EVALUATION OF THE DWP GROWTH FUND

APPENDIX 2: ASSESSING THE IMPACT OF THE DWP GROWTH FUND

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PERSONAL • FINANCE • RESEARCH • CENTRE

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Contents

This appendix sets out in detail our estimates of the impact of the DWP Growth Fund on the interest rates faced by Growth Fund borrowers, and their total borrowing, for the purposes of delivering a robust cost-benefit analysis of the intervention.

A1.1 Propensity Matching Scores: Successful Borrowers and Comparison Group

A1.1.1 Outline of approach

Surveys of Growth Fund borrowers (the treatment group) and a control group of financially excluded individuals living in areas with little or no Growth Fund coverage were undertaken in order to assess the impact of the fund on the interest rates faced by Growth Fund borrowers and their total borrowing.

However, straightforward comparisons between the treatment group and the control group are unlikely to yield robust estimates of the impact of the fund. Growth Fund applicants go through a selection process through which Growth Fund lenders approve loans, and if there are characteristics of Growth Fund applicants that influence the probability they are successful as well as the interest rate they face and their total borrowing, then such an approach is likely to over- or understate the impact of the Growth Fund unless the control group also share these features. For example, if those with lower credit risk are more likely to be successful in their application for a Growth Fund loan, while the control group is representative of both successful and unsuccessful applicants, then straightforward comparisons between the two groups will inevitably overestimate the impact of the Growth Fund.

Propensity Matching Scores (PMS) is one technique for dealing with this potential issue (known as selection bias). The approach is based on matching each member of the treatment group to a member of the control group on the basis of the probability that each would have been successful in their application for a Growth Fund loan. The intention is to create a matched sample through which comparisons between the two groups can be made that is free from selection bias.

Implementation of the approach depends on developing a statistical model describing the influence of the relevant characteristics of Growth Fund applicants on the probability that they are successful in their application. This model is then applied to both the treatment and control groups to predict the probability they would be successful in the hypothetical event that they applied for a Growth Fund loan. These probabilities (or 'propensity scores') are then used as the basis for creating the matched sample.

A1.1.2 Selection model

A logistic regression model was developed to describe the probability that an individual would be successful in their Growth Fund application using the survey results from successful and unsuccessful Growth Fund applicants. Growth Fund lenders are assumed to take account of the credit risk associated with individual applicants and their ability to repay, including:

- **Employment status, income and savings:** Lenders will need to consider the ability of borrowers to repay in the future in evaluating their credit risk. It is expected that those on higher incomes and/or with savings would be more likely to be successful in their loan applications, with those unemployed or economically less likely to be successful. Point estimates of respondents' annual income were derived from the survey evidence (using mid-points where respondents reported income in bands, and missing values were replaced using median values).
- **Credit rating:** Lenders will also use information available through agencies rating the credit risk of individuals. If individuals have had difficulties in the past in terms of repaying loans or other forms of unsecured credit, particularly those resulting in legal action, then this will be reflected in their credit rating, and will likely result in higher interest rates (or greater difficulty in securing loans). Respondents were asked to report if they had been unable to pay any bills by the final reminder in the last 5 years, received a bad credit rating or had an application for credit turned down, received a CCJ, experienced a visit from or had goods seized by a Bailiff, been threatened with eviction or repossession, entered into special arrangements with creditors (including IVAs), or had been declared bankrupt (including Debt Relief Orders). These responses were used as proxy measurements for an individual's credit rating, and included in the logit model as dummy variables (where respondents refused to respond, it was assumed that these individuals had not experienced the financial difficulty in question).
- **Behaviour:** Borrowers behaviour in managing their finances is also assumed to reflect their probability in being successful in a Growth Fund application. For example, if borrowers tend to run out of money before the end of the month, this may reflect a greater credit risk and higher interest rates on borrowing. Survey responses relating to how frequently respondents had money left over at the end of the week or month, how frequently they ran out of money before the end of the month, how well they keep up with bills and credit commitments, and how far respondents felt they

could afford their current borrowing levels, were included as measures of how well individuals managed their finances.

- **Individual characteristics:** Individual characteristics, including gender, ethnicity, number of children, and age were included in the selection model to explore whether these characteristics influenced the decisions of lenders.

The preferred model is set out in the table below, which excludes the non-significant variables in the full model. It was found that the key factor having the largest influence over the probability a Growth Fund application was successful was whether an individual had an application for credit turned down or received a bad credit rating over the last 5 years, which has the expected negative effect. Additionally, Growth Fund applicants' reported management of their finances had the expected effects on the probability that they would be successful with their Growth Fund application; those reporting that they have borrowed more than they can afford seeing a particularly low probability of success.

