



CAN PERSONAL BUDGET MANAGEMENT SERVICES IMPROVE DEBT REPAYMENTS? A STUDY USING BUDGET DATA*

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ABSTRACT

We investigate the effect of personal budget management services provided by a financial institution on undesirable debts of 4,256 individuals and families over a period of one year using objective budget data spanning three years. Results from this study using an Australian dataset show that the majority of the participants reduced their debt repayments and debt repayment to income ratio over a period of one year. Our results also show that the majority of the participants had an increase in funds available for living expenses and savings.

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Introduction

According to the Australian Bureau of Statistics, household debts in Australia have been increasing in recent decades (La Cava and Simon, 2005, Lowe, 2017). The average household debt was just 30 percent of the annual disposable income in 1974 and rose by 10 percent to 40 percent of the total household income by 1984. Household debt has been exploding in Australia since the mid-1990s, and by 2014, it had hit 165 percent (Reserve Bank of Australia, 2021c). The debt to income ratio hit a new record high 187 percent in 2019 (Reserve Bank of Australia, 2021c). As of December 2019, the total household debt in Australia stood at 2.5 trillion dollars (Reserve Bank of Australia, 2021b). Data from Reserve Bank of Australia shows that there was a modest downward trend in household debt to income ratio, since 2019 and until June 2021 (Reserve Bank of Australia, 2021c), possibly due to the current COVID-19 pandemic. The growth in household debt has been larger than the growth in income and assets. Several factors, such as lower mortgage interest rates and financial deregulation have been cited for the aforementioned steady rise (Worthington, 2006, La Cava and Simon, 2005). Other factors include changes in attitudes of consumers toward credit use (Chien and Devaney, 2001) and credit becoming more acceptable and accessible (Livingstone and Lunt, 1992). Other studies show that amount of debt, including mortgage is directly linked to materialism, after controlling for income and money-management skills (Garðarsdóttir and Dittmar, 2012). The Australian Securities and Investments Commission (ASIC) reported in June 2017, that roughly one in six consumers (1.9 million people) were struggling to repay their credit card debts (ASIC, 2018), with the total nation-wide credit card outstanding amount reaching \$50 billion in 2018 (Reserve Bank of Australia, 2021a). Credit card has become a preferred and acceptable payment method to make payment toward any type of purchase in recent times (Kamleitner and Kirchler, 2007).

The Consumer Finance Protection Bureau (CFPB), a U.S. government agency heavily involved in personal finance research defines financial well-being as "as a state of being wherein a person can fully meet current and ongoing financial obligations, can feel secure in their financial future and is able to make choices that allow them to enjoy life" (Bureau, 2015). Increased availability of funds to meet living expenses can be seen associated with improved financial well-being from the definition. Studies have shown that good financial behaviours such as paying credit card outstanding in full each month and paying all bills on time and thus avoiding potential undesirable consequences arising from them are associated with improved financial well-being (Madakkattel et al., 2019). Studies on the negative effects of household debts have also been conducted. For example, in one study conducted in the UK using the British Household Panel Survey, it was shown that the heads of households with non-mortgage debts were less likely to report high levels of psychological well-being (Brown et al., 2005). In another study, Shen et al. (2014) follow a different approach to understand the relationship between debt and psychological well-being. Rather than using a single snapshot of data, this study used data collected monthly for 2 years and 5 months to investigate the relationship over time. The study finds that debt stress is more than double that of long-run debtors for short-run debtors. Recent meta-analysis studies have also shown the negative effects of debts on depression, anxiety, suicide ideation, completion, or attempt (Richardson et al., 2013, Amit et al., 2020). Studies on the relationship between over indebtedness and health have also been carried out. For example, Cuesta and Budría (2015) finds that non-mortgage debt repayments and debt arrears negatively affect people's health while Sweet et al. (2013) finds, after studying the longitudinal data of 8,400 young adults, that high financial debt relative to available assets is associated with higher perceived stress and depression, worse self-reported general health and higher diastolic blood pressure.



