze behaviour ex ante, dealing with questions of prevention against insolvency. What happens ex post, after the insolvency, is not part of this research. *Dubey* and *Shubik* (1988) elaborate an optimal attachment rule for assets. Attachment of wage, which is much more common (at least in Switzerland), seems not to be a topic of interest in spite of its incentives on labour supply. Empirical studies were undertaken by *Sullivan et al.* (1989, 1994), who provided a first profound inquiry about private households in excessive debt in the United States. For Germany empirical studies were undertaken e.g. by *Rosendorfer* (1993) and *Landesarbeitsämter Nordrhein-Westfalen und Baden-Württemberg* (1996) [Employment offices of Northrhine-Westfalia and Baden-Wurttemberg]. Our interview study at Swiss bankruptcy offices in 1997 is the first inquiry of this kind in Switzerland [*Zaborowski* (1999)].¹

3 Enforcing payment: the legal procedure in Switzerland

The aim of this section is to give an overview of the bankruptcy law in Switzerland as it applies to private persons (see also Figure 1).²

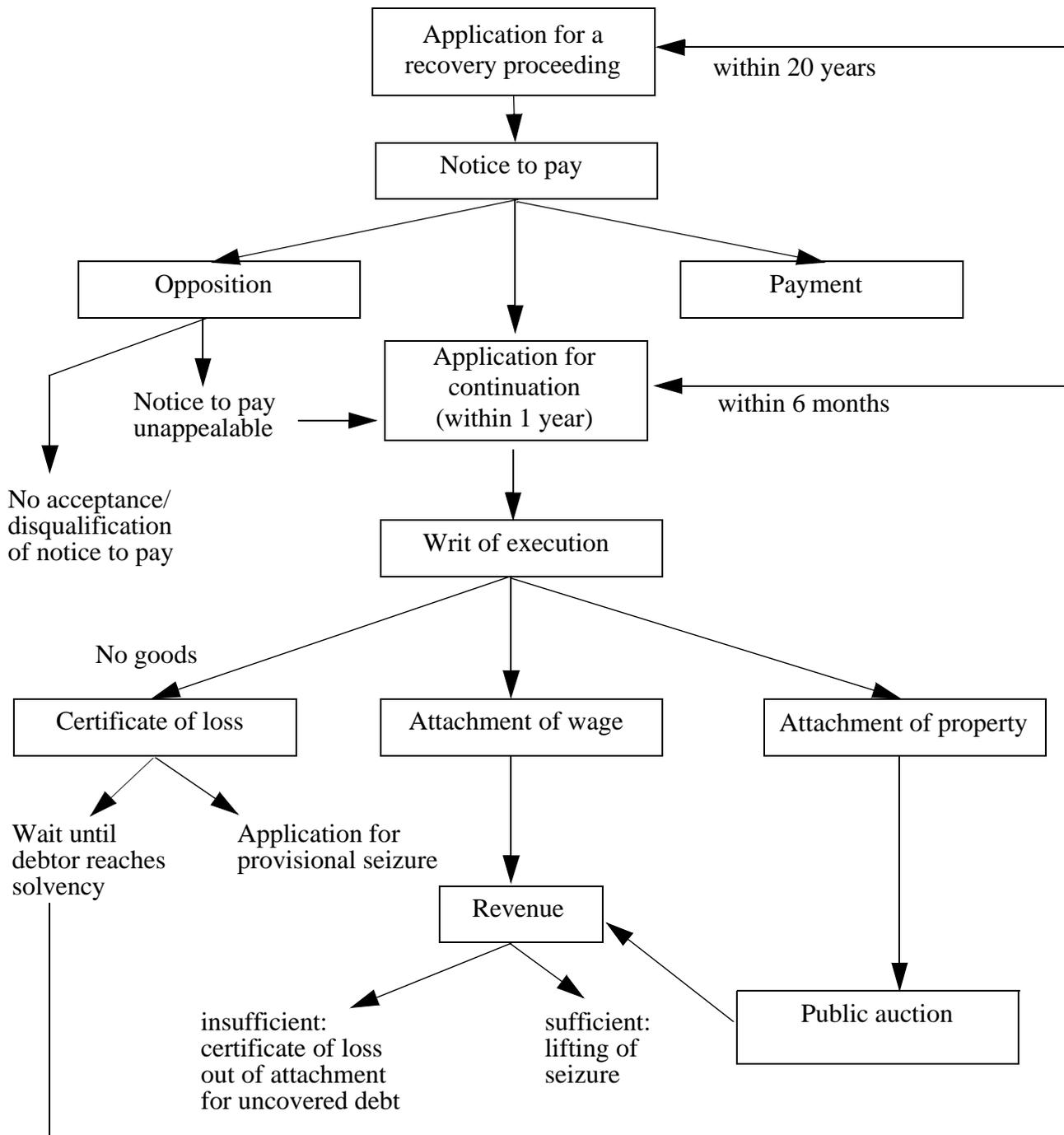
If a private household is not willing to pay back a debt, the creditor can try to enforce payment by advising the bankruptcy office. The first step is to apply for a recovery proceeding, specifying the debtor, the creditor, the amount of the claim including interest accrued and the reason for the claim. The creditor must advance the costs for the proceeding. The legality of the claim is not checked at this stage. The bankruptcy office sends a notice to pay to the debtor, threatening him with continued enforcement if he fails to pay within 20 days. The debtor can announce his opposition against the notice within 10 days by challenging the legality or amount of the claim. Opposition leads to a review of the claim by a court.

For the judicial review, the creditor has to show evidence for his claim. Depending on the evidence, the judge confers a definitive or a provisional opening of the judgement. A definitive opening renders the notice to pay unappeable, giving the creditor the right to apply for continuation of the recovery proceeding. Provisional opening means a provisional removal of the debtor's opposition. Now the debtor has the opportunity to disprove the legality of the claim by a civil action, which may result in a disqualification of the notice to pay (see Figure 1). Losing the civil suit leads to a definitive opening of the judgement.

If the judge rejects the evidence for the legality of the outstanding debt, the creditors can still try to attain a definitive opening of the judgement by a civil trial.

1) In appendix B some of the results of our interview study at swiss bankruptcy offices will be presented.

2) Detailed descriptions of the swiss bankruptcy law are given by *Amonn* (1997), *Spühler et al.* (1996) and *Spühler/Pfister* (1997) [all in German].

Figure 1 Enforcement of payment in Switzerland

The application for continuation of the recovery proceeding must be made by the creditor within 1 year from the start. If the debtor is still not willing to pay, he is informed by writ of execution stating that the attachment procedure is initiated. Assets are attached in presence of the debtor up to the value of the debt, accrued interest, and the costs of the recovery proceeding (attachment of property, see Figure 1). Assets which are necessary for daily life (for instance clothes, tableware and some furniture) are exempted. Attached assets are sold at a public auction, with the revenue going to the creditor.

If there is no attachable property, part of the debtor's income can be garnished (attachment of wage). Debtor's income exceeding the subsistence level is fully attached. The value of the subsistence level is individually fixed by the bankruptcy civil servants. Directives for the calculation of the subsistence level are given by the cantonal superior courts, based on advice of the Swiss Council of Bankruptcy Civil Servants.¹

If there are neither assets or sufficient wage income to cover the debt, the creditor obtains a certificate of loss. The recovery proceeding is stopped by the certificate of loss for the moment. Within 6 months the creditor can reinstate the enforcement by filing an application for continuation. Any assets found in the debtor's hands can be provisionally seized. The certificate of loss becomes statute-barred after 20 years. During the attachment period and after a certificate of loss, interest on the debt ceases to accrue. This provision is of considerable economic importance (see section 5).