The model also generated some unexpected findings. It was found that economically inactive individuals were more likely to be successful than those unemployed (and equally likely as those in employment), and this may reflect an expectation that loans will be repaid from benefits. The economically inactive will likely include a high proportion of lone parents who can potentially receive a range of premiums depending on the number and age of their children, boosting their gross income. Those with ill-health may also receive additional benefits, such as Disability Living Allowance.

Additionally, income was not found to be a significant explanatory factor in the success of Growth Fund applications (although individuals with savings were found to be more likely to be successful[1]). Average monthly incomes were not greatly different across the two groups (£840 per month for successful applicants compared with £740 for unsuccessful applicants), and were correlated with employment status (suggesting co-linearity may have been a problem).

The model successfully 'predicted' 78.6 percent of cases correctly, but explained only 29 percent of the variance in success (based on the adjusted R-squared value). This may have been driven by the intensive use of dummy variables in the model (which only allow a binary interpretation), which may not have been sensitive enough to explain a higher share of the variation in the evidence. However, it is possible that there are relevant variables omitted

[1] In some cases, successful Growth Fund applicant may have started saving as a result of participation in the initiative, which may have contributed to this finding.

from the model (such as variation of practices across lenders or over time) that it was not possible to capture through the survey of applicants[2].

Table 1.1 Logit Model (Dependent variable: Success in Growth Fund Application)

Variable	β Co-efficient[3]	Exp(β)[4]	P-value	Slope[5]	Sig
Constant	-0.413679	0.66	0.56003		
Membership of a Black or Minority Ethnic Group (1 = Yes, 0 = No)	-1.16247	0.31	0.00057	-0.281595	***
Employment Status (Excluded: Economically Inactive)					
In Employment	-0.375274	0.69	0.10988	-0.0873355	
In Unemployment	-0.863252	0.42	0.00008	-0.205606	***
Savings (1 = Yes, 0 = No)	1.3748	3.95	<0.00001	0.290657	***
Application for credit turned down or bad credit rating over the last 5 years (1 = Yes, 0 = No)	-1.55045	0.21	<0.00001	-0.344484	***
How often have you had money left over at the end of the week or month over the past 12 months? (Excluded: Never)					
Always	0.5016	1.65	0.35902	0.104929	
Most of the time	0.72688	2.07	0.06656	0.150485	*
Sometimes	0.0226303	1.02	0.94579	0.00512756	
Hardly ever	0.711271	2.04	0.02174	0.150006	**

[2] Note that model tests also suggested the presence of colinearity in the model, although estimated co-efficients were robust to the exclusion of those variables with high variance inflation factors.
[3] The β co-efficient measures the impact of the factor in question on the logit function, i.e. the natural logarithm of the odds ratio.
[4] The exponential of the β co-efficient measures the impact of the factor in question on the odds ratio.
[5] The slope co-efficient measures the impact of the factor on the probability function, evaluated at the sample average.

How often have you run out of money before the end of the week or month over the past 12 months? (Excluded: Always)					
Most of the time	-0.675605	0.51	0.12104	-0.161203	
Sometimes	-0.658744	0.52	0.12834	-0.150126	**
Hardly ever	-0.113161	0.89	0.80860	-0.0259108	***
Never	0.333211	1.40	0.51027	0.0724376	
What best describes how well you have kept up with your bills and credit commitments over the past 12 mths? (Excluded: Have real financial problems and have fallen behind with many of them)					
Keep up with all bills and commitments	0.0326815	1.03	0.96389	0.00738673	
Keeping up, but it is a struggle from time to time	0.131414	1.14	0.84972	0.0298443	
Keeping up, but is a constant struggle	1.00641	2.74	0.14601	0.202433	
Falling behind with some of them	0.440269	1.55	0.55141	0.0931352	
Which of the following best describes your current level of borrowing? (Excluded: I have borrowed more than I can afford)					
I could afford to borrow more if I needed or wanted to	1.5919	4.91	<0.00001	0.313352	***
My level of borrowing is about right, I would not want to borrow more	1.84022	6.30	<0.00001	0.385647	***

**** = significant at the 1% level, ** = significant at the 5% level, * = significant at the 1% level*

A1.1.3 Matched Sample

The logistic regression models were applied to both surveyed successful Growth Fund applicants and the each member of the comparison group to generate a predicted probability that they would be successful in a Growth Fund application. Each successful applicant was matched to the member of the comparison group with the closest predicted probability of

success[6]. Details of the unmatched and matched comparison samples are set out in the table below.

