The Saving Gateway: Implications for Optimal Saving

Matthew D. Rablen*
Brunel University

June 2010

Abstract

The Saving Gateway is a government saving initiative aiming to 'kick-start a saving habit for those on low incomes'. Funds saved in a Saving Gateway account up to a monthly limit are matched by the government at a rate of £0.50 per £1 saved after two years. A Saving Gateway account is embedded alongside an ordinary interest-bearing account in a simple lifecycle savings model to assess the implications of the scheme for optimal saving. Among the findings are that, for agents with access to credit, the Saving Gateway is associated with a fall in saving during the life of the account and a rise in consumption. However, the scheme increases saving by the credit constrained. On their own, empirically plausible levels of habit formation in consumption preferences have too small an effect on saving to justify the scheme.

JEL Classification: D91, H30
Keywords: Saving Gateway, Saving incentives, Matching payments, Habit formation.

*Correspondence: Department of Economics and Finance, Brunel University, Uxbridge, UB8 3PH. E-mail: matthew.rablen@brunel.ac.uk

1 Introduction

In addition to evidence of an apparent 'savings gap' afflicting households in the UK - around half of whom have less than £1,500 in savings according to the 2006-07 Family Resources Survey (FRS) - there is evidence that the problem is especially acute among low income households. For instance, FRS data also show that 43 per cent of the lowest income households have no savings or assets at all, compared with an average of 24 per cent across all households (Kempson and Finney, 2009).

The former Labour government sought to address this problem through the idea of asset-based welfare (HM Treasury, 2001a,b), which emphasises the importance of asset-holding in determining individuals' education, employment, and wellbeing (Sherraden, 1991). In order to promote asset-based welfare, the Labour government designed two principal initiatives: the Child Trust Fund (launched in 2002) and the Saving Gateway. Although the newly elected coalition government has announced its intention to end the Child Trust Fund, the Saving Gateway will be launched in July 2010, having received cross-party support during its passage through parliament. While there remains an important debate as to the merits of asset-based welfare more generally (see e.g. Emmerson and Wakefield, 2001), this paper focuses on its proposed implementation in the form of the Saving Gateway.

The Saving Gateway consists of an account that lasts for two years. Eligibility for Saving Gateway accounts consists of those in receipt of the main means-tested benefits and credits.[1] Each month, participants can deposit up to £25 in a Saving Gateway account. Saving Gateway providers - initially the Post Office and two high-street banks - have the option of paying interest

[1] The precise eligibility criteria are individuals in receipt of Income Support, Jobseeker's Allowance, Incapacity Benefit, Severe Disablement Allowance, Carer's Allowance, and Child and Working Tax Credits (with income below a specified level - currently £16,040 per annum).

on credit balances, but are not required to do so. Upon maturity of the account, the government will match the qualifying balance at a rate of £0.50 per £1.00 saved, where the qualifying balance is the highest balance achieved during the life of the account (excluding any interest). Withdrawals from the account are permitted, but cannot exceed the credit balance of the account.

The design of the Saving Gateway, in particular the use of matching payments, is partly influenced by experiments with Individual Development Accounts (IDAs) in the USA. However, unlike IDAs, the Saving Gateway contains no commitment to financial education, and the proceeds of the Saving Gateway account are unrestricted in use.

The stated aims of the Saving Gateway are to ‘kick-start a saving habit among working age people on lower incomes’ and to ‘promote financial inclusion by encouraging people to engage with mainstream financial services’ (HM Treasury, 2008). The first aim is designed to exploit the idea that people are susceptible to habit formation in their consumption behaviour, which can be modelled as a latent dependency between present and past consumption in utility. If agents with habit formation preferences can be induced to increase their saving, even for only a short period, this can potentially generate a lasting impact on their future saving behaviour.

The second aim is of diminished importance - and may even be redundant - as, with benefit books having been phased out, all persons eligible for a Saving Gateway account must already have at least a (basic) bank account or a Post Office Card Account (POCA). Therefore, if one views such products as mainstream (there are over 4.7 million POCAs), then Saving Gateway participants already have the level of engagement being sought.[2]

[2] More generally, the latest report of the Financial Inclusion Taskforce (2009) shows that the number of households without access to a bank account of any kind fell from 1.8 million in 2002/03 to 0.69 million in 2007/08 for reasons unconnected to the Saving Gateway. Of the 0.69 million unbanked customers, around 0.59 million have a POCA.

The Saving Gateway has received a mixed response in the literature. The scheme receives strong support from those who argue that existing incentives in the form of tax relief on savings yield no benefit to non-taxpayers (Altmann, 2003); or who argue that the Saving Gateway can generate significant increases through time in the asset holdings of low income individuals (e.g. Sodha and Lister, 2006).

On the other hand, the results of a large-scale pilot of the Saving Gateway involving over 22,000 participants, uncovered only very limited evidence of reduced consumption, and no discernible evidence of increased net worth, among pilot participants (Harvey et al., 2007).[3] Concerns have also been raised about the targeting of the Saving Gateway, since a substantial minority of those on the lowest incomes have more than £500 in financial assets and, of the remainder, many may have good reasons for not saving (Emmerson and Wakefield, 2003). Using simple numerical examples, Emmerson and Wakefield (2003) also discuss ways in which the introduction of the Saving Gateway might affect the optimal savings decisions of participants. In particular, the authors argue that the scheme might provide incentives to transfer existing assets into Saving Gateway accounts, and to borrow from other sources in order to maximise the balance of the Saving Gateway account.

In this paper I extend the analysis of Emmerson and Wakefield (2003) by offering a detailed appraisal of the implications of the Saving Gateway for optimal saving behaviour before, during, and after participation in the scheme. I employ theoretical and simulation techniques to analyse a lifecycle model of saving, extended to allow for the existence of the Saving Gateway. I analyse the Saving Gateway under three main sets of assumptions: the baseline case

[3] An earlier, smaller-scale, pilot provides encouraging evidence regarding levels of saving in the Saving Gateway accounts themselves. However, the evaluation of the pilot (Kempson, McKay and Collard, 2005) does not perform the types of test on net worth and consumption needed to evaluate whether saving, broadly defined, increased.

is that in which agent's gain utility only from current consumption (no habit formation) and are free of credit constraints, while the second case introduces credit constraints. Given its importance to the rationale for the scheme - the third case I consider is that in which agents exhibit habit formation preferences.

I compare policy outcomes under the Saving Gateway with those under a benchmark 'do nothing' option. I also compare the outcomes of the Saving Gateway relative to those generated by an alternative policy option that entails the same level of subsidy to those on low incomes. In particular, I analyse a one-off lump-sum increase in the qualifying benefits and credits (the lump-sum option). This analysis extends the government's own formal appraisal of the Saving Gateway (HM Treasury, 2008, pp. 37-42), which is only against 'do nothing'.