The connection between personal budgeting and consumer behaviour have been highlighted by several previous studies (Galperti, 2019, Beshears et al., 2016, Antonides et al., 2011, Bénabou and Tirole, 2004, Boobier, 2018). Current explanations of personal budgeting are based on the seminal paper by Thaler (1985), whereas the classic economic theory of consumption cannot explain the practice of personal budgeting. Most of the studies have shown that the main reason people resort to personal budgeting is to manage their self-control problems, often caused by present bias (Thaler, 1999, Ameriks et al., 2003, Antonides et al., 2011), even though some other researchers argue that personal budgeting is a technique to simplify household finance (Simon, 2013, Johnson, 1984). A recent study shows that self-control problems alone cannot explain the need for personal budgeting, but proposes a theory combining the need for self-control with the flexibility needed to accommodate uncertainty about intra-temporal trade-off between goods (Galperti, 2019). That study shows that consumers can strictly improve by employing good-specific budgets as a commitment device and highlights that personal budgeting services by third parties can play a role in helping consumers. However, people with short-term time orientation (impatient consumers) are less likely to use budget than those who have long-term time orientation (patient consumers), if they see the long-term benefit of it (Antonides et al., 2011, Galperti, 2019). In this study, we are using an anonymised subset of real personal budget data from an Australian financial institution with participants from all states and territories of Australia to study the effect of budget management services on debt repayment. This institution provides budget management services, targeted at families and individuals experiencing financial distress due to debts, difficulty in managing their financial affairs and those that need external assistance to improve their overall financial health. The services are centred around setting up a long-term financial plan, creating a detailed budget for spending and then actively managing it on behalf of its customers. The institution also offers the service of negotiating with creditors for temporary payment deferral, debt consolidation and arranging mortgage re-financing. To the best of our knowledge, there are no publicly available studies strictly using objective temporal financial data and reporting the effect of subscribing to budget management services, particularly on debt. This study fills that gap in the literature. Our goal in this study is to investigate the trajectories of debt repayments, living expenses and savings of individuals and families subscribed to the budget management services over a period of one year. In particular, we investigate changes in the levels of measures within a year for the whole working age participants as well as changes along families with or without children and single or joint accounts.

Background and related work

There are some studies using interviews and survey data in Australia on the effect of personal or family budget managed by consumers themselves on credit card debts. One such study shows that individuals and families with a written budget and follow that budget had better effective credit card usage as compared to those who had a written budget but rarely followed it (Ajzerle et al., 2015). Studies on the effects of counselling services on debts have established positive effects of counselling and can be seen a precursor to this study (Brackertz, 2012). Research has shown counselling services such as financial education, budget counselling, debt management plans (DMP) and bankruptcy referrals have improved financial behaviours of people with debt problems (Roll and Moulton, 2019). Delegating management of financial decisions is arguably effective in setting realistic financial goals and achieving them. For instance, Finke et al. (2009) finds that those who rely on financial planners are more likely to have adequate life insurance holdings.



Studies in personal finance using survey data greatly outnumber studies using financial data generated by financial organizations that may be commercial or not-for-profit. Surveys can be helpful in capturing a wide range of information (objective and subjective), which may not be easily available through other means. However, using surveys to collect data has its own challenges. It is not unusual for potential participants to refuse to take part in a survey. For instance, Kennickell (1998) reported that about one in three households selected for a standard sample declined to take part in the Survey of Consumer Finances (SCF) in 1995. Also, the bias in responses that the participants provide is a challenge in collecting data using surveys. Studies have shown, for example, that people tend to underestimate their future spending (Peetz and Buehler, 2009). Inconsistency in responses is another difficulty with using survey data. For instance, in a survey, a majority of participants who did not have a written budget or having a written budget but rarely following it, strongly indicated that they benefit from an interest free period on their credit cards but were carrying an outstanding balance on them (Ajzerle et al., 2015). Therefore, financial data produced by computerised budget management systems may be more useful in reporting more accurate findings.

Good financial management practices include budgeting (or expense planning), record keeping, comparing records to plan, estimating net worth, and saving on a regular basis. Budgeting includes identifying sources of income, expenditure (including future lump sum expenditure), and cost savings areas. The essential foundational financial principle behind budgeting is 'living within your means' (Guthrie and Nicholls, 2015). Income, tax, debt, and both short-term and long-term savings are considered within budgeting. Budgeting often involves carefully allocating disposable income to provide for the basic needs so that there is enough money to cover 'wants' (Guthrie and Nicholls, 2015). Even though there has been widespread agreement on the benefits of using financial management practices such as budgeting among personal finance researchers, studies show that few people actually follow them (Davis and Carr, 1992, Davis and Weber, 1990). In the United States, according to the Gallop Economy and Personal Finance Survey, only 32 percent of households prepared a detailed written budget or used computer software for developing a budget (Jacobe, 2013).