In terms of the key variables identified above, the unmatched control sample shared many features of sample of Growth Fund borrowers, although there were some key differences. In particular, the unmatched control sample was more likely to be in unemployment than successful growth fund applicants, and less likely to be economically inactive. There was also some evidence that the unmatched control sample tended to report that they had borrowed more than they can afford, and more likely to report that they never had money left over at the end of the month.

In most cases, the selection model was effective in increasing the similarity of the sample of Growth Fund applicants and the comparison group, particularly in terms of respondents reported management of their finances, employment status, and probability they will hold any formal savings. However, the comparison sample was made less alike in terms of the probability that they had had an application for credit turned down over the last five years, which may have led to an underestimate of the impact of the Growth Fund on total borrowing.

Table 1.2 Characteristics of Matched and Unmatched Samples (Percentage of respondents)

Variable	Successful Growth Fund applicants	Comparison Group	
		Unmatched	Matched
BAME Group	0.04	0.03	0.00
In Employment	0.22	0.22	0.22
In Unemployment	0.14	0.32	0.23
Economically inactive	0.63	0.45	0.54
Savings (1 = Yes, 0 = No)	0.54	0.24	0.43
Application for credit turned down or bad credit rating over the last 5 years (1 = Yes, 0 = No)	0.30	0.21	0.15

[6] Using a process called 'Greedy Matching,' in which the treatment group are matched to the control group firstly where propensity scores to 5 decimal places are identical, then using scores to 4 decimal places, and so on until a complete matched sample is generated.

How often have you had money left over at the end of the week or month over the past 12 months? (Excluded: Never)			
Always	0.08	0.07	0.09
Most of the time	0.21	0.10	0.18
Sometimes	0.36	0.26	0.34
Hardly ever	0.24	0.28	0.22
How often have you run out of money before the end of the week or month over the past 12 months?			
Always	0.04	0.10	0.06
Most of the time	0.11	0.18	0.08
Sometimes	0.40	0.36	0.38
Hardly ever	0.26	0.20	0.27
Never	0.18	0.15	0.19
What best describes how well you have kept up with your bills and credit commitments over the past 12 mths?			
Keep up with all bills and commitments	0.21	0.19	0.24
Keeping up, but it is a struggle from time to time	0.54	0.41	0.47
Keeping up, but is a constant struggle	0.20	0.26	0.24
Falling behind with some of them	0.04	0.10	0.04
Have real financial problems and have fallen behind with many of them	0.01	0.03	0.00
Which of the following best describes your current level of borrowing? (Excluded: I have borrowed more than I			

can afford)			
I could afford to borrow more if I needed or wanted to	0.36	0.19	0.25
My level of borrowing is about right, I would not want to borrow more	0.53	0.46	0.57
I have borrowed more than I can afford	0.09	0.23	0.09

A1.1.4 Measurement error

The quality of the results depends on how effectively it has been possible to accurately capture relevant information, particularly in terms of the borrowing behaviour of both Growth Fund borrowers and the control group. The need to base the impact assessment on primary surveys with the relevant groups has the potential to introduce scope for error. Respondents found it difficult to report the APR associated with their borrowing, and in some cases were unable to report the value of their repayments.

Interest on borrowing was estimated using three measures (in order of preference): on the basis of reported APRs (where known), total loan balance due (including interest), and finally on the basis of monthly reported credit obligations and the term time of the loan. Where results were implausible or unavailable (for example, if estimated payments did not cover the total amount borrowed) then median values were utilised.

Further consideration of the survey results suggests that these types of error lead may have led to an upward bias in estimates of the interest paid by individuals on their Growth Fund loans. For a Growth Fund loan lent at a monthly interest rate of 2 percent over 12 months, interest payments should equal 21 percent of monthly credit obligations. For a typical Growth Fund loan of £500, this would imply monthly repayments of £53.68, of which interest would represent £11.91. On the basis of the survey, respondents reported an average monthly repayments of £62.99 and associated interest of payments £18.60 (with interest representing 30% of total credit obligations). This is closer to a monthly interest rate of 2.8 percent, or an APR of 39.3 percent rather than an APR of 26.8 percent.

Additional cleansing was performed on the survey data to address this issue. This included assuming that where respondents reported an APR of on Growth Fund borrowing of less than 5 percent they were referring to monthly interest rates, and applying the median reported monthly interest rate (1.94 percent) to the Growth Fund borrowing of those that

could only report the amount they paid each month or week, and the duration over which they were repaying the loan.

This additional cleansing brought sample average closer to expectations, with an average reported AER on Growth Fund loans of 24.2 percent. All analysis below has been performed on this re-cleansed dataset.