Quantitatively, the model suggests that the impact of the scheme on saving behaviour depends in a complex way on the parameters of the model. Qualitatively, however, the model yields a number of clear findings. First, if agents have access to credit, I find that the Saving Gateway is associated with reduced levels of asset-holding during the life of the Saving Gateway account - implying that saving observed in the Saving Gateway is more than offset by dissaving elsewhere. To the extent that agents are able to anticipate their future participation in the Saving Gateway, the scale of this effect is magnified. By contrast, if agents are credit constrained, the scheme is associated with an increase in asset-holding during the life of the account.

Second, the wealth effect engendered by the matching payment results in an increase in consumption in all periods beyond the life of the Saving Gateway account. For those with access to credit, the increase in consumption occurs from as early as the period in which the Saving Gateway account is opened.

Third, in spite of the prominence of habit effects in the rationale for the Saving Gateway, I find that the presence of either habit formation or durability in preferences has no important quantitative or qualitative implications for the impact of the Saving Gateway on saving behaviour.

Last, notwithstanding the issues above, I find that the Saving Gateway yields higher levels of asset-holding over the remainder of the lifecycle as the government match is consumed. For credit constrained agents, this effect exceeds that produced by the wealth effect associated with the matching payments. However, for agents with access to credit, an identical outcome can be achieved at a lower cost through a lump-sum transfer.

The plan of the paper is as follows: Section 2 motivates a lifecycle analysis of the Saving Gateway. Section 3 presents the model. Section 4 analyses the implications for optimal saving of participation in the Saving Gateway, and how these compare to those arising from a simple lump-sum transfer. Section 5 analyses the special case of the model with habit formation preferences. Section 6 concludes.

2 Modelling the Saving Gateway

The paper utilises a simple lifecycle model of savings, a key feature of which is that agents are assumed to be saving optimally at all points in the lifecycle, including before the introduction of the Saving Gateway. However, it might be argued that this feature of the lifecycle approach makes it inherently unlikely to provide a positive assessment of a scheme aiming at 'kick-starting a saving habit'.

According to this view, a more favourable framework might be provided by time inconsistent models of consumption with quasi-hyperbolic discounting (e.g. Gruber and Kőszegi, 2004), in which some agents might not be saving optimally before the scheme (they would like to save more than they actually do). It remains debated, however, as to whether effects due to bounded self control are economically significant: for instance, Scholz, Seshadri and

Khitatrakun (2006) find empirical evidence that the standard lifecycle model is a powerful predictor of patterns in saving behaviour.

A further feature of the model is that the Saving Gateway is assumed to be able to exploit preexisting features of agents' preferences (e.g. a susceptibility to forming habits), but is not able to systematically change preferences. This assumption corresponds the economic orthodoxy that preferences are fixed and unchallengeable axioms of an agent's behaviour (Stigler and Becker, 1977).

An alternative viewpoint might be that the Saving Gateway is capable of changing preferences. Against this viewpoint is the absence in the scheme of provision for financial education (despite it being a feature of the second Saving Gateway pilot). There is evidence that financial education, whether provided through the workplace (Bernheim and Garrett, 2003) or through schools (Bernheim, Garrett and Maki, 2001), has a positive effect on individuals' subsequent saving rates. Equally, however, the possibility of preference change should not be dismissed, and I briefly explore its implications in Section 5.

3 Model

In this section I extend a simple lifecycle model of saving to allow for a Saving Gateway account. Throughout the lifecycle, agents are assumed to have access to a standard interest-bearing investment account (herein referred to as the 'bank' account), and, for a time-limited period, to have access to a Saving Gateway account. During the life of the Saving Gateway account, agents therefore have a choice of investment instruments, which allows an analysis of not only saving behaviour in the Saving Gateway account, but also how the presence of a Saving Gateway account potentially alters saving behaviour in the bank account.

There are three types of agent - borrowers, savers and the credit-constrained - indexed by $i = B, S, CC$. Borrowers and savers are distinguished by a per-period discount factor denoted δ_i, but are otherwise identical in all other respects. Under the 'do nothing' option savers optimally choose to hold a positive asset balance in the bank account, while borrowers find it optimal to hold a strictly negative asset balance in the bank account. This necessarily implies the restriction $\delta_S > \delta_B$. Credit constrained agents are distinguished by having no access to credit on reasonable terms (they face a rate of interest $r_{CC} \rightarrow \infty$ on debit balances).

As the Saving Gateway requires participants to make monthly saving decisions, I take each period of the model to represent a month. Agents live for n periods and receive an exogenous monthly income of y, used to finance consumption c_t^i. In each period, t, agents can choose to save an amount s_t^i in the bank account. Savers receive a monthly rate of interest r_S on credit balances, while borrowers pay interest at a rate r_B on debit balances, where $r_B \geq r_S$. These assumptions are intentionally strong in order to focus attention on the effects on saving of participation in the Saving Gateway, and eliminate complications due to retirement and uncertainty over lifespan and income.[4]

The Saving Gateway account is opened in period $t = a$ and matures in period $t = b$ (implying a duration of $d \equiv b - a + 1$ periods). In the baseline case I assume that agents are unaware of their future participation the Saving Gateway prior to opening their account in period a. In Section 4.4 I relax this assumption to explore the impact of agents anticipating their future participation in the scheme.

During its life, agents can choose to save an amount g_t^i in the Saving Gate-

[4] A further motivation, not unimportant in practice, is the need to minimise the complexity of the model to make simulation over a large number of periods computationally feasible.

way account in each period t, subject to the monthly cap $g_t^i \leq \overline{g}$ and the requirement that withdrawals cannot exceed the credit balance of the account, $g_t^i \geq -\sum_{j=a}^{t-1} g_j^i$. The matching payment is made at time $t = b+1$ at the rate m, where m exceeds the market rate of interest available to savers $(m > r_S)$. To maximise the distinction between the two types of account, I assume that credit balances in the Saving Gateway account do not earn interest. This assumption also seems likely to be realistic as there are limited incentives for providers to increase further the already generous returns offered by the account.

Given these assumptions consumption can be written as:

$$c_t^i = \begin{cases} y + s_{t-1}^i (1+r_i) - s_t^i & t = 1, ..., a-1 \\ y + s_{t-1}^i (1+r_i) - s_t^i - g_t^i & t = a, ..., b \\ y + s_{t-1}^i (1+r_i) - s_t^i + (1+m) \max_{j \leq b} \sum_{k=a}^{j} g_k^i & t = b+1 \\ y + s_{t-1}^i (1+r_i) - s_t^i & t = b+2, .., n \end{cases}$$

Agents act as if they maximise lifetime utility, in which case their problem can be written as:

$$\max_{s_t^i, g_t^i} \sum_{t=1}^{n} \delta_i^{t-1} U \left[c_t^i \right]$$

subject to $s_t^i = s_t^i |_{\overline{g}=0}$ for $t < a$, $s_0^i = s_n^i = 0$, $c_t^i \geq 0$ and $g_t^i \in [-\sum_{j=a}^{t-1} g_j^i, \overline{g}]$. The first constraint imposes that, prior to period a, saving behaviour corresponds to the equilibrium of the model under the 'do nothing' option - achieved by 'turning off' the Saving Gateway ($\overline{g} = 0$).