A debtor who does not see any chance to pay off the debt can file for bankruptcy. By filing for bankruptcy the debtor declares himself as insolvent. Before bankruptcy is accepted, an attempt for rescheduling has to be made.² A trustee, the creditors, and the debtor are called upon to find a solution, e.g. by deferral of payment. Failing such a solution, bankruptcy procedure is opened. The bankruptcy stops all executions, in particular the attachment of wage, permitting the debtor to consume his whole income again. However, this advantage must be weighed against the loss of reputation and the fee to be paid for the bankruptcy procedure. Should the debtor build up new assets, the creditors may initiate the enforcement of payment procedure again.

4 The household subject to wage attachment - A two-period model

This section contains an analysis of the decision situation of a household that is subject to a wage attachment. A simple two-period model is used here; consideration of the full dynamic optimization problem is deferred to section 5. The household is assumed to maximize utility from consumption (c) and leisure (l) over both periods,

1) The interview study at Swiss bankruptcy offices yielded an average monthly subsistence level of SFr. 2,000 (US\$ 1,300 at 1998 exchange rates) for a single-person-household without any alimony liabilities.

2) This step was introduced in 1997.

$$U = U(c_1, l_1, c_2, l_2) \quad (1)$$

In order to keep the model as simple as possible, the wage rate, prices of goods, the interest rate, and the rate of time preference are all constant and equal to 1. Given that the household is in debt and subject to attachment of wage, its labour income and therefore its consumption cannot exceed the subsistence level during the first period, resulting in $c_1 \leq m$. If the debt is paid off during the first period, resulting in nonnegative wealth ($v_1 \geq 0$), the household's wage income will not be attached in the second period, and its consumption c_2 can be freely chosen. If it is not able or willing to pay back ($v_1 < 0$), attachment of wage will continue during the second period and therefore $c_2 \leq m$.

The attachment condition can be written,

$$(c_2 - m) \cdot v_1 \geq 0, \quad \text{with } c_2 \geq 0 \quad (2)$$

Therefore $c_2 > m$ is possible only if $v_1 \geq 0$ (no debt at the end of period 1). Vice versa, $v_1 < 0$ requires $c_2 \leq m$ (continuation of wage attachment). The value of assets at the end of period 1 is given by the exogenous debt at the end of the preceding period (\bar{v}_0), plus the household's wage income (given by labour supply $1 - l_1$ times the wage of 1), minus the consumption (c_1),¹

$$v_1 = \bar{v}_0 + 1 - l_1 - c_1 \quad (3)$$

To close the model, the value of assets at the end of period 2 needs to be fixed. As there is no reason for positive assets at the end of period 2 in absence of a bequest motive, the value of assets may be set to zero at this time. However, this would force a repayment of the debt, whereas it is precisely the circumstances under which repayment occurs that is at the centre of attention here. Therefore, the constraint is relaxed, stating that at the end of period 2 the value of assets must not be positive:

$$v_2 \leq 0 \quad (4)$$

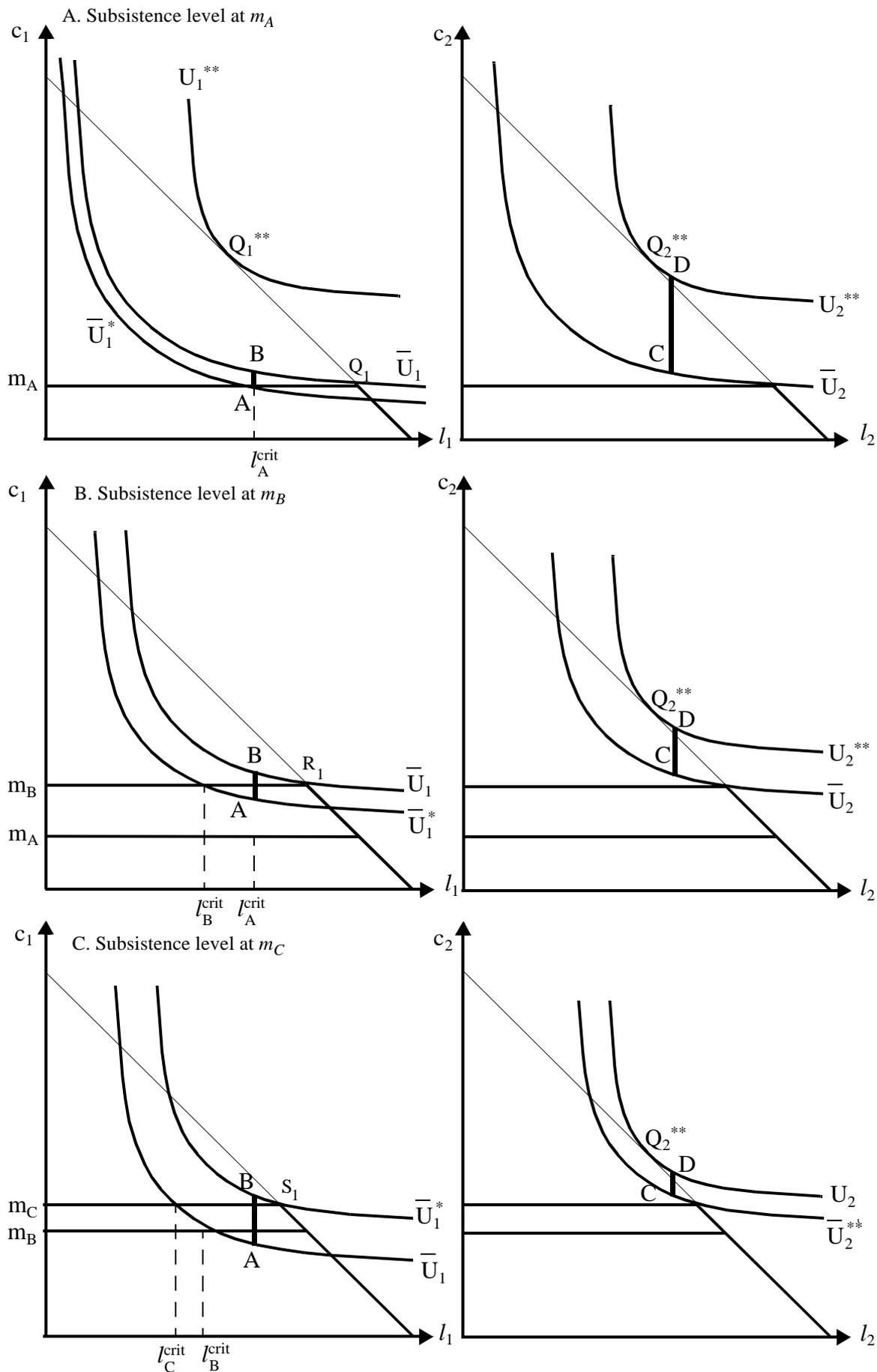
We also need a constraint for c_2 in the case the garnishment of wage is lifted. For simplicity we assume consumption must not be higher than labour income during this period,

$$c_2 \leq 1 - l_2, \quad (5)$$

thus ignoring the possibility that the household not only to pays off the debt but achieves savings during the first period which could be consumed in the second period.

1) Total time available is set to 1, therefore $(1-l_1)$ equals labour supply.