A1.1.5 Credit Mix

In order to provide context for the findings of the impact analysis, the table below shows average borrowing, duration of credit, and associated AER (AERs were utilised to facilitate comparisons between different lines of credit with different compounding frequencies) for each credit line accessed by Growth Fund borrowers. The table suggests:

- **Displacement of high cost credit:** Usage of the highest cost forms of credit (Home Collection and Pawnbroker Loans) was limited both amongst Growth Fund borrowers and the comparison group. Home collection loans made up a higher proportion of the overall credit utilised by unsuccessful borrowers, with such loans making up 12 percent of total borrowing. On the basis of reported usage of these forms of credit, the scope for the Growth Fund to make significant impact on the interest paid by borrowers as a result of displacing the highest cost forms of credit is limited.
- **Bank loans, finance company loans, and hire purchase:** The comparison group tended to rely more heavily on bank loans, finance company loans, and hire purchase than Growth Fund borrowers. Bank loans and finance company were reported to carry comparable APRs to Growth Fund borrowing. This suggests that either that Growth Fund borrowing has displaced these forms of credit, or that the matched comparison group have broader access to credit than Growth Fund borrowers. As noted previously, this is possible; as the selection model explained 30 percent of variance in the probability an applicant would be successful. However, the average AERs reported by Growth Fund borrowers and unsuccessful applicants are broadly comparable on most forms of credit. The figures in the table do not control for personal factors such as income that may influence these averages.
- **Duration of borrowing:** However, the average duration over which borrowing was repaid was substantially longer for these types of credit in comparison to a Growth Fund loan. While a Growth Fund loan was repaid over 12 months, bank and finance company loans were repaid over around 3 years, while higher purchase agreements endured for 2 years.

- **Repayment of Growth Fund loans:** Those that had repaid their Growth Fund loan had a similar credit profile to the matched comparison group, with the notable exception that they had virtually no reliance on bank or finance company loans. A possible implication of this is that once Growth Fund borrowers have repaid their loans, they have no requirement (or are unable) to replenish their credit, while the matched comparator group are continuing to service their longer term credit obligations.

Overall, the figures indicate that the Growth Fund will potentially reduce the total interest paid by borrowers through two mechanisms. Firstly, it appears that Growth Fund borrowing is paid over a shorter period of time. This will reduce the overall interest paid on credit. Secondly, and potentially less significantly, the figures do suggest that the Growth Fund did displace some borrowing from credit lines with higher AERs (although not necessarily from those types of credit with the highest interest rates). This will again lead to savings amongst Growth Fund borrowers.

Figure 1.1 Credit Mix - Growth Fund Borrowers and Comparison Group

Type	Growth Fund	Bank Loan (#)	Home Collection Loan	Finance Company Loan	Pawnbroker Loan	Social Fund Loan (*)	Hire Purchase	Credit Card Balance	Overdraft Borrowing
1. Percentage using credit	-	-	-	-	-	-	-	-	-
Current Growth Fund Borrowers	100.0	1.0	7.9	1.8	1.0	14.0	11.2	6.1	6.9
Ex-Growth Fund Borrowers	0	0.9	10.8	0.0	1.8	18.9	23.4	10.8	11.7
Unsuccessful Growth Fund applicants	0	3.0	14.3	4.3	0.6	13.1	8.8	7.6	7.3
Comparison Group	0	9.0	19.6	4.0	0.8	13.8	16.2	14.8	11.0
Matched Comparison Group	0	10.7	15.1	4.2	0.2	9.3	15.7	14.3	9.5
2. Total borrowing (£)									
Current Growth Fund Borrowers	493	41	32	36	2	63	129	49	47
Ex-Growth Fund Borrowers	0	18	39	0	2	66	298	114	64
Unsuccessful Growth Fund applicants	0	95	70	130	1	47	122	68	38
Comparison Group	0	537	90	223	2	71	254	187	85
Matched Comparison Group	0	540	82	177	0	38	261	110	76
3. Average Duration of Credit (Months)	-	-	-	-	-	-	-	-	-
Current Growth Fund Borrowers	12	36	11	36	12	12	23	-	-
Comparison Group	-	45	13	33	12	12	22	-	-
Matched Comparison Group	-	36	14	33	12	12	19	-	-

Type	Growth Fund	Bank Loan (#)	Home Collection Loan	Finance Company Loan	Pawnbroker Loan	Social Fund Loan (*)	Hire Purchase	Credit Card Balance	Overdraft Borrowing
4. Average Annual Effective Interest Rate (%)	-	-	-	-	-	-	-	-	-
Current Growth Fund Borrowers	24.2	19.2	153.1	28.8	386.3	0	39.3	28.6	19.5
Comparison Group	-	17.1	104.5	26.2	142.2	0	41.6	27.1	19.5
Matched Comparison Group	-	28.4	82.2	29.2	231.2	0	48.0	25.6	19.5

(#) note that average bank loan borrowing for the comparison group are distorted to some extent by a small number of respondents that reported very high volumes of bank loan borrowing (in excess of £25,000). Excluding these observations brings average bank loan borrowing to £300. (*) Social Fund borrowing does not accrue interest, although respondents reported interest on this borrowing when asked in the survey.