The Euler equations characterising an interior optimum for investment in each type of account are:

$$\begin{array}{ll} s_t^i : \delta_i (1+r_i) = \frac{U'\left[c_t^i\right]}{U'\left[c_{t+1}^i\right]} & t = 1, ..., n-1 \\ g_t^i : \delta_i^{b-t+1} (1+m) = \frac{U'\left[c_t^i\right]}{U'\left[c_{b+1}^i\right]} & t = a, ..., b \end{array} . \qquad (1)$$

As I shall go on to discuss, however, the optimum involves a corner solution for at least one of (s_t^i, g_t^i), so the two Euler equations in (1) do not hold simultaneously. While the Euler equations for s_t^i have a familiar interpretation, it is instructive to interpret those for g_t^i. They show that when investing in period t, an agent must wait $(b - t + 1)$ periods to obtain the matched payment. This implies that, even in a world of certainty, the underlying incentive to save in the Saving Gateway is not constant over time. For instance, saving £25 in $t = a$ yields a final sum (after matching) of £37.50 two years hence, equivalent to an annual percentage rate (APR) of 22.5 per cent. Conversely, investing £25 in $t = b$ yields £37.50 the very next month, equivalent to an APR of 12,875 per cent.

In this sense, although the matching payments made under the Saving Gateway can be converted in to an implied interest rate - 44.4 per cent for an agent contributing the maximum £25 each month - the underlying incentives to save generated by matching are quite different to those generated by the payment of interest.

3.1 Simulation

To help elucidate implications of the Euler equations in (1) I perform simulations of the model. A difficulty with allowing periods to correspond to months is that the full post-educational lifecycle requires over 700 periods. For computational reasons, I restrict the simulation to 200 periods, which somewhat exaggerates the duration of the Saving Gateway as a proportion of the lifecycle, but nevertheless preserves the intuition that it is small.

Utility in period t is given by $U[c_t] = \log[c_t]$. The choice of utility function is informed by a number of factors. First, the logarithmic specification exhibits prudence in the sense of Kimball (1990) and is therefore consistent with evidence of precautionary saving. Second, economic theory provides no a-priori presumption that offering a high rate of matching acts as an incentive to save, due to opposing income and substitution effects. While many economists think the elasticity of intertemporal substitution (EIS) is positive, the empirical evidence is mixed at best: many studies find evidence that the EIS is zero (e.g. Hall, 1988).

If the EIS is zero, or even negative, it is immediate that the Saving Gateway will fail to increase saving, as indeed Engen, Gale and Scholz (1996) argue is true of most saving incentives. However, logarithmic utility presents a more interesting case as it implies a unit EIS - a feature that is also consistent with the findings of recent empirical studies (e.g. Vissing-Jorgensen, 2002).

Given logarithmic utility, under the 'do nothing' option an agent will hold a positive level of assets in the bank account if $\delta > (1 + r_S)^{-1}$; a zero level of assets in the bank account if $\delta \in \left[(1 + r_B)^{-1}, (1 + r_S)^{-1}\right]$; and a negative level of assets if $\delta < (1 + r_B)^{-1}$. I therefore set:

$$\delta_S = (1 + r_S)^{-1} + \lambda; \qquad \delta_B = (1 + r_B)^{-1} - \lambda;$$

where $\lambda > 0$ is a constant. For credit constrained agents, the most interesting case to consider is that in which they enter the Saving Gateway with no accumulated stock of assets. I therefore assume $\delta_{CC} = (1 + r_S)^{-1}$.

Based on current UK capital market conditions I assume a 2 per cent APR on assets held in the bank account (implying $r_S \approx 0.0017$), and an APR of 17 per cent (implying $r_B \approx 0.0132$) on funds borrowed from the bank account. The latter rate is typical of what is presently offered on UK credit card borrowing. For $\lambda = 0.0001$ these rates of return yield $\delta_S \approx 0.998$ and $\delta_B \approx 0.987$. These estimates fall either side of Samwick's (1998) empirical estimate of $\delta = 0.993$ for the median rate of time preference in the 1992 Survey of Consumer Finances.

Given that the Saving Gateway is explicitly aimed at those below retirement age, I assume that agents participate in the Saving Gateway in the first half of the lifecycle ($a = 30$). In principle, agents can choose the optimal time at which to take up their eligibility for the Saving Gateway. Since time is discounted, there is an incentive to participate at the earliest possible opportunity, however, this might be offset by the desire to build-up an existing stock of assets so as to maximise contributions to the scheme while minimising the requirement to borrow. However, I choose not to optimise explicitly on the parameter a, as to do so in a sensible fashion would require a much more detailed specification of model than that employed here.

Based on the prevailing level of UK benefits, I assume a monthly net income $y = \pounds 400$, though it is accepted that recipients of tax credits, in particular, could be earning well in excess of this sum, while those on, for instance, Jobseeker's Allowance could be earning somewhat less. The remaining parameters are set to mirror the actual design of the Saving Gateway, so $d = 24$, $m = 0.5$, and $\overline{g} = 25$.

4 Analysis

4.1 Contributions to the Saving Gateway Account

To analyse the level and timing of contributions to the Saving Gateway account it is instructive to begin by considering behaviour at $t = b$, as investing in the Saving Gateway account a single period prior to the receipt of the matching payment is equivalent to investing in the bank account, except that the implied rate of return is m. For savers with an existing stock of assets it is therefore always possible to increase c_{b+1}, holding c_b constant, by dissaving in the bank account at rate r_S and placing these assets in the Saving Gateway at rate m (a borrow-to-save strategy). Since $m > r_S$, the matching payment in period $b + 1$ exceeds the costs associated with dissaving in period b. The only difference for agents without existing assets is that they must borrow funds, so the argument requires $m > r_B$. As the surplus in period $b + 1$ can be achieved at no loss of consumption in period b, such a strategy is always beneficial whenever more consumption is preferred to less (monotonicity).

As the surplus that can be generated in this way is increasing in g_b^i, if an agent can dissave at a rate less than m, any contribution to the Saving Gateway other than the maximum cannot be optimal, so $g_b^i = \overline{g}$. Alongside investing the maximum in the Saving Gateway an agent may also optimally choose to also save/borrow an additional amount in the bank account, where this amount is determined by the Euler equation for s_b^i in (1).