Figure 2 Effect of a variation of the subsistence level on labour supply



Note that the subsistence level m is not a transfer payment but the amount of the household's income that is exempt from attachment. This motivates the constraint that the household always will supply enough labour to finance the subsistence level,

$$0 \leq l_1 \leq 1 - m \quad (6)$$

and

$$0 \leq l_2 \leq 1 - m \quad (7)$$

The impact of a variation of the subsistence level on the labour supply is shown in Figure 2. The panels on the left-hand side show the household's first-period decision concerning consumption and leisure, those on the right-hand side show its second-period decisions. In part A, the subsistence level is fixed at m_A for both periods. Without wage garnishment, the optimal consumption points would be the points of the tangency between the indifference curves U_1^{**} and U_2^{**} and the corresponding budget constraints (Q_1^{**}, Q_2^{**}) . If the household's wage is attached, consumption is reduced to the subsistence level m_A . Ignoring a second period, it would be optimal for the household to choose the corner solution Q_1 . The household would opt for an amount of leisure l_1 such that its labour supply is just sufficient to finance the subsistence level (yielding utility as indicated by indifference curve \bar{U}_1).¹ This also means that the debt is not paid back. Therefore consumption will be constrained in the second period as well because of the continuing wage attachment, permitting the household to reach indifference curve \bar{U}_2 .

Alternatively the household could pay back its debt. For an exogenously given value of the debt \bar{v}_0 , there must be a labour supply $1 - l_A^{crit}$. As a result, the household is out of debt at the end of period 1. In the first period it incurs a loss of utility given by line AB because of the sacrifice of leisure. In return the household will gain utility in the second period thanks to unrestricted consumption, as the wage attachment is lifted (line CD). In the present case line CD is longer than AB, indicating that the gain in utility exceeds the loss. Therefore the household will pay off the debt (and provide a good deal of labour) under the circumstances depicted in part A of Figure 2.

In part B of Figure 2, the subsistence level is increased from m_A to m_B . According to the preference structure shown, the household will increase its consumption, choosing the corner solution R_1 . If the household still wants to pay off its debt, it has to renounce to more leisure. Accordingly the critical value of leisure is lowered, from l_A^{crit} to l_B^{crit} (say). The corresponding utility level is given by \bar{U}_1^* . As before, line AB shows the first-period loss in utility caused by a repayment of the debt.

1) This statement not only holds for the preferences shown in Figure 2, but for all cases in which the marginal rate of substitution of leisure for consumption at point Q_1 is lower than the attainable wage rate.

During the second period, the release from the attachment will cause a gain in utility amounting to CD. In comparison to the first scenario (part A of Figure 2) the gain is smaller because the subsistence level has increased. Still the household will pay back its debt because the gain CD continues to exceed loss AB. Also, note that the higher subsistence level causes labour supply to increase.

In part C of Figure 2, the subsistence level is increased to m_C . Assume that the household chooses the corner solution S_1 once more, profiting from the added consumption possibilities. To pay off the debt, the household would thus have to give up even more leisure, as shown by the move from l_B^{crit} to l_C^{crit} (say). Paying off the debt comes with utility level \bar{U}_1 , implying a loss of AB. This time the gain in period two utility CD occasioned by the end of the attachment is not sufficient to compensate the household for reduced leisure during the first period (CD is smaller than AB). The household now prefers to curtail its labour supply to an amount necessary to finance the subsistence level.

A second exogenous change is an increase of the debt \bar{v}_0 . This requires a reduction of leisure if the household wants to pay back the debt (movement to the left of l^{crit} in Figure 2). The budget constraints remain unchanged. Therefore, in order to pay off the debt the household has to sacrifice more leisure, resulting in a higher loss of utility during the first period. The gain in utility due to the lifting of the attachment are unchanged. Hence, the incentives to pay off the debt and to supply labour are weakened.

Conclusion 1

Within the scope of a two-period model, an increase of the subsistence level may initially result in an increase of labour supply. Sooner or later, there will be a point where it is not optimal for the household to pay off the debt by giving up leisure. From there on, the household will reduce its labour supply because the utility gain due to unrestricted consumption during the second period is not sufficient to compensate the loss of leisure during the first period.

5 Dynamic optimization in a multi-period model

In the two-period model the household's only choice was to pay the debt back or to leave it. In a multi-period model, it has a wider range of choice because it may defer the debt.

Let the objective function to be maximized be given by

$$U(c, l) = \sum_{t=1}^T e^{-\delta \cdot t} \cdot [\alpha \cdot \ln c_t + (1 - \alpha) \cdot \ln l_t] \quad (8)$$

The function of equation (8) is additive separable in time, with logarithmic per period utility of Cobb-Douglas type. The rate of time preference is given by δ . The equation of motion for assets is given by (the corresponding Lagrangian multipliers appear in parentheses):

$$v_t = v_{t-1} \cdot (1 + r) + w \cdot (1 - l_t) - p \cdot c_t \quad ({}_1\lambda_t) \quad (9)$$

In contradistinction from the two-period model, the interest rate r , the wage rate w , and the price of the consumption good p are not fixed to 1 anymore.

The constraint due to the attachment of wage is analogous to the two-period-model:

$$(p \cdot c_t - m) \cdot v_t \geq 0 \quad ({}_2\lambda_t) \quad (10)$$

Equation (11) requires for labour supply in every period to be sufficient for the subsistence level:

$$w \cdot (1 - l_t) \geq m \quad ({}_3\lambda_t) \quad (11)$$

The non-negativity constraints read

$$c_t, l_t \geq 0 \quad ({}_4\lambda_t, {}_5\lambda_t) \quad (12)$$

At the end of the planning period, the value of assets must not be positive as a bequest motive is ruled out,

$$v_T \leq 0 \quad (13)$$

The objective function (8) together with the constraints (9) to (12) define a control problem. From the necessary conditions for an optimum, the following equation of motion for leisure may be derived,¹

$$\dot{l}_t = l_t \cdot \left\{ -\delta + \frac{{}_1\lambda_t \cdot r \cdot w + {}_2\lambda_t \cdot w \cdot (p \cdot c_t - m) - {}_3\dot{\lambda}_t \cdot w + {}_5\dot{\lambda}_t}{{}_1\lambda_t \cdot w + {}_3\dot{\lambda}_t - {}_5\dot{\lambda}_t} \right\} \quad (14)$$

Equation (14) shows how leisure and therefore labour supply change over time. Assuming an interior solution, the constraints (11) and (12) become nonbinding, which implies ${}_1\lambda_t = {}_4\lambda_t = {}_5\lambda_t = 0$

1) The derivation of equation (14) can be found in appendix A.

and hence $\dot{\lambda} = {}_4\dot{\lambda} = {}_5\dot{\lambda} = C$. Therefore the denominator in (14) is positive. Based on this result, the impact of some parameters may be discussed as follows.