These results suggest consideration may need to be given to the total interest paid by borrowers over the lifetime of the loan (these effects may be significant: for example, a Growth Fund borrowers would pay £350 more interest on a Growth Fund loan at 2 percent per month over three years than a loan over one year). Where the Growth Fund has helped borrowers repay over a shorter period, monthly repayments will be larger, and this should also be reflected in the impact analysis.

This also introduces complications in terms of applying these results in a Cost-Benefit Analysis framework. While savings resulting from reductions in interest rates are clearly a benefit to the individual, it is less clear that this applies to savings resulting form loans being taken out over a shorter period of time, since the price (i.e. interest rate) of that credit is unchanged.

A1.1.6 Model 1: Impacts on total borrowing

The matched sample was utilised to assess the impact of the Growth Fund on successful applicants' total borrowing. Individuals' borrowing decisions were modelled on the basis that their expectations of their future income and to achieve a constant level of consumption over their lifetime, within the constraints they face in credit markets. The model included the following:

- **Total borrowing:** Individuals total borrowing was estimated on the basis of reported borrowing (covering any current Growth Fund borrowing, bank loans, loans from finance companies, home collection loans, pawnbroker loans, Social Fund loans, loans from unlicensed lenders, usage of hire purchase, products on credit via mail order, credit and store card balances, overdraft usage, and borrowing from friends and family). This was used as the dependent variable in the analysis.
- **Age:** The expectation was that total borrowing will be negatively related to age, with younger individuals more likely to borrow in the expectation of higher incomes in the future, and older individuals more likely to save.
- **Consumption smoothing:** If borrowers experience a sudden drop in income (that is temporary rather than permanent) then it is expected that they will 'smooth' their consumption in line with lifetime consumption by increasing their borrowing. Respondents were asked to report if they had experienced a sudden drop in income and this was included in the model as a dummy variable.

- **Employment status and income:** Total borrowing can expected to be higher amongst those with higher incomes, with those currently on higher incomes having higher expected future earnings (this may not hold true among some benefit recipients, such as lone parents where total benefits may fall as children get older). It is also anticipated that income will be correlated with employment status, with those in employment earning higher incomes than those who are unemployed or economically inactive. Monthly incomes were estimated from survey responses, while evidence on reported employment status of both individuals and the partners of individuals (where applicable) was included in the model.
- **Savings:** Total borrowing is expected to be negatively related to savings, on the basis that the relative cost of consuming from borrowing is generally higher than consuming from saving. Savings were estimated on the basis of survey responses, with mid-points being used where respondents were only able to report savings in bands.
- **Credit constraints:** Borrowing is also expected to be determined by an individual's access to different lines of credit, which will be determined by their credit risk. A similar range of variables as used in the selection model were used to estimate the influence of credit risk and constraints on total borrowing.
- **Need:** Individuals may experience particular consumption needs that are positively related to borrowing. For example, those with children may experience greater consumption needs than those without. Equally, those with low housing costs (such as those living with parents or those living rent-free) may experience lower need to borrow than those servicing mortgages or paying rent to a private or social landlord.
- **Usage of the Growth Fund:** Usage of the Growth Fund was included as a dummy variable to capture the influence of the Growth Fund on total borrowing.

Other variables are also likely to determine borrowing, including individuals' rate of time preference and their relative risk aversion. The more individuals prefer consumption today to consumption in the future, the more they will tend to borrow, while the more averse they are to risk, the less they will tend to borrow. Such variables were not included in the model as the survey evidence did not cover these types of issues (which would merit a study in its own right).

Two models were developed, a first model covering all variables (details of which are appended) and a reduced model focusing on those variables that were statistically significant. Modelling showed that income and savings had the expected effects on borrowing, as did employment status (although the employment status of individuals'

partners could not be shown to have a significant effect). Those who owned their house (either outright, with a mortgage or shared ownership) were more likely to borrow more (although accounting for a small share of the sample), while those that never ran out of money by the end of the month borrowing substantially less.

However, it could not be shown that the Growth Fund had an impact (positive or negative) on successful applicants' total borrowing (with estimated effects not significantly different from zero). The model overall set out below explained 11 percent of the overall variation in total borrowing (adjusted R-squared), suggesting that there is a range of wider factors that influence individuals' borrowing decisions, although intensive use of dummy variables will have contributed to the low explanatory power of the model.