Turning to period $b-1$, suppose $(1+m) > (1+r_i)^2$, then by substituting the Euler equation for s_b^i into that for s_{b-1}^i, the optimum must satisfy:

$$\begin{array}{r} s_{b-1}^i : \delta_i^2 \left(1+r_i\right)^2 = \frac{U'\left[c_{b-1}^i\right]}{U'\left[c_{b+1}^i\right]} \\ g_{b-1}^i : \delta_i^2 \left(1+m\right) > \frac{U'\left[c_{b-1}^i\right]}{U'\left[c_{b+1}^i\right]} \end{array},$$

from which it follows that a surplus in $b+1$ can again be obtained through a borrow-to-save strategy in period $b-1$. Extending this logic yields that $g_t^i = \overline{g}$ is optimal in period t when it holds that:

$$1+m > \left(1+r_i\right)^{b-t+1}. \tag{2}$$

Since the right-hand side of (2) is decreasing in t, contributing the maximum to the Saving Gateway account in every period is optimal if (2) is satisfied at $t=a$:

$$1+m > \left(1+r_i\right)^{d}. \tag{3}$$

For $d=24$ and $m=0.5$ the condition in (3) is met for APRs of less than 22.5 per cent.[5] This implies that savers earning the market rate of interest,

[5] Note that the required rate of 22.5 per cent is the implied rate of return on contributions to the Saving Gateway in $t=a$.

or borrowers able to obtain credit at the rate r_B, are predicted to contribute the maximum to the Saving Gateway in every period.

However, this prediction will not hold for all borrowers. For instance, unsecured loans of up to £500, targeted at those on low incomes, are presently on offer at APRs in the region of 250-300 per cent.[6] At these rates, a borrow-to-save strategy only becomes operable in the final three periods of the Saving Gateway account. Other, so-called 'payday' loans, are on offer at APRs in excess of 1,500 per cent, for which a borrow-to-save strategy is only operable at $t = b$.

For such credit constrained agents, who cannot utilise borrow-to-save strategies, the optimality of investing the maximum in the Saving Gateway is no longer immediate. Whether the monthly cap $g_b^i \leq \overline{g}$ is binding for such agents depends on their willingness and ability to invest in the Saving Gateway out of current income. Suppose at $t = b$ that an agent optimally invests an amount $g_b^i < \overline{g}$ in the Saving Gateway (so $g_b^i \leq \overline{g}$ is non-binding). Then, turning to period $b - 1$, by substituting the Euler equation for g_b^i into the Euler equation for s_{b-1}^i I have:

$$\begin{array}{l} s_{b-1}^i : \delta_i^2 \left(1 + r_i\right)\left(1 + m\right) = \frac{U'\left[c_{b-1}^i\right]}{U'\left[c_{b+1}^i\right]} \\ g_{b-1}^i : \delta_i^2 \left(1 + m\right) < \frac{U'\left[c_{b-1}^i\right]}{U'\left[c_{b+1}^i\right]} \end{array}.$$

It follows that any assets saved at $t = b - 1$ are optimally held in the bank account, not the Saving Gateway account. Extending this logic, the optimal saving path is to save nothing in the Saving Gateway until the final period, $t = b$. More generally, if an agent will have a total of £45 to invest in the Saving Gateway with $\overline{g} = 25$, this is optimally invested as £0 in $t = a, .., b-2$, £20 in $t = b - 1$ and £25 in $t = b$.

[6] For instance, Provident Financial, one of the UK's largest providers of unsecured loans, presently offers loans of £300 repaid over 52 weeks with a typical APR of 272.2 per cent (June 2010).

Summarising this analysis, the use of matching payments for Saving Gateway accounts implies that the optimal contribution in each period is usually either nothing or the maximum. This prediction of the model is consistent with evidence from the Saving Gateway pilots: for instance, Kempson, McKay and Collard (2005, p. 53) report that in the first pilot "the two most common amounts being saved were £25 (the maximum) and zero."

The observation that determination of the optimal level of saving in the Saving Gateway in most cases relies only on arguments relating to the monotonicity of preferences implies that many factors that conventionally influence saving decisions - such as time and risk preferences, prudence, and the EIS - play a much reduced role. While this simplicity is argued by some to be a virtue, there is a danger that the saving decisions agents face in the Saving Gateway fail to replicate those they face in the market more generally.

4.2 Asset-holding

To analyse the implications of the Saving Gateway for asset-holding over the lifecycle I turn to simulation findings. In each period I calculate the total holding of assets (A_t^i) comprising those held both in the bank and Saving Gateway accounts:

$$A_t^i = \begin{cases} s_t^i & t = 1, ..., a-1 \\ s_t^i + \sum_{j=a}^t g_j^i & t = a, ..., b \\ s_t^i & t = b+1, .., n \end{cases}$$

To generate the level of asset-holding that agents make under the 'do nothing' option I simulate the model without the Saving Gateway ($\overline{g} = 0$). The additional asset-holdings generated by the Saving Gateway are therefore measured as $A_t^i - A_t^i \mid_{\overline{g}=0}$.

I also compare the impact of the Saving Gateway to that from making a one-off lump-sum transfer - of an identical amount to the matching payment - at time $t = b$ through the qualifying benefits and credits (the lump-sum option). For instance, an agent who would save the maximum under the Saving Gateway option receives a £300 transfer under the lump-sum option. To ensure full comparability between options I assume that, as for the Saving Gateway, agents become aware of the future transfer only in $t = a$.

Because the lump-sum option generates a pure wealth effect of an identical size to that under the Saving Gateway, differences in outcomes between the two options ($A_t^i - A_t^i|_{\Delta y}$) can be interpreted as behavioural (substitution) effects arising from the Saving Gateway scheme, separate from wealth effects. The distinction is of importance as, if the Saving Gateway is only a transfer from government to those on low incomes, aggregate saving across government and households is unchanged.

Figures 1a-1c show asset-holding under the 'do nothing', Saving Gateway, and lump-sum options for, respectively, savers, borrowers, and the credit constrained. Several aspects are noteworthy. First, since Figures 1a-1c do not break down saving in the two accounts separately, it is necessary to clarify that all three types find it optimal to invest the maximum in the Saving Gateway account in each period. Indeed, the simulation results suggest that only those who are credit constrained and additionally very strongly disinclined to save, and/or with extremely low incomes, do not find it optimal to invest the maximum. Second, for all types, there is a discernible spike in asset-holding in period $b + 1$, which reflects the receipt of the matching payment.

Third, for savers and borrowers (Figures 1a-1b), the Saving Gateway is associated with a reduction in asset-holding during the life of the Saving Gateway account. For there to be positive saving in the Saving Gateway account and also a reduction in total asset holdings, requires that, on the optimal saving path, every £1 saved in the Saving Gateway is associated with more than £1 dissaved in the bank account. That asset-holding actually falls is a stronger finding than that implied by the pure borrow-to-save strategy discussed in

Emmerson and Wakefield (2003), under which every £1 saved in the Saving Gateway is precisely offset by £1 dissaved elsewhere.[7]

By comparison with the lump-sum option, the finding can be seen to arise from the wealth effect of the matching payments: the logic of consumption smoothing demands that if an agent knows they will receive a matching payment - which will increase future consumption - then this should be anticipated by increasing present consumption.