- Rate of time preference δ : The higher δ , the faster leisure decreases over time. The household prefers to enjoy leisure at the beginning of the optimization horizon, therefore it has to work harder towards the end.
- Wage rate w : The impact of the wage rate is ambiguous as w appears in the denominator and in the numerator of equation (14). On the one hand, a high wage has an income effect in that it gives the household the opportunity to have leisure in the beginning and to compensate for this later by increasing its labour supply ($\dot{l} < 0$, w in the denominator). On the other hand, a higher wage also has, substitution effect. It creates an incentive for high labour supply in the beginning, permitting to have more leisure later ($\dot{l} > 0$, w in the numerator).
- Interest rate r : As long as the household is not subject to wage attachment (${}_2\lambda_t = 0$), the incentive to save increases with the interest rate. If the interest rate exceeds the rate of time preference, the household will start with a high amount of labour supply, building up savings in the beginning that can be consumed later. Therefore leisure will increase over time in this case. If the interest rate is less than the rate of time preference, leisure will decrease over time. As long as the household's wage income is attached, (${}_2\lambda_t = 0$ but $p \cdot c_t - m = 0$), the result is the same. However, it is not the incentive to save but the pressure of increasing debt, caused by a relatively high interest rate, which induces the household to start with high labour supply that can be reduced later.
- Subsistence level m : Here, one has to distinguish between two situations. As long as the household is in an attachment procedure, the attachment condition (10) holds and therefore ${}_2\lambda_t > 0$. Because of the small amount of consumption available, its marginal utility is relatively high, causing the household to consume at the subsistence level, hence $p \cdot c_t - m = 0$ as a rule. Variations of the subsistence level do not have any impact on the movement of leisure over time, which depends on the rate of time preference δ (note that numerator and denominator of equation (14) can be divided by ${}_1\lambda_t \cdot w$). If δ is above the interest rate, we have $\dot{l} < 0$, if δ is below the interest rate, $\dot{l} > 0$. Once wage attachment has come to an end, ${}_2\lambda_t$ becomes zero, and again variations of the subsistence level have no impact on the development of leisure over time. However, this does not exclude effects on the level of leisure, of the type found in the two-period model. Thus, a higher subsistence level generally enlarges the opportunity set of the debtor, permitting him to enjoy more leisure.¹

Unfortunately, there are no data available to the authors that would allow them to subject these implications to an empirical test. In order to at least obtain a feeling for the dynamics of this model, a series of computer simulations were run using GAMS (General Algebraic Modeling System). Con-

1) Equation (A 5) of appendix A determines the optimal level of leisure. There, a higher value of m serves to relax the constraint (10) and hence to lower the value of ${}_2\lambda_t$ (which appears in the denominator). Thus l_t increases.

sumption and leisure were given equal weight in the per-period utility function [$\alpha = 0.5$ in equation (8)]. The rate of time preference was set at $\delta = 0.03$. As no interest accrues on the debt during attachment, the interest rate for the debtor equals zero ($r = 0$). Therefore we have $\delta > r$, implying that the household will never accumulate savings (besides redemption of the debt). The price of goods p equals one and remains constant. Concerning the wage rate, we distinguish three different groups. The first group has a wage of $w = 1$, the second group $w = 3$, and the third $w = 5$. Finally we fix the optimization horizon at $T = 20$.¹

In keeping with the discussion of equation (14), $p \cdot c_t - m = 0$, causing the household to reduce its leisure by 3 percent per period as long as it is subject to attachment. As soon the debt is paid off and the restriction on consumption lifted, the household will divide its budget between consumption and leisure following its utility function; with $\alpha = 0.5$, this is 0.5 units of leisure and $0.5 \cdot w$ units of consumption. In Figure 3 the intertemporal optimization of a household with wage $w = 1$, a given subsistence level $m = 0.45$ and initial debt $\bar{v}_0 = -0.37$ is shown. According to the simulation, it takes 10 periods to pay off the debt. During this phase leisure is lowered and labour supply increased by 3 percent every period. Consumption is first restricted equal to the subsistence level and increases after the debt is paid off.

6 Comparative-dynamic analysis

6.1 Variation of the debt

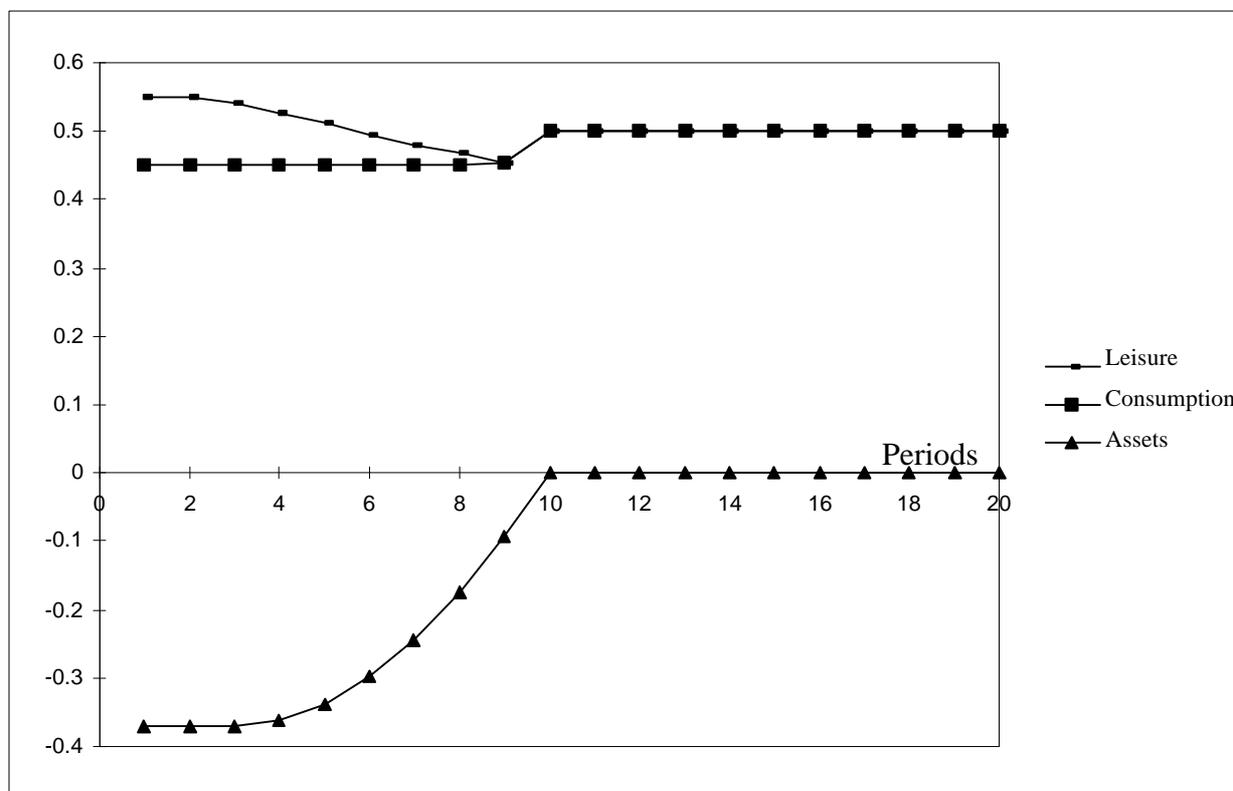
Ceteris paribus, an increase of \bar{v}_0 causes the time required to pay off the debt to be longer. On the horizontal axis of Figure 4, the variable \bar{v}_0 is replaced by the standardized duration of redemption. The standardized duration of redemption is the amount of time it would take to pay the debt back if the household could choose its income without any restriction:

$$\text{standardized duration of redemption } D_s = \frac{-\bar{v}_0}{\alpha \cdot w - m} \quad (15)$$

In equation (15), optimal labour income is given by $\alpha \cdot w$. With free optimization, expenditure on consumption equals labour income, $p \cdot c^* = \alpha \cdot w$, since there are no savings apart from paying back the debt. The expression in the denominator of equation (15) thus gives the revenue that wage attachment could theoretically generate per period.