Table 1.3 Ordinary Least Squares Analysis (Dependent variable: Total Borrowing)

Variable	Co-efficient	P-value	Significance
Constant	147.192	0.84751	
Monthly Income	0.693612	0.00887	***
Total savings	-0.210607	0.00038	***
Employment status: (Excluded: Economically Inactive)			
In Employment	556.844	0.03377	**
Unemployed	-189.014	0.47080	
Housing status: (Excluded: Other housing)			
Ownership of House	3126.66	0.00005	***
Private Rented	-12.357	0.98638	
Rented from an RSL / Local Authority	16.9246	0.98069	
Live rent-free (with Parents or other)	-413.362	0.61801	

How often have you had money left over at the end of the week or month over the past 12 months? (Excluded: Never)			
Always	-1129.81	0.01226	**
Most of the time	293.638	0.41096	
Sometimes	-209.256	0.51297	
Hardly ever	-545.519	0.09906	*
Which of the following best describes your current level of borrowing? (Excluded: I have borrowed more than I can afford)			
I could afford to borrow more if I needed or wanted to	-65.4188	0.84846	
My level of borrowing is about right, I would not want to borrow more	530.634	0.07603	*
Growth Fund borrower (1 = Yes, 0 = No)	-135.534	0.51553	

**** = significant at the 1% level, ** = significant at the 5% level, * = significant at the 1% level*

A1.1.7 Model 2: Impacts on monthly interest paid by borrowers as a share total monthly payments

The matched sample was utilised to assess the impact of the Growth Fund on the interest paid by individuals. The model considered the following:

- **Interest as a share of monthly credit obligations:** Respondents typically accessed a wide range of credit lines, with different term structures, making it difficult to compare interest rates across borrowers. In order to make an consistent estimate of interest paid by individuals, an estimate of monthly credit obligations and associated interest was derived from reported borrowing, APRs, and term length of borrowing under each form credit utilised. Where APRs were unknown, interest was derived from the total amount (including interest) owed by borrowers where known, and estimated on the basis of monthly repayments and term time where unknown. Where it was not possible to generate an estimate of the interest owed by individuals, median APRs were utilised for the form of credit in question. In the case of overdrafts, an APR of 16.9 percent was used (the average of standard rates across

Barclays, HSBC, NatWest and Lloyds current accounts)[7]. Monthly interest as a share of monthly credit obligations was used as the dependent variable in the regression model.

- **Growth Fund borrowing as a percentage of total borrowing:** To test the hypothesis that the Growth Fund had an impact on the interest payments made by borrowers, current Growth Fund borrowing as a percentage of total borrowing was included as an independent variable (in some cases, Growth Fund loans may have already been repaid). If the Growth Fund enables individuals to borrow at lower interest rates, then those with a higher share of Growth Fund borrowing would expect to see a lower share of interest in their monthly credit obligations.
- **Credit risk:** A range of further explanatory variables designed to establish the credit risk associated with individuals were included, as in the preceding model.
- **Usage of different credit lines:** The interest rate faced by individuals was also expected to be related to the particular mix of credit lines utilised. Dummy variables were included to indicate whether individuals held commercial loans (including loans from unlicensed lenders), the Social Fund, hire purchase, mail order, credit cards, an overdraft, or borrowing from family or friends in their mix of borrowing.

Results suggested that usage of the Growth Fund had a negative influence on interest payments as a share of total monthly credit obligations. Estimates suggested that interest as a percentage of monthly payments is 25.4 percent lower for a Growth Fund borrower borrowing from the Growth Fund alone (i.e. for 1 percent of total borrowing accounted for by the Growth Fund, this equates to a reduction in monthly interest as a percentage of payments of 0.25 percent).

Table 1.4 Ordinary Least Squares Analysis (Dependent variable: Interest as a % of Monthly Credit Obligations)

Variable	Co-efficient	P-value	Significance
Constant	0.370085	<0.00001	***
Which of the following best describes your current level of borrowing? (Excluded: I have borrowed more than I can afford)			
I could afford to borrow more if I needed or wanted to	-0.0369074	0.25179	***
My level of borrowing is about right, I would not want to borrow more	-0.0841582	0.00510	***

[7] Interest on credit cards was estimated directly on the basis of APRs reported by respondents.