The prediction that asset-holding falls during the life of the Saving Gateway is consistent with the failure of the evaluation of the second Saving Gateway pilot to detect evidence of an increase in net worth among pilot participants (Harvey et al., 2007). A further implication of the analysis is that the incentive to increase present consumption must fade the lower is the match rate (which determines the extent of increased future consumption). This prediction is consistent with evidence from US experiments into IDAs, which finds an inverse relationship between saving and the match rate (Schreiner, 2001).

A fourth observation (again for savers and borrowers) is that, were Saving Gateway balances to attract the market rate of interest in addition to the government match, the impact of the scheme would be identical to that under the lump-sum option. As, however, I assume no interest is paid on Saving Gateway balances, the Saving Gateway is predicted to generate a small behavioural effect - but importantly this effect acts to reduce asset-holding. As such, aggregate saving is predicted to fall in such cases. The lump-sum option is able to dominate the Saving Gateway in the sense that, at the same cost, it generates greater asset holdings in every period $t \geq a$.

[7] Closer inspection of Figures 1a and 1b also shows that borrowers dissave in the bank account more sharply than do savers, despite facing a higher cost of capital. Also, the severity of asset switching increases over the life of the Saving Gateway account, peaking at maturity.

Last, the findings for savers and borrowers discussed above do not hold for the credit constrained. For these agents (Figure 1c) the Saving Gateway is associated with increased asset-holding as agents now find it optimal to finance contributions to the Saving Gateway through additional saving (reduced consumption). Because the credit constrained are assumed not to not save under ‘do nothing’, all assets held in the Saving Gateway represent genuinely additional asset-holding as a result of participation in the scheme. The Saving Gateway therefore dominates the lump-sum option in the sense that it generates greater asset holdings in every period $t \geq a$.

To summarise this analysis, whether the Saving Gateway is observed to increase or decrease asset-holding during the life of the Saving Gateway account hinges on an agent’s access to credit: agents with access to credit hold fewer assets than under ‘do nothing’, while the credit constrained hold greater.

Beyond the life of the Saving Gateway account, all agent types experience higher asset holdings over the remainder of the lifecycle relative to under ‘do nothing’, so the scheme achieves a measure of success from an asset-based welfare perspective. However, for unconstrained savers and borrowers an equivalent effect can be achieved under the lump-sum option for a smaller subsidy than under the Saving Gateway. Only for the credit constrained does the effect outweigh that arising under the lump-sum option.

4.3 Consumption

If the aim of ‘kick-starting a savings habit’ is met, agents will be observed to increase their saving out of current income beyond the life of the Saving Gateway account. In the absence of a change in income, this necessarily implies a reduction in consumption (relative to under ‘do nothing’).

Figure 2 shows the change in consumption attributable to the Saving Gateway, $\Delta c_t^i \equiv c_t^i - c_t^i\,|_{\overline{g}=0}$, over the lifecycle. For both savers and borrowers Δc_t^i

is positive for all periods $t > a$. Therefore, rather than consumption being predicted to fall after participation in the Saving Gateway, the model predicts the opposite behavioural response. Moreover, consumption rises from the moment the Saving Gateway account is opened, not only after it has matured. The findings are due in a straightforward way to the wealth effect arising from the receipt of the matching payment.

The picture is, however, somewhat different for the credit constrained (Figure 2), for whom the Saving Gateway is associated with a reduction in consumption during the life of the account. However, this temporary reduction in consumption is reversed by the wealth effect once the Saving Gateway account matures. Therefore, irrespective of credit constraints, the model finds no evidence to suggest that the Saving Gateway is associated with subsequent falls in consumption.

4.4 Prior Effects

Thus far, the analysis has assumed that agents do not anticipate their future participation in the Saving Gateway in advance of opening their account. However, if agent's anticipate their future eligibility, or if they choose to wait before opening their account (perhaps to first build-up a stock of assets), this assumption is violated.

To examine the implications of such prior anticipation, I simulate a version of the model in which agents anticipate their future participation in the Saving Gateway in period p, where $p < a$. The results shown here assume that participation is anticipated by a year, such that $p = a - 12$. Figure 3 shows the predictions of the model for savers. Under anticipation asset-holding does not only fall during the life of the Saving Gateway account, but from $t = p$, the period in which participation is first anticipated. Comparing Figure 1a (no anticipation) with Figure 3, it can be seen that the effect of anticipation is to exacerbate the fall in asset-holding associated with the Saving Gateway during the life of the account.

The qualitative result for borrowers under anticipation is identical to that for savers. However, for credit constrained agents, anticipation provides an opportunity to build-up a stock of assets before opening a Saving Gateway account. As such, the Saving Gateway is associated with increased asset-holding between $t = p$ and $t = a$. However, because the credit constrained then enter the Saving Gateway with positive assets, they are able to finance some proportion of their contributions through asset switching rather than through reduced consumption. The principal effect is therefore one of timing: some accumulation of assets is brought forward to the period prior to the opening of the Saving Gateway account.

5 Habit Formation

One reason that might explain the failure of the model to predict lower consumption upon the maturity of the Saving Gateway account is that the specification of preferences employed so far assumes no latent dependency between consumption choices today and those made in previous periods, despite the presumption of such a dependency being a key motivator of the design of the Saving Gateway.

The effect of habit formation on decision making is discussed in the economics literature as far back as Marshall (1890) and Duesenberry (1949). The concept provides a theoretical explanation of the excess sensitivity (Constantinides, 1990), and equity-premium (Campbell and Cochrane, 1999) puzzles. The most common specification of habit formation is to write utility as $U\left[c_t^i - \gamma c_{t-1}^i\right]$.[8] The parameter γ measures the strength of habit formation

[8] Studies employing this specification include Muellbauer (1988), Carroll and Weil (1994), Alessie and Lusardi (1997), Guariglia and Rossi (2002), Angelini (2009) and Alessie and Teppa (2010).

in preferences. If γ is positive utility exhibits habit formation in the traditional sense, and higher values of γ imply a stronger role for habits. If γ is negative then utility exhibits what Deaton (1992) terms durability, in the sense that not only current, but also past consumption generates utility.[9]

Despite its prominence in the theoretical literature, empirical evidence of habit formation in consumption decisions is weak and inconclusive. For habit formation to resolve the excess sensitivity of consumption requires γ to be at least 0.8 (Constantinides, 1990). However, empirical estimates of γ vary from $\gamma = -0.25$ (Guariglia and Rossi, 2002) to $\gamma = 0.21$ (Alessie and Teppa, 2010), with many studies being unable to distinguish γ from zero (e.g. Dynan, 2000). It is unclear, therefore, that habit formation in consumption decisions is sufficiently robust an empirical phenomenon to justify being a centrepiece of government saving policy.