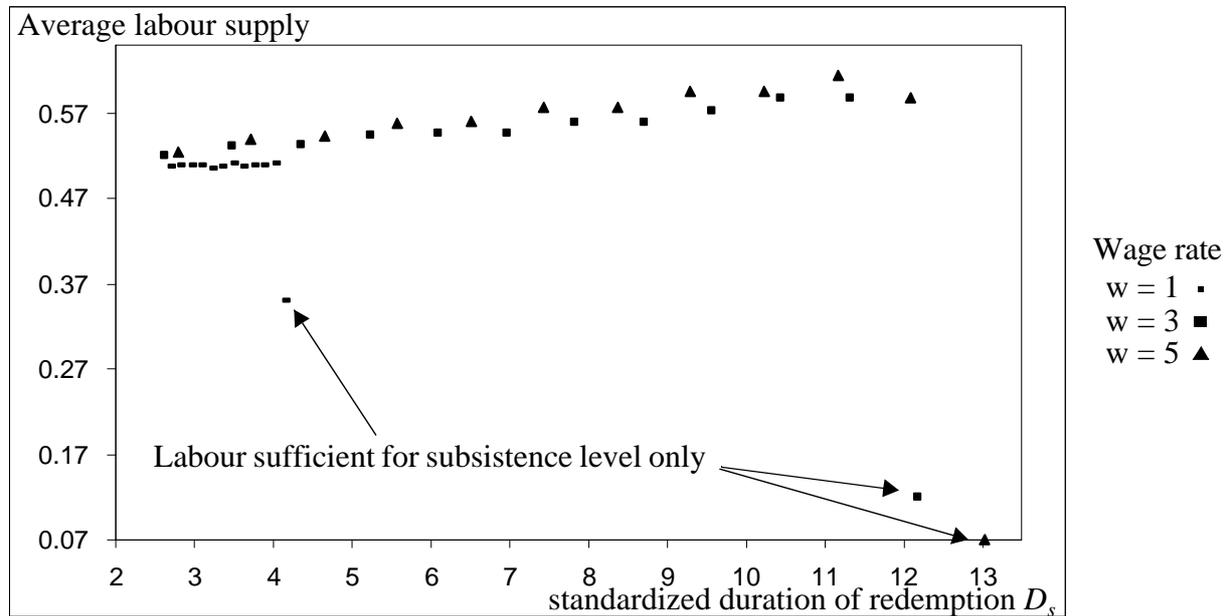
1) We chose 20 periods because the interviews performed at the bankruptcy offices showed that 83 percent of individuals in debt expected to be out of debt within 20 years. A mere 1 percent said they would need more than 20 years whereas 16 percent had the expectation of never getting out of debt. Furthermore 20 years correspond with the time in which a certificate of loss becomes statute-barrated.

Figure 3 Paths of consumption, leisure, and value of assets of a household subject to wage attachment ($\alpha = 0.5$, $m = 0.45$, $\delta = 0.03$, $w = 1$, $\bar{v}_0 = -0.37$)



Now Figure 4 shows that debtors of different wage groups may differ in their labour supply in response to a variation of the standardized duration of redemption D_s (and therefore the debt to be paid back).¹ The household with the lowest wage ($w = 1$) keeps its labour supply at a high level as long as D_s does not exceed 4 periods. Beyond that limit, labour supply drops to the amount necessary to guarantee subsistence ($1 - l_t = m = 0.35$ at $w = 1$), without any redemption of the debt. The two households with higher wage ($w = 3$, $w = 5$) increase their average labour supply in the beginning. However, when the standardized duration of redemption reaches 13 periods at the latest, they let their labour supply drop too ($0.35/3$ at $w = 3$, $0.35/5$ at $w = 5$). This kind of behaviour can be interpreted as follows. There is a point where even for a household with a high wage it is not optimal anymore to pay off an increased debt by giving up more leisure. If the gain in utility from free consumption is not sufficient to compensate the household for the loss in utility from additional labour (beyond what is necessary for the subsistence), the household will stop its effort. The debt will not be paid off.

1) Average labour supply $\left(0 \leq \left\{ \sum_{t=1}^{20} (1 - l_t) \right\} / 20 \leq 1\right)$ is displayed on the vertical axis of Figure 4. The subsistence level is set at $m \equiv 0.35$.

Figure 4 Impact of a variation of the debt on labour supply ($\alpha = 0.5$, $m = 0.35$, $\delta = 0.03$)

Conclusion 2

An increase of the initial debt at first calls for an increase of labour supply. However, there will be a point where redemption of the debt is not optimal for the household. The lower the wage, the faster this critical point is reached.

The first part of the prediction of Conclusion 2 is confirmed by the interview study. A share of 16 percent of the interviewed debtors expect never to be out of debt; these households have an estimated average duration of redemption (not standardized) of 3.6 years. Taking all households, the average duration is lower (2.6 years), which corresponds with Conclusion 2.

6.2 Variation of the subsistence level

The impact of a variation of the subsistence level is an important policy issue. Analysis of the two-period model led to the conclusion that an increase of the subsistence level may result in an increase of labour supply (cf. Conclusion 1). In a multi-period setting, the household has the possibility to delay redemption of the debt rather than increasing its work effort.

For the simulation study, six different groups of debtors were formed, the three wage groups ($w = 1, 3$, and 5) and a group a) with relatively low and b) with relatively high debt. Group Ia mat-

ches the interview study with regard to the ratio of subsistence level to optimal labour income [see equation (15)] and duration of redemption.

Table 1 Groups of debtors distinguished in the simulation

Group	Ia	Ib	IIa	IIb	IIIa	IIIb
Wage (w)	1		3		5	
Initial value of assets (\bar{v}_0)	- 0.37	- 0.6	- 2.9	- 4.6	- 5.3	- 8.7
Subsistence level (m)	0.35					
Subsistence level/optimal labour income $m/(\alpha \cdot w)$ ¹	0.7		0.23		0.14	
Standardized duration of redemption ² $\frac{-\bar{v}_0}{\alpha \cdot w - m}, \alpha = 0.5$	2.5	4	2.5	4	2.5	4

¹ The average ratio in the interview study is 0.69.

² The estimated duration of redemption in the interview study is 2.6.

A customary standard for reform is Pareto improvement. In the present context, this means that the legal procedure of wage attachment should be reformed in such a way that none of the parties involved is worse off than before and at least one is better off. Creditors may be assumed to be interested in payment of the debt within the shortest time possible because they do not receive interest on their claim during the attachment phase. This amounts to a maximization of attachment revenue per period ξ_t which is given by

$$\xi_t = w \cdot (1 - l_t) - m, \quad (16)$$

with labour supply $(1 - l)$ as a function of m . Differentiating equation (16) w.r.t. m yields the necessary condition for a maximum,

$$\frac{w \cdot \partial(1 - l_t)}{\partial m} = 1 \quad \text{and therefore} \quad \frac{\partial(1 - l_t)}{\partial m} = \frac{1}{w} \quad (17)$$

From equation (17), we can derive the elasticity of labour supply w.r.t. m which is necessary to keep the attachment revenue per period maximum after an increase of the subsistence level,

$$e^{*(1-l_t),m} = \frac{\partial(1-l_t)}{\partial m} \cdot \frac{m}{(1-l_t)} = \frac{m}{(1-l_t) \cdot w} \quad (18)$$

The necessary elasticity of labour supply thus equals the ratio between subsistence level and effective labour income. Its values for the six debtor groups are given in the second column of Table 2. In the remaining columns, the results of the simulation runs are presented. The elasticities of labour supply refer to increases of the subsistence level by 1, 10, 20, 30, 40, and 50 percent, starting from an amount of 0.35.