Age	0.00312714	0.00005	***
Partner in employment (1 = Yes, 0 = No)	0.0456787	0.12833	***
Partner unemployed (1 = Yes, 0 = No)	0.00731525	0.79468	***
Partner inactive (1 = Yes, 0 = No)	-0.0630633	0.00663	
Growth Fund borrowing as % of total borrowing	-0.254351	<0.00001	***

**** = significant at the 1% level, ** = significant at the 5% level, * = significant at the 1% level*

Amongst current Growth Fund borrowers, Growth Fund loans made up 55 percent of borrowing, implying that on average, monthly interest payments are estimated to have been 14 percentage points higher in the absence of the Growth Fund. Current Growth Fund borrowers paid £93 on average in monthly payments, of which £21 represented interest (23 percent). Holding monthly repayments constant, it is estimated that that interest paid as a share of monthly repayments would rise to 36 percent in the absence of the Growth Fund, or £36. This implies the Growth Fund has helped Growth Fund borrowers save £12.80 per month, or £153.40 over the course of a typical Growth Fund loan.

A1.1.8 Model 3: Impacts on total interest paid, APRs, and duration of credit

Supplementary analysis of the impact of the Growth Fund has been undertaken on the basis of three regression models, looking at the total interest paid by borrowers over the lifetime of their credit obligations, the size of monthly repayments, and the proportion of monthly repayments that represent interest. This new analysis makes the assumptions that credit card and overdraft borrowing is paid off in a similar way to a loan amortized over five years, and that once debt is repaid, credit is not replenished. Growth Fund borrowers are compared to the same matched comparison group as in the first draft report.

1.1.8.1 Impact on total interest paid

The table below shows the regression results exploring the impact of the Growth Fund on total interest paid by borrowers over the lifetime of their borrowing. The results suggest (given the assumptions outlined above) that for every £1 of Growth Fund borrowing, total interest paid on credit is reduced by £0.86. The average size of a Growth Fund loan reported by current Growth Fund borrowers was £493, suggesting an overall lifetime saving in interest paid of £425.

Table 1.5 OLS - Impact of Growth Fund on Total Interest Paid

Variable	Coefficient	p-value	sig
Constant	-73.4057	0.73433	-
Total borrowing	0.741637	<0.00001	***
Growth Fund borrowing	**-0.86287**	**<0.00001**	*******
Age	16.7983	0.00003	***
Employed (1 = Yes, 0 = No)	553.222	0.00009	***
Unemployed (1 = Yes, 0 = No)	-94.7716	0.52375	-
Partner employed (1 = Yes, 0 = No)	699.164	0.00002	***
Partner unemployed (1 = Yes, 0 = No)	475.403	0.01605	**
Partner inactive (1 = Yes, 0 = No)	115.604	0.46785	-
How often have you had money left over at the end of the week or month over the past 12 months? (Excluded: Never)			
Always	-494.013	0.04005	**
Most of the time	-88.8849	0.64006	-
Sometimes	-735.533	0.00002	***
Hardly ever	-372.075	0.04287	*

1.1.8.2 Impacts on APRs, and duration of credit

By creating an estimate of the average duration over which credit was to be repaid by respondents (weighted by the amount borrowed), it was possible to create an estimate for

the average AER paid on credit by comparing total interest paid, total borrowing, and the number of months over which credit is repaid. This effectively assumes that individual's total borrowing can be treated as a single loan, repaid over the average duration of their current borrowing.

This analysis suggested that current Growth Fund borrowers face an average AER on their credit of 27.8 percent, on total borrowing of £892, repaid over 17.1 months. Results of two regressions comparing the average AER and duration of the credit used by Growth Fund borrowers against the control group are set out in the table below. The results suggest that for every £100 of Growth Fund borrowing, the average AER on credit is reduced by 1.01 percentage points, while the average duration over which debt is repaid falls by 1.77 months (+/- 0.4 months).

Table 1.6 OLS - Impact of Growth Fund on AERs

Variable	Coefficient	p-value	sig
Constant	0.372563	<0.00001	***
Partner employed (1 = Yes, 0 = No)	0.0864626	0.02970	**
Partner unemployed (1 = Yes, 0 = No)	0.174439	0.00026	***
Partner inactive (1 = Yes, 0 = No)	-0.0120612	0.75353	
How often have you had money left over at the end of the week or month over the past 12 months? (Excluded: Never)			
Always	-0.0816997	0.25514	
Most of the time	-0.0841677	0.12579	
Sometimes	-0.149683	0.00303	**
Hardly ever	-0.141957	0.00412	*
How often have you run out of money before the end of the week or month over the past 12 months? (Excluded: Never)			

Variable	Coefficient	p-value	sig
Always	0.22478	0.00349	*
Most of the time	0.139491	0.01770	**
Sometimes	0.0552744	0.20829	**
Hardly ever	0.0586856	0.18194	***
Growth Fund Borrowing (£100s)	**-0.010085**	**0.02231**	****