This concern notwithstanding, I simulate the model with habit formation preferences. To take account of the spread of the empirical estimates, I run simulations for both $\gamma = \pm 0.25$. The earlier analysis (that does not allow for habit formation) corresponds to $\gamma = 0$. I calculate the difference between asset-holding under the Saving Gateway and that under 'do nothing', i.e. $\Delta A_t^i \equiv A_t^i - A_t^i|_{\overline{g}=0}$. Estimates using $\gamma = -0.25$ are labelled ΔA_t^{i-}, while those using $\gamma = 0.25$ are labelled ΔA_t^{i+}. I also compare outcomes under the Saving Gateway to those under the lump-sum option ($\Delta A_t^i|_{\Delta y} = A_t^i - A_t^i|_{\Delta y}$).

Figure 4a shows results for ($\Delta A_t^{S-}, \Delta A_t^S, \Delta A_t^{S+}$) and the corresponding three measures under the lump-sum option. The reader could be forgiven for thinking that Figure 4a depicted only two lines, for to a very close approximation, the policy impact, whether under the Saving Gateway or under the lump-sum option, is invariant to the three possible settings of γ. As such, the earlier

[9] A related approach to modelling the formation of a savings habit is Becker and Murphy's (1988) economic model of rational addiction. However, addiction may be too strong a paradigm in the case of saving, which is not known for being overtly addictive.

analysis of Section 4, which assumes $\gamma = 0$, is robust to plausible levels of either habit formation or durability.

In interpreting this finding, it is important to understand that allowing for habit formation does have a quantitatively significant impact on predicted levels of asset-holding over the lifecycle. In particular, positive values of γ are associated with higher levels of asset-holding over the lifecycle. However, because this level effect is common to both A_t^i and $A_t^i\,|_{\overline{g}=0}$, it is eliminated in the calculation of ΔA_t^i, from which the finding follows.

Figure 4b depicts the results for the credit constrained (ΔA_t^{CC-} and ΔA_t^{CC+}). Although in this case there is a visually discernible difference in outcomes between the two settings - higher asset-holding for $t \geq a$ is predicted under habit formation than under durability - the effect is still quantitatively small, and does not alter the qualitative implications of the analysis using $\gamma = 0$.

In the case of savers, how large would γ have to be before a discernible difference arises between ΔA_t^{S-} and ΔA_t^{S+}? Figure 5 depicts the model for $\gamma = \pm 0.5$ (twice the range of γ found empirically). While a visually discernible difference becomes present, the effect remains quantitatively small.

As discussed in Section 2, a more radical alternative view is that participation in the Saving Gateway is able to alter agent's preferences. Consistent with the aim of the Saving Gateway to 'kick-start a saving habit' I analyse the case whereby agents experience an unanticipated preference change - from $\gamma = 0$ to $\gamma = 0.25$ - during their participation in the Saving Gateway. Qualitatively similar results obtain if the preference change is assumed to be from $\gamma = -0.25$ to $\gamma = 0$. The preference change is assumed to occur at time $t = c$, where, for simplicity, I take c to be halfway through the Saving Gateway account ($c = (a + b)/2$).

Figure 6 depicts asset-holding by borrowers under the Saving Gateway option, both under taste-change (denoted $A_t^i\,|_{\Delta\delta}$), and with fixed preferences.

Allowing for taste change is seen to generate higher predictions for asset-holding in all periods $t \geq c$. Moreover, beyond $t = b$ the difference in the predicted levels of asset-holding is seen to grow continuously over almost the entire remaining lifecycle, implying that under taste change the model predicts lower levels of consumption beyond the life of the Saving Gateway account.

Summarising this analysis, on its own, introducing plausible degrees of habit formation or durability into preferences generates too small an effect to influence, either quantitatively or qualitatively, the analysis of the previous section. As such, habit formation effects would not appear to warrant their centrepiece role in the rationale for the Saving Gateway. If, however, participation in the Saving Gateway is able to raise an agent's value of γ, the impact of the Saving Gateway becomes somewhat more different to that generated by a pure wealth effect, even in the absence of credit constraints: the scheme generates greater asset-holding and lower consumption than when γ is assumed fixed.

6 Conclusion

The principal aim of the Saving Gateway is to 'kick-start a saving habit' for those on low incomes. This paper embeds a Saving Gateway account in a simple lifecycle model of saving in order to assess the predictions of economic theory for the scheme's impact on saving behaviour.

While saving behaviour inevitably depends on a wide range of factors, the analysis highlights the importance of an agent's access to credit in explaining optimal saving behaviour with respect to the Saving Gateway. The scheme finds support for agents who are credit constrained. For such agents the Saving Gateway creates additional asset-holding over and above that observed under the lump-sum option, and results in asset-holding by agents who would optimally hold no assets under the 'do nothing' option. However, even for this group, the model offers no reason to suggest that the fall in consumption observed during the life of the Saving Gateway account will pertain beyond the life of the account: the prediction is indeed the opposite.

However, for agents with access to credit, the Saving Gateway has a different impact on optimal saving. I show that for such agents the Saving Gateway is associated with a fall in asset-holding during the life of the Saving Gateway account and a rise in consumption from the period in which the account is opened. Although asset-holdings are increased over the remainder of the lifecycle as the matching payment is gradually consumed - supporting the principle of asset-based welfare - an equivalent effect can be generated at lower cost under the lump-sum option.

Habit effects, which are at the heart of the rationale for the Saving Gateway, appear to generate only quantitatively insignificant effects on saving behaviour. On their own, these effects seem too small to justify the implementation of the scheme.

The case for the Saving Gateway therefore appears to rely on either it being able to alter agent's fundamental preferences towards saving (as in Figure 6), or it being carefully targeted only at the credit-constrained: agents with prior savings and/or access to credit would be excluded. The former argument would suggest a role for financial education, while the latter would suggest a role for an assets test as a part of the eligibility criteria, possibly coupled with the use of third party information from credit rating agencies.

References

Alessie, R. and Lusardi, A. (1997), 'Consumption, saving and habit formation', *Economics Letters,* vol. 55, pp. 103-108.

— and Teppa, F. (2010), 'Saving and habit formation: evidence from Dutch panel data', *Empirical Economics*, vol. 38, pp. 385-407.

Altmann, R. (2003), 'Beyond tax relief - a new savings incentive framework', in W. Paxton (ed.), *Equal Shares? Building a Progressive and Coherent Asset-Based Welfare Policy*, London: Institute for Public Policy Research.

Angelini, V. (2009), 'Consumption and habit formation when time horizon is finite', *Economics Letters*, vol. 103, pp. 113-116.

Becker, G. S. and Murphy, K. M. (1988), 'A theory of rational addiction', *Journal of Political Economy*, vol. 96, pp. 675-700.

Bernheim, B. D. and Garrett, D. M. (2003), 'The effects of financial education in the workplace: evidence from a survey of households', *Journal of Public Economics*, vol. 80, pp. 435-465.