Table 2 Necessary and effective elasticities of labour supply w.r.t. an increase of the subsistence level

Group	Necessary elasticity ¹ $e^{*(1-l),m}$	Average labour supply per period $m = 0.35$	Effective elasticity of labour supply, given an increase of the subsistence level by...					
			1 percent	10 percent	20 percent	30 percent	40 percent	50 percent
Ia	+ 0.7	0.51	0	- 0.05	- ²	- ²	- ²	- ²
Ib	+ 0.6	0.51	+ 0.1	- ²				
IIa	+ 0.2	0.52	0	0	0	+ 0.006	+ 0.008	+ 0.008
IIb	+ 0.2	0.53	0	+ 0.02	+ 0.015	+ 0.016	+ 0.018	+ 0.016
IIIa	+ 0.1	0.52	0	0	0	0	0	0
IIIb	+ 0.1	0.53	0	+ 0.01	+ 0.01	+ 0.01	+ 0.01	+ 0.01

¹ Calculated at average labour supply (see footnote 1 on page 12).

² Labour supply just sufficient to reach the subsistence level.

Creditors of debtors with a low wage ($w = 1$) are worse off after an increase of the subsistence level. For, the simulations for group I indicate negative or slightly positive effective elasticities, which fall far short of the necessary elasticity of labour supply of $e^* \geq 0.6$. The households with higher wage (Groups II and III) do increase their labour supply in response to the higher subsistence level, but never enough to compensate the negative effect of the increased subsistence level on the attachment revenue per period [cf. equation (16)]. Thus, any increase of the subsistence level imparts a loss to the creditors.

Conclusion 3

In the multi-period mode, as well, an increase of the subsistence level may lead to an increase of labour supply. However, simulations suggest that this effect is insufficient to compensate creditors for the loss of the attachment revenue per period.

7 Evaluation of proposals for reform

The attachment procedure currently in force in Switzerland is not satisfactory for both debtors and creditors.

- Debtors have to bear a marginal tax rate of 100 percent on their income as soon as it exceeds the subsistence level. Any increase of the subsistence level would make them better off but impart losses to creditors (see Conclusion 3 above).
- Under the current regime creditors cannot be happy with their situation, since 70 percent of all attachment procedures end up with a certificate of loss. One reason for this could be lack of work incentives for debtors.

In the following section, two reform proposals will be presented. One is the introduction of a flexible subsistence level, which means a reduction of the marginal attachment rate below its current value of 100 percent. The second proposal is a release of the debt. Using simulation studies once more, we test whether there is scope for Pareto improvement.

7.1 Introduction of a flexible subsistence level

The current procedure calls for total attachment of the income which exceeds the subsistence level. This has the same effect as a tax rate of 100 percent on income beyond the subsistence level.

A flexible subsistence level can be modelled in the following way:

$$m_t = f + [w \cdot (1 - l_t) - f] \cdot (1 - \tau) \quad (19)$$

There still exists a fixed minimum subsistence level f .¹ The part of the income which exceeds f is attached at the rate of τ ($\tau \leq 1$). Thus the fixed subsistence level m of the attachment condition (10) is replaced by its flexible counterpart m_t of equation (19).

1) f can be interpreted as an allowable deduction.

The advantage to the debtor is obvious. Now, a sacrifice of leisure not only contributes to an earlier lifting of the attachment (and therefore to free choice of consumption) but also permits more consumption right away since less than 100 percent of additional income is attached. On the downside, attachment revenue per period decreases, holding labour supply constant. It takes a longer time to pay back the debt, causing a loss to creditors, who receive no interest on the debt. To check for the possibility of Pareto improvement, we derive, in analogy to (16) through (18), the elasticity of labour supply w.r.t. the attachment rate τ necessary to keep attachment revenue per period constant (for a given f),

$$e^*_{1-l_t, \tau} = \frac{\partial(1-l_t)}{\partial\tau} \cdot \frac{\tau}{1-l_t} = \frac{f-(1-l_t)}{1-l_t} \quad (20)$$

In Table 3, necessary and calculated elasticities are again shown. As in the case of an increase of the subsistence level, simulations suggest that households with low wage ($w = 1$, Group I) will not increase their labour supply as a rule. Likewise the enhanced work effort of the other groups ($w = 3$ and 5, Groups II and III) is not sufficient to keep attachment revenue per period constant.

Table 3 Necessary and effective elasticities of labour supply w.r.t. a reduction of the attachment rate

Group	Necessary elasticity ¹ $e^*_{(1-l), \tau}$	Average labour supply per period $f = 0.35$ $\tau = 1$	Effective elasticity of labour supply, given a reduction of the rate by...					
			1 percent	10 percent	20 percent	30 percent	40 percent	50 percent
Ia	+ 0.3	0.51	0	-0.03	-0.015	0	-0.008	-0.008
Ib	+ 0.3	0.51	0	+ 0.04	0	-0.01	-0.01	-0.005
IIa	+ 0.8	0.52	+ 0.1	+ 0.08	+ 0.04	+0.007	-0.008	+0.001
IIb	+ 0.8	0.53	+ 0.1	+ 0.09	+0.005	+ 0.04	+ 0.03	+0.005
IIIa	+ 0.9	0.52	+ 0.1	+ 0.09	+ 0.045	+0.007	+0.023	+ 0.014
IIIb	+ 0.9	0.53	+ 0.1	+ 0.11	+ 0.01	+ 0.05	+0.035	+0.008

¹ Calculated at average labour supply (see footnote 1 on page 12).

To compensate the loss of attachment revenue, one could lower the minimum allowance f . Since this would affect the poorest of all debtors, room for manoeuvre is limited in this regard. Moreover, simulations indicate that households of the lowest wage group I would have to be compensated by a

sizeable decrease of the attachment rate τ for a reduction of f . For example, lowering the minimum allowance by 15 percent (from 0.35 to 0.3) would require a reduction of the attachment rate τ by 20 percent (from 1 to 0.8). However, such a combination would cause a loss of attachment revenue from the higher wage groups. There is no evidence of a combination (f, τ) that guarantees a Pareto improvement.

Still, there is chance for potential Pareto improvement. A potential Pareto improvement merely requires that losers from a change of policy could in principle be compensated by the winners. In the present context, there are three categories of winners whose gain might be sufficiently large to make a potential Pareto improvement possible.

- (1) The debtors, who necessarily profit from a reduction of the attachment rate τ .
- (2) Those (numerous) creditors who lose their claims under the present attachment procedure.
- (3) The taxpayers, who (contrary to the model's assumptions up to this point) finance the public transfer for securing the subsistence of debtors whose labour income falls short of the subsistence level m .¹

In the following, the debtors will be treated as accepted gainers to be left out of the analysis.

As to the creditors, the simulations presented in section 6 suggested that there is a size of the debt (measured by the standardized duration of redemption D_s) beyond which the debtor gives up any attempt to pay back the debt. Now this critical value D_s^{crit} should depend on the attachment rate τ once equation (19) is substituted into (10).

Table 4 shows the critical values of the standardized duration of redemption D_s^{crit} as a function of the attachment rate τ , distinguished between the three wage groups. For example, Group III (with the highest wage rate) is predicted to maintain redemption efforts even in the case of very high debt if only the attachment rate is 0.7 or less.

Moreover, results from the interview study indicate that debts whose redemption is expected to take more than 4 years or even infinity make up 38 percent of cases. Therefore, lowering the attachment rate could generate some additional attachment revenue for some creditors, suggesting a limited scope for potential Pareto improvement.