In this study, rather than consumers by themselves prepare and manage their budgets, the financial institution prepares a specific and tailored budget by analysing customer's finances, from income to debt and expenses, household characteristics and long-term financial goals. Each bill/invoice is ranked according to its importance (for instance, repayment of loans or paying utilities is more important than a subscription to an entertainment service) and a comprehensive budget foreseeing future payments is prepared for the next 12 months. Debt repayment, insurance premiums, accommodation, utilities (gas, electricity, telephone, water), food, clothing and footwear, household goods and services, health, travel, recreation, personal care and so on can be the spending categories of such a budget. If required, the institution offers the service of negotiating with creditors for payment deferral, debt consolidation and mortgage re-financing. If needed, the budget template is revised to meet the changed circumstances that a participant may face from time to time. An account is created by the financial institution for each customer to collect their income and from there, funds are distributed, as scheduled, to different third parties in order to satisfy the customers' financial obligations. Funds for living expenses are transferred to customers' personal accounts. A unique advantage of using flow data from the execution of such a budget is that it provides a full view of real income and expenses data of participants and reporting findings based on such data is a unique contribution of this study.



Methodology

Dataset

All individual identification data elements were de-identified by the financial institution before providing access to the data and only a limited number of sociodemographic variables were made available⁴. The resulting data represented 4,699 customers who subscribed to the services between July 2015 and May 2017 and had at least 13 months of relationship with the financial institution. In addition to verifying the service start date and termination date (if available), we also checked the inflows of income and outflows of expenses over the duration to ensure that the account was active for at least 13 months from the date of entering the service. For our analyses, we considered only debts used for personal consumption and various debt arrears, marked as undesirable debts by the financial institution. For instance, such debts did not include some loans such as mortgage loans and car loans. Around 90 percent of customers entered the service with at least one kind of debt. These debts included credit card debts (approximately 60% of customers), personal loans, instalment loans for appliances, loans from family members, pay day and pawn shop loans and other debts such as tax debts, various arrears, and fines. For this study, we considered only those participants who entered the service with such undesirable debts and were in the working age bracket (18-64), resulting in a dataset of 4,256 participants. We did not consider people 65 years and above due to a low number of participants (only 71) and different dynamics of spending and saving in their life. We were also provided with the count of adult account holders on the account (representing single, couple, a partnership, a parent and adult child or a carer and a guardian relationship), the age of account holder(s), number of children in the family unit, state and territory of residence, and annual income, as provided by the customers at the time of joining the service. Table 1 shows descriptive statistics on sociodemographic data and Table 2 shows descriptive statistics on inflows and outflows of funds.

⁴An ethics application was filed by the research team and was subsequently approved by University of South Australia (protocol number 201056, dated 30/5/2018).



Table 1. Descriptive statistics on the sociodemographic data provided by the financial institution and used for this study. There were in total 4,256 participants considered for this study.

Variable	Description	# Participants	Missing	Min	Max	Median (IQR)
Adults	Count of adult account holders on the account	4,256	-	1	2	1 (1-2)
	One adult	2,380				
	Two adults	1,876				
Children	Number of children in the family unit		-	0	8	1 (0-2)
	No child	1,991	-			
	One or more child	2,265	-	1	8	2(1-3)
Age	Age of main account holder	4,256	-	20	64	37 (31-46)
Initial Income	Expected annual income provided by participants at the time of joining	4,256	4	14,544	623,674	65,318 (47,779 - 90,483)

Table 2. Descriptive statistics (median value and IQR for each quarter, divided by three) on the income and expenses data provided. There were 4,256 participants considered for this study.