Bernheim, B. D., Garrett, D. M. and Maki, D. M. (2001), 'Education and saving: the long-term effects of high school financial curriculum mandates', *Journal of Public Economics*, vol. 87, pp. 1487-1519.

Campbell, J. Y. and Cochrane, J. H. (1999), 'By force of habit: a consumption-based explanation of aggregate stock market behavior', *Journal of Political Economy*, vol. 107, pp. 205-251.

Carroll, C. D. and Weil, D. N. (1994), 'Saving and growth: a reinterpretation', *Carnegie-Rochester Conference Series on Public Policy*, vol. 40, pp. 133-192.

Constantinides, G. M. (1990), 'Habit formation: a resolution of the equity premium puzzle', *Journal of Political Economy*, vol. 98, pp. 519-543.

Deaton, A. (1992), *Understanding Consumption*, Oxford: Clarendon Press.

Duesenberry, J. S. (1949), *Income, Saving and the Theory of Consumer Behavior*, Cambridge, MA: Harvard University Press.

Dynan, K. (2000), 'Habit formation in consumer preferences: evidence from panel data', *American Economic Review*, vol. 90, pp. 391-406.

Emmerson, C. and Wakefield, M. (2001), *The Saving Gateway and the Child Trust Fund: is Asset-Based Welfare 'Well-Fair'?*, Commentary 85, London: Institute for Fiscal Studies.

— and — (2003), 'Increasing support for those on lower incomes: is the Saving Gateway the best policy response?', *Fiscal Studies*, vol. 24, pp. 167-195.

Engen, E. M., Gale, W. G. and Scholz, J. K. (1996), 'The illusory effects of saving incentives on saving', *Journal of Economic Perspectives*, vol. 10, pp. 113-138.

Financial Inclusion Taskforce (2009), *Fourth Annual Report on Progress Towards the Shared Goal for Banking*, London: HM Treasury.

Gruber, J. and Kőszegi, B. (2004), 'Tax incidence when individuals are time-inconsistent: the case of cigarette excise taxes', *Journal of Public Economics*, vol. 88, pp. 1959-1987.

Guariglia, A. and Rossi, M. (2002), 'Consumption, habit formation, and precautionary saving: evidence from the British Household Panel Survey', *Oxford Economic Papers*, vol. 54, pp. 1-19.

Hall, R. E. (1988), 'Intertemporal substitution in consumption', *Journal of Political Economy*, vol. 96, pp. 339-357.

Harvey, P., Pettigrew, N., Madden, R., Tu, T., Emmerson, C., Tetlow, G. and Wakefield, M. (2007), *Final Evaluation of the Saving Gateway 2 Pilot: Main Report*, London: HM Treasury.

HM Treasury (2001a), *Saving and Assets for All: the Modernisation of Britain's Tax and Benefit System*, No. 8, London: HM Treasury.

— (2001b), *Delivering Saving and Assets: the Modernisation of Britain's Tax and Benefit System*, No. 9, London: HM Treasury.

— (2008), *The Saving Gateway: Operating a National Scheme*, London: HM Treasury.

Kempson, E. and Finney, A. (2009), 'Saving in lower-income households: a review of the evidence', Personal Finance Research Centre, University of Bristol.

—, McKay, S. and Collard, S. (2005), *Incentives to Save: Encouraging Saving Among Low Income Households: Final Report on the Saving Gateway Pilot Project*, London: HM Treasury.

Kimball, M. S. (1990), 'Precautionary saving in the small and the large', *Econometrica*, vol. 58, pp. 53-73.

Marshall, A. (1890), *Principles of Economics*, London: Macmillan.

Muellbauer, J. (1988), 'Habits, rationality, and myopia in the life cycle consumption function', *Annals of Economics and Statistics*, vol. 9, pp. 47-70.

Samwick, A. A. (1998), 'Discount rate heterogeneity and social security reform', *Journal of Development Economics*, vol. 57, pp. 117-146.

Scholz, J. K., Seshadri, A. and Khitatrakun, S. (2006), 'Are Americans saving "optimally" for their retirement?', *Journal of Political Economy*, vol. 114, pp. 607-643.

Schreiner, M. (2001), 'Match rates and savings: evidence from individual development accounts', Center for Social Development, Washington University, Working Paper 01-6.

Sherraden, M. (1991), *Assets and the Poor: A New American Welfare Policy*, New York: M.E. Sharpe.

Sodha, S. and Lister, R. (2006), *The Saving Gateway: From Principles to Practice*, London: Institute of Public Policy Research.

Stigler, G. J. and Becker, G. S. (1977), 'De gustibus non est disputandum', *American Economic Review*, vol. 67, pp. 76-90.

Vissing-Jorgensen, A. (2002), 'Limited asset market participation and the elasticity of intertemporal substitution', *Journal of Political Economy*, vol. 110, pp. 825-853.

List of Figures

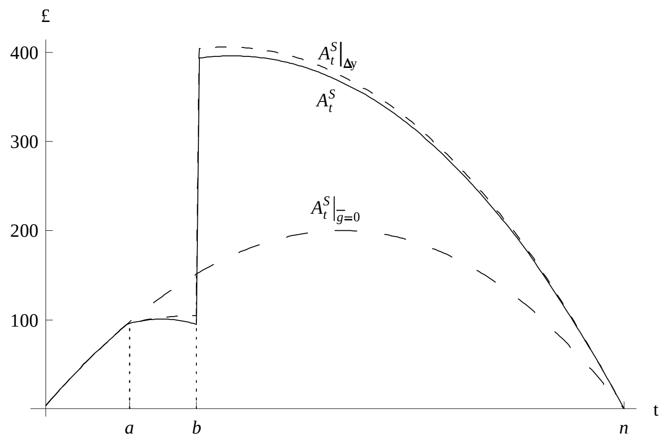

Figure 1a: Asset-holding (savers)

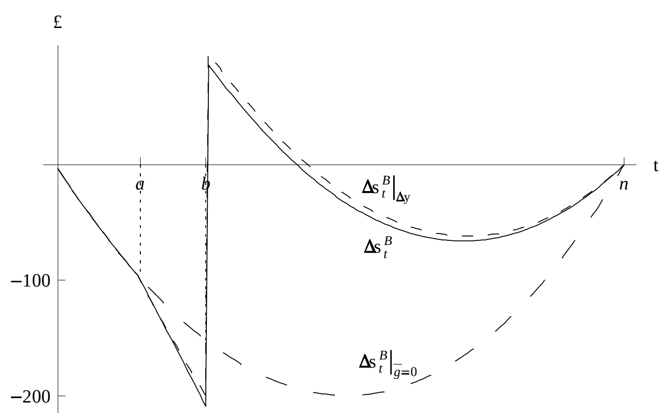

Figure 1b: Asset-holding (borrowers)