As to the taxpayers as gainers, it should be noted that 11 percent of the interviewed debtors get public assistance. Depending on the size of the transfer, work incentives of debtors may be affected. If the public transfer is the same as the subsistence level, then a household which decides not to pay back its debt has no incentive to work and to earn at least its subsistence level. If the transfer exceeds the subsistence level and furthermore is non-attachable (as is customary in Switzerland), the household even derives a financial gain from not working.

1) Note that 11 percent of the interviewed debtor's receive public transfers.

Table 4 Critical duration of redemption D_s^{crit} as a function of attachment rate τ^1

Attachment rate \ Wage group	1	0.99	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2
I	4	4	4.7	5.3	5.3	5.3	5.3	5.3	6.0	∞
II	11.3	11.3	13	14.8	17.4	∞	∞	∞	∞	∞
III	13	13.5	16.7	20.5	∞	∞	∞	∞	∞	∞

¹ D_s^{crit} defines the value of the standardized duration of redemption beyond which the debtor gives up paying back the debt.

The introduction of a flexible subsistence level makes the option „work and pay back the debt“ more attractive, which causes taxpayers to be winners of such a reform. With two winning parties (debtors and taxpayers) and also some of the creditors, there are chances for potential Pareto improvement.

Conclusion 4

It is not possible to reach a Pareto improvement by introducing a flexible subsistence level. Taking into account that some creditors and taxpayers may also profit from the change however, there are chances for potential Pareto improvement.

7.2 Release of the debt

From 1999 there will be a new bankruptcy law in Germany. Households that are deeply in debt may be discharged of at least a part of their debt. Release of debt is known in many countries, especially the anglo-saxonian ones,¹ such as the discharge according to chapter 7 or chapter 13 in the United States. In Swiss law there is no comparable provision to date. A private household may file bankruptcy, but this does not remove its debt (cf. section 3).

Debtors certainly stand to gain from a corresponding change in policy. As to creditors as potential gainers, effects on labour supply appear to be decisive. In order to revert to simulation techniques once more, the model needs to be modified.

1) In England since the 18th century and in the United States since the 19th century [cf. Forsblad (1997)].

Discharge is introduced by a new variable Γ_t which causes the debt of period t to be neutralized,

$$\Gamma_t = -v_{t-1} \cdot (1 + r) \quad (21)$$

Inserting this variable into the equation of motion (9) yields:

$$v_t = v_{t-1} \cdot (1 + r) + w \cdot (1 - l_t) - p \cdot c_t + \Gamma_t \cdot \phi_t \quad (22)$$

Here ϕ_t is a dummy variable which is 1 in the period where the discharge occurs and 0 in all other periods.

For the simulations, the discharge was introduced in the 10th period. This had the same effect as a shortened planning horizon, causing the debtor to give up redemption efforts at a much lower value of the standardized duration of redemption D_s^{crit} . For the household with wage $w = 1$ this critical value is lowered by 38 percent compared to a situation without debt release. For the household with wage $w = 3$, the critical value is lowered by 46 percent and for the household with $w = 5$, by 45 percent.

A discharge of the debt thus has an impact on households which would have otherwise have paid back their debt. For some of them, it is not optimal anymore to supply more labour than necessary for attaining the subsistence level in order to pay off the debt, but rather to wait for the release of it. This kind of behaviour is known as „cheating“ before anticipated tax amnesties, where the expectation of the future amnesty induces additional tax-evasion [cf. for instance *Das-Gupta* (1996) or *Andreoni* (1991)]. In sum, creditors are unambiguous losers in the case of debt release.

As to the taxpayers, there seem to be two opposing effects. On the one hand, they gain from the fact that households which are highly indebted have a fresh start after the discharge, rather than being dependent on public assistance. On the other hand, debtors have an incentive to stay in debt and to receive transfer payments until the release, instead of working and reducing the debt.

Clearly, an unconditional discharge of the debt would hurt creditors' and possibly taxpayers' interests, which makes even a potential Pareto improvement unlikely. Possibly in an attempt to mitigate its negative effects, the future German bankruptcy law grants discharge only on some conditions. Specifically, debtor and creditor must elaborate a plan for rescheduling together with the bankruptcy court. The debtor is forced to leave the attachable part of his income to a trustee for a maximum of 7 years.¹ In the United States, the introduction of the Bankruptcy Code 1978, which opened a relatively easy way to a discharge based on chapter 7 or chapter 13, seems to have been the cause of a doubling of private bankruptcies within 6 years. In response, a few changes to the code

1) Cf. *Forsblad* (1997), S. 201ff.

were made in 1984 in order to improve the protection of creditors. Estimates of the number of individuals who make use of a discharge according to chapter 7 although they could pay back their debt differ widely. *Sullivan et al.* (1989) mention 20 or even 70 percent but arrive at 3 to 9 percent themselves [p. 220]. Effects of a debt release on credit markets were found by *Gropp et al.* (1997). By using data of the U.S. 1983 Survey of Consumer Finances, they found that in states with generous rules for debt release, availability of credit and amounts granted to low-asset households were lower than elsewhere. The same households were also faced with higher interest rates on automobile loans.

To prevent abuse and losses for creditors, a combination of both proposals „flexible subsistence level“ and „release of debt“ could be useful. During a certain period of time the debtor has to repay part of his debt. However, the attachment rate applied should be less than 1. To introduce incentives even for households with high debt, the attachment rate should not be too high. A reasonable value could be 0.7 or 0.6, in accordance with the results of Table 4.

Still there is the problem of ex ante moral hazard. The existence of a release of debt may undermine a household's interest preventing bankruptcy. Yet the duration of attachment, the loss of assets and the loss of reputation as a solvent customer should pose a threat big enough to forestall negligent behaviour in most cases.

Conclusion 5

A release of debt weakens the incentive to pay off the debt, inflicting losses on creditors and possibly on taxpayers as well. By imposing some conditions on partial repayment and introducing a flexible subsistence level, these disadvantages could be mitigated. Still the danger of ex ante moral hazard has to be kept in mind.

8 Summary and conclusions

This paper analyzes the decision situation of a household that is subject to wage attachment. From a dynamic optimization model, the optimal paths for consumption and leisure can be derived. The development of leisure (and hence labour supply) over time depends on the rate of time preference, the interest rate, and the wage rate. The level of labour supply depends on the value of the subsistence level (beyond which income is attached) and the size of the initial debt.

Due to a lack of individual data, the theoretical predictions were checked by a series of simulations. Their results are in accordance with the theoretical model. Of course this test is imperfect, as its results depend on the parameters of the utility function and the rate of time preference. However, the

basic trade-off remains the same: Paying off the debt means less leisure during the current period but free choice of consumption in future.

The procedure of wage attachment currently in force in Switzerland does not appear very successful. Two proposals for reform were discussed in this paper. One is the flexibilization of the subsistence level, the other, the introduction of a debt release (which will become law in Germany in 1999). The results of the simulation predict that there is no scope for Pareto improvement. There is always a party involved whose position deteriorates. Still, a potential Pareto improvement could be possible, especially if taxpayers are introduced as a third party who gain from every increase of labour supply as they are relieved from financing public welfare. A lowering of the attachment rate (from 100 percent at present) would strengthen incentives to work, thus conveying an advantage not only on debtors but taxpayers as well.

A release of debt gives households in high debt a chance for a fresh start. Without it they may be dependent on public welfare for a long time. On the other hand, households do have incentives to stop repaying their debt even if they could once they anticipate a release. The effect on creditors thus is definitely negative, whereas the effect on taxpayers is ambiguous. Making the release of debt conditional on partial repayment and combining it with a flexible subsistence level could lead to better results. A point not discussed in this paper, however, is the issue of ex ante moral hazard in that a release of debt could cause less prevention against bankruptcy [for prevention against bankruptcy cf. for instance *Sethi et al.* (1997)].