Table 1.7 OLS - Impact of Growth Fund on average duration of credit

Variable	Coefficient	p-value	sig
Constant	23.2142	0.00002	***
Gender (1 = Female, 0 = Male)	-3.80514	0.00667	**
Age	0.183364	0.00005	***
Income (£s)	0.00464838	0.00123	***
Ownership of house (1 = Yes, 0 = No)	12.3819	0.01810	**
Private rented (1 = Yes, 0 = No)	-3.46961	0.48936	
Social housing (1 = Yes, 0 = No)	-4.2295	0.38836	
Live with parents (1 = Yes, 0 = No)	0.0570632	0.99192	
Partner employed (1 = Yes, 0 = No)	5.5358	0.00188	***
Partner unemployed (1 = Yes, 0 = No)	-2.99249	0.12856	

Variable	Coefficient	p-value	sig
Partner inactive (1 = Yes, 0 = No)	1.0515	0.51955	
Growth Fund Borrowing (£100s)	**-1.77372**	**<0.00001**	***

Applying these results to the average size of Growth Fund loans (£493), this implies that the effect of the Growth Fund is to reduce the average AER on total credit by 5.0 percentage points, while shortening the period over which the debt is repaid by 8.75 months. These findings are consistent with estimates of the impact on total interest paid, implying total savings of £377 per borrower, as shown in the table below. Of this, £130 is attributable to the impact on the interest rates paid by borrowers, and £248 to the shortened period over which debt is repaid.

Table 1.8 Impacts on interest paid

	Total borrowing	Average AER	Average duration (months)	Implied total repayments
Growth Fund borrowers	892	27.8	17.1	1,266
Impact of Growth Fund		-4.97	-8.75	
Implied interest paid without Growth Fund (counterfactual)	892	32.7	25.9	1,643

A1.2 Conclusions

The results suggested that overall, the Growth Fund has led to substantial savings for borrowers, but this effect has come through both reducing interest payments as well as shortening the period over which loans are repaid. Results across the various models are consistent with an interest rate saving of between £130 and £150 per borrower, with total interest savings (over the lifetime of credit) of between £377 and £425.

A1.3 Potential limitations

The PMS approach is designed to reduce a substantial level of bias associated with pseudo-experimental evaluation approaches, but has a wide range of potential limitations that should accounted for when considering the findings.

A1.3.1 Propensity to apply for a Growth Fund loan

The PMS analysis predicts the probability that members of the control group would have been successful in a Growth Fund application. However, it is implicitly assumed that members of the control group would have made an application for the Growth Fund if it were available in that area. This will introduce selection bias in the results if this assumption does not hold, and there are characteristics of Growth Fund applicants that influence their decision to apply for loan that also influence their overall borrowing and the interest rate they face.

For example, if applicants carry a greater credit risk than non-applicants (as may seem plausible), then the results set out above will over-state the impact of the growth fund. This source of bias has been minimised as far as possible by ensuring that the control survey is as far as possible targeted at individuals sharing similar features to Growth Fund borrowers, but cannot be explicitly taken into account without a survey of the general population of Growth Fund areas.

A1.3.2 Strategic response bias

Secondly, there is a potential issue with strategic response bias that cannot be addressed through the analysis. Many of the issues covered through the surveys touched on some potentially highly sensitive topics, particularly the detailed questions around borrowers' usage of credit. The borrowers surveyed may have felt pressure to under-report levels of total borrowing and interest repayments.

If this pressure was felt equally by the treatment and control group, then the effect of strategic response bias on the overall estimates of impact is likely to be small. However, the degree to which respondents feel pressure to understate their borrowing may vary substantially from person to person, and by credit line accessed.

A1.3.3 Unmeasured contextual variables

The quality of the results derived from a propensity scores approach depends critically on a strong overlap between the treatment and control groups. In this study, the control group was recruited from deprived wards in areas with little or no Growth Fund coverage. Although the control areas were selected so as to share similar features to Growth Fund areas, and the comparison group selected to match the profile of successful applicants, there may have been unobserved characteristics of those areas with wider influence over borrowing behaviour of the population that has been unaccounted for. If this is the case, then a degree

of bias has been potentially introduced into the findings (whether this is an upward or downward bias is unknown).

A1.3.4 Unobserved characteristics of borrowers

In order to address the issue of selection bias, a range of observed features of successful and unsuccessful features of Growth Fund borrowers were used to describe the probability that an applicant would be successful in their application. However, there may be further unobserved characteristics of both borrowers and lenders that have influenced the both the probability that applicants were successful as well as their total borrowing and the interest rate they faced. One example at borrower level might be attitudinal bias due to non-response. If such unknown variables exist, then it is possible that there is an unknown source of selection bias in the findings (creating an upward or downward bias in our estimates of impact).