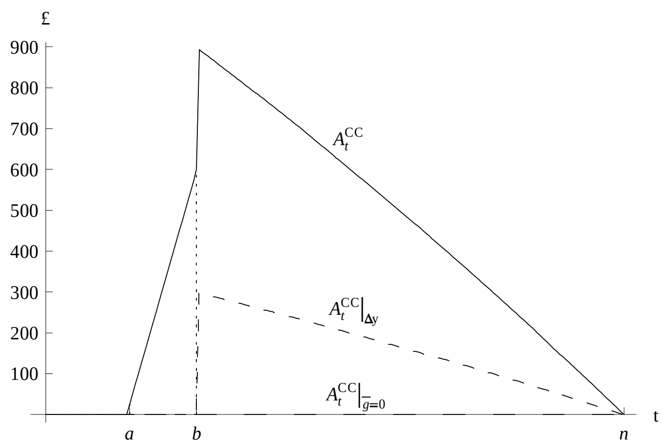

Figure 1c: Asset-holding (credit constrained)

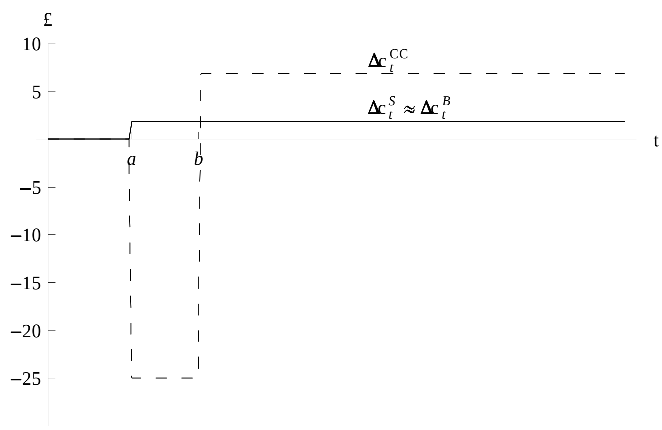

Figure 2: Change in consumption

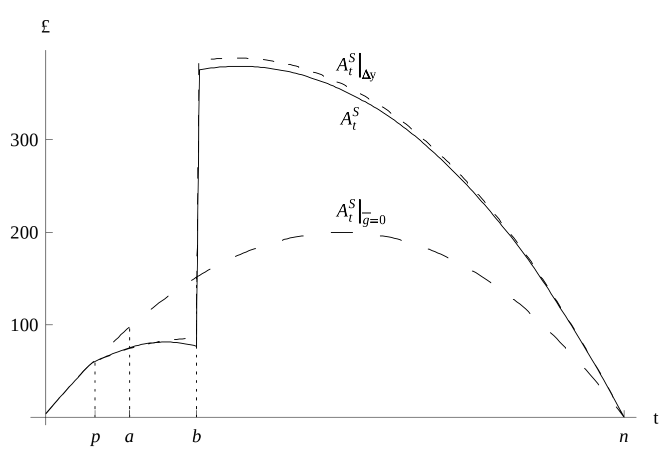

Figure 3: Asset-holding under anticipation at $t = p$ (savers)

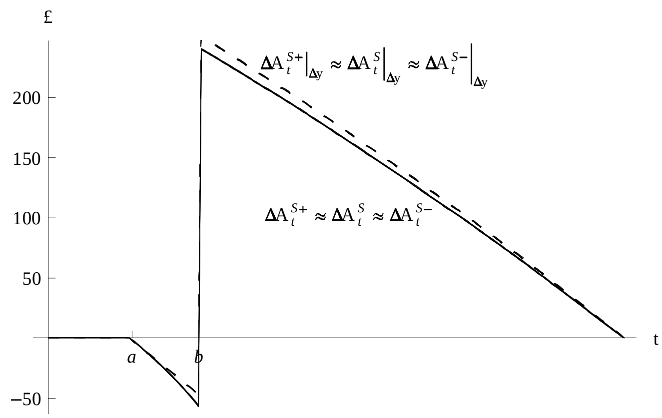

Figure 4a: Change in asset-holding with habit formation/durability preferences (savers)

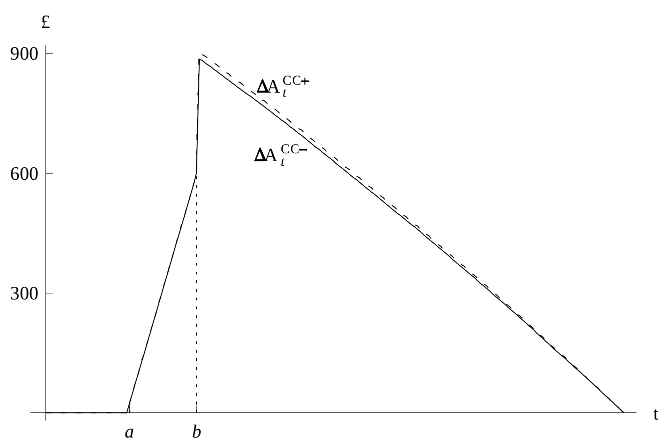

Figure 4b: Change in asset-holding with habit formation/durability preferences (credit constrained)

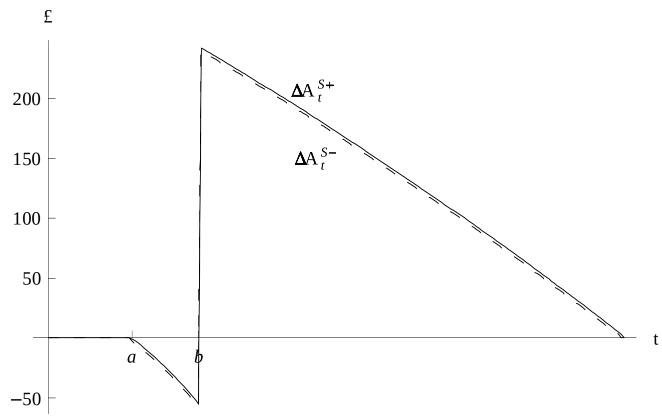

Figure 5: Change in asset-holding with $\gamma = \pm 0.5$ (savers)

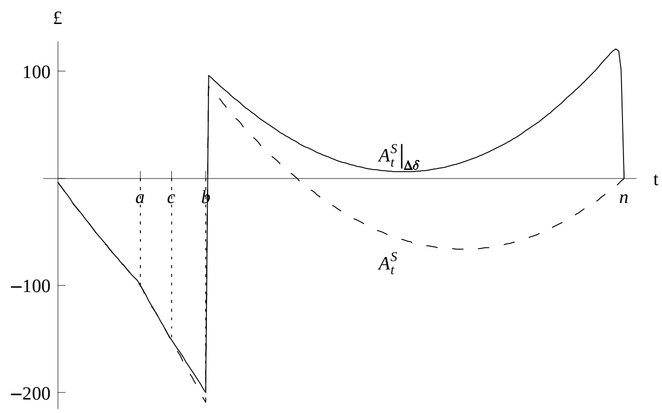

Figure 6: Change in asset-holding with preference change at $t = c$ (borrowers)