According to an interview study, 30 percent of the debtors are unemployed. Improving the incentives to work by reforming the bankruptcy law could therefore be of considerable value. Moreover, 42 percent of the interviewed persons had contact with the bankruptcy office before. This is an indication to the effect that many individuals have great difficulty to get out of debt. Thus the introduction of a flexible subsistence level combined with a conditional release of debt should not be discarded out of hand. Empirical research based on individual panel data is needed for more well-founded conclusions.

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10 Appendix A

This appendix is devoted to the derivation of equation (14) in the text. For a more detailed description of optimal control theory, see cf. *Chiang* (1992, part 3).

The equation of motion (9) has to be rewritten:

$$\dot{v} = v_t \cdot r + w \cdot (1 - l_t) - p \cdot c_t \quad (\text{A } 1)$$

From the objective function (8) and the restrictions (A 1) and (10) to (12), the Hamiltonian can be derived:

$$\begin{aligned} H = \sum_{t=1}^t e^{-\delta \cdot t} \cdot [\alpha \cdot \ln c_t + (1 - \alpha) \cdot \ln l_t] + {}_1\lambda_t \cdot [v_t \cdot r + w \cdot (1 - l_t) - p \cdot c_t] \\ + {}_2\lambda_t \cdot [(p \cdot c_t - m) \cdot v_t] + {}_3\lambda_t \cdot [w \cdot (1 - l_t) - m] + {}_4\lambda_t \cdot c_t + {}_5\lambda_t \cdot l_t \end{aligned} \quad (\text{A } 2)$$

To obtain the equation of motion for leisure, only two of the first-order conditions are needed. Differentiating (A 2) w.r.t. leisure l_t yields:

$$\frac{\partial H}{\partial l_t} = \frac{(1 - \alpha) \cdot e^{-\delta \cdot t}}{l_t} - {}_1\lambda_t \cdot w - {}_3\lambda_t \cdot w + {}_5\lambda_t = 0 \quad (\text{A } 3)$$

The costate equation results from the differentiation of equation (A 2) w.r.t. assets v_t :

$$\frac{\partial H}{\partial v_t} = {}_1\lambda_t \cdot r + {}_2\lambda_t \cdot (p \cdot c_t - m) = -{}_1\dot{\lambda} \quad (\text{A } 4)$$

Solving equation (A 3) w.r.t. l_t we get:

$$l_t = \frac{(1 - \alpha) \cdot e^{-\delta \cdot t}}{{}_1\lambda_t \cdot w + {}_2\lambda_t \cdot w - {}_5\lambda_t} \quad (\text{A } 5)$$

Differentiating of (A 5) w.r.t. time results in the equation of motion,

$$i = \frac{-\delta \cdot (1 - \alpha) \cdot e^{-\delta \cdot t} \cdot ({}_1\lambda_t \cdot w + {}_2\lambda_t \cdot w - {}_5\lambda_t) - (1 - \alpha) \cdot e^{-\delta \cdot t} \cdot ({}_1\dot{\lambda} \cdot w + {}_3\dot{\lambda} - {}_5\dot{\lambda})}{({}_1\lambda_t \cdot w + {}_2\lambda_t \cdot w - {}_5\lambda_t)^2} \quad (\text{A } 6)$$

This can be simplified by using (A 5),

$$i = l_t \cdot \left\{ -\delta + \frac{-{}_1\dot{\lambda} \cdot w - {}_3\dot{\lambda} + {}_5\dot{\lambda}}{{}_1\lambda_t \cdot w + {}_2\lambda_t \cdot w - {}_5\lambda_t} \right\} \quad (\text{A } 7)$$

Finally, $-{}_1\dot{\lambda}$ may be replaced by equation (A 4) to obtain equation (14) in the text:

$$i = l_t \cdot \left\{ -\delta + \frac{{}_1\lambda_t \cdot r \cdot w + {}_2\lambda_t \cdot w \cdot (p \cdot c_t - m) - {}_3\dot{\lambda} \cdot w + {}_5\dot{\lambda}}{{}_1\lambda_t \cdot w + {}_3\lambda_t - {}_5\lambda_t} \right\} \quad (\text{A } 8)$$

11 Appendix B

This second appendix contains a few descriptive statistics from an interview study performed in 1996-97 at 25 Swiss bankruptcy offices in 15 cantons. In this study 187 persons involved in a recovery proceeding were interviewed and 2,705 administrative records were analyzed to complement the interviews.

Table 5 documents the social composition of both samples, analysis of records and interviews. According to both sources, men, individuals in their „thirties“, and immigrants are over-represented.

There is also some information about the financial magnitudes involved. The average value of claims presented by creditors is SFr. 78,544 (some 53,000 US\$ at 1998 exchange rates) in the records and SFr. 13,965 (some 9,400 US\$) in the interview study. The overall debt of a person amounts to SFr. 61,075 (some 41,000 US\$) in average (interview study). The average income of the households is SFr. 2,859 (some 1,900 US\$ per month) which is clearly below the Swiss average. The high fraction of unemployed (29 percent, interview study) could be one reason for the difference. The ratio between debt and household income per year is 1.8 (interviews) and 2.3 (records). In comparison, in the United States this ratio is estimated by *Sullivan et al* (1989) to be 2.5 [p. 135]. One third of the individuals in the sample are subject to wage attachment. The average subsistence level for a single-person household without any alimony liabilities is SFr. 1,997 (1,300 US\$, analysis of records) and SFr. 2,129 (1,400 US\$, interview study).

Table 5 Social composition of debtor samples (Switzerland, 1996-97)

Sex	Analysis of records		Interviews	
Women	855	(32 %)	54	(29 %)
Men	1,813	(68 %)	132	(71 %)
Sum I	2,668	(100 %)	186	(100 %)
No information	37		1	
Sum II	2,705		187	
Age	Analysis of records		Interviews	
under 25	156	(11 %)	17	(9 %)
26 - 30	207	(15 %)	27	(14 %)
31 - 40	437	(31 %)	66	(35 %)
41 - 50	323	(23 %)	52	(28 %)
51 - 60	202	(14 %)	18	(10 %)
> 60	95	(7 %)	7	(4 %)
Sum I	1,420	(100 %)	187	(100 %)
No information	1,285			
Sum II	2,705		187	
Nationality	Analysis of records		Interviews	
Switzerland	725	(60 %)	132	(70 %)
Germany	36	(3 %)	2	(1 %)
France	9	(1 %)	2	(1 %)
Italy	101	(8 %)	9	(5 %)
Former Yugoslavia	98	(8 %)	17	(9 %)
Turkey	52	(4 %)	3	(2 %)
Rest of Europe	80	(7 %)	13	(7 %)
All other	100	(8 %)	9	(5 %)
Sum I	1,201	(100 %)	187	(100 %)
No information	1,504			
Sum II	2,705		187	

Finally, Table 6 shows the three most important categories of creditors. In both samples, the three major claims were retained and the type of creditor recorded. The three most important categories creditors are tax authorities, private and social insurers, and banks.

**Table 6 The three most important creditors
(Percentage of recorded claims, Switzerland 1996-97)**

	Records	Interviews
Tax authorities	23 %	32 %
Private and social insurance	21 %	16 %
Banks and trustees	12 %	17 %