Variable	Q1	Q2	Q3	Q4
Income received	5,516	5,600	5,531	5,502
	4,028 - 7,762	4,060 - 7,760	4,000 - 7,729	3,968 - 7,718
Debt repayment	639	653	631	567
	327 - 1,116	311 - 1,145	271 - 1,133	229 - 1,060
Funds for living expenses/saving	2,624	2,756	2,740	2,821
	1,882 - 3,701	1,938 - 3,946	1,883 - 4,032	1,903 - 4,148

To avoid bias with respect to specific time (year and month) of joining the service, we arranged data in a way that the begin time (that is, time=0) is when the participant joined the service. This way of organizing data also nullifies seasonal effects, including, but not limited to calendar year beginning/ending, and financial year beginning/ending effects. Thus, the findings from the experiments are more robust and generic than otherwise.



Statistical analyses

We started with correlation analyses to understand the predictability of financial measures such as income received and debt repayment at the end of one year of service by using only the figures at the beginning of the service. A higher correlation indicated a higher association of ending measures with beginning measures and a lower correlation indicated a lower association, resulting correspondingly in higher/lower predictability. We did the correlation analyses for income, debt repayment, debt repayment to income ratio, and funds available for living expenses/saving and its income ratio, between the first quarter after joining the service and the fourth quarter as month-to-month fluctuations are less likely to appear when quarterly figures are compared. The correlation of these measures with the age of the main account holder was also tested. The non-parametric method of Spearman's rho was used for correlation analyses as the variables tested were having non-normal distributions. We then proceeded with testing the differences in distribution of these variables along single and joint accounts, and participants with and without children using the non-parametric Mann-Whitney U test. The dynamics of spending and saving can be quite different between family units with and without children as additional expenses and possibly savings are needed when there are children in the family unit. We included testing the differences in distribution along number of account holders because we found significant difference in income (median income \$51,000 versus \$89,756) between single and joint accounts.

Our final set of statistical tests were to check whether customers reduced their income, debt repayment, debt repayment to income ratio after joining the service, and whether they increased the funds available for living expenses/saving and its income ratio. We used the non-parametric Wilcoxon signed rank test for testing these as the repeated measures tested had non-normal distributions. We chose Wilcoxon signed rank test instead of sign test as Wilcoxon signed rank test considers both the sign of the differences and the magnitude of the differences and is more powerful than the sign test.

Results

We calculated median of income received, debt repayments, debt repayment to income, funds for living expenses/saving and its income ratio for each month. Figure 1 shows the downward trend in median debt repayment and debt repayment to income ratio. Figure 2 shows the upward trend in median living expenses spending/saving and its income ratio.



Figure 1. Debt repayments median values in dollars over 12 months and debt repayment to income ratio in percent.

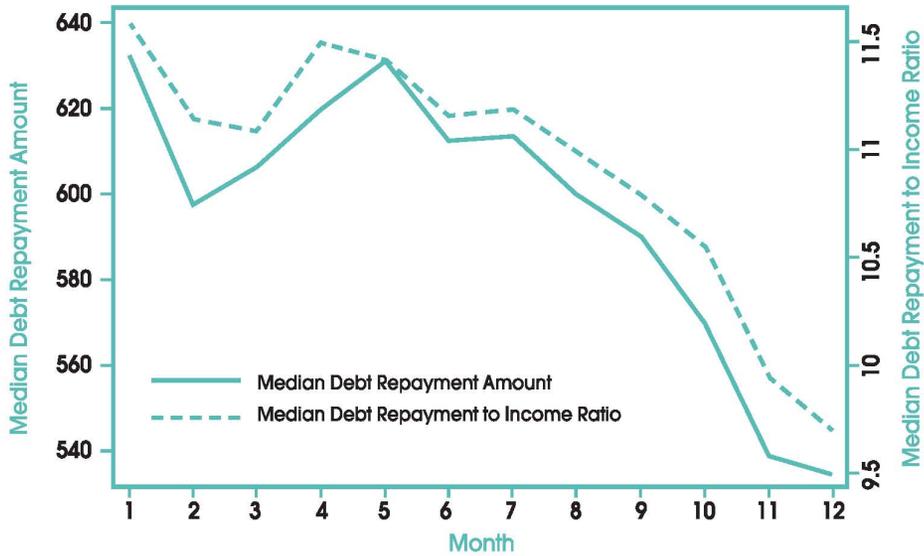


Figure 2. Median funds for living expenses/saving in dollars and its income ratio in percent.



As shown in Table 3, income received for the first quarter and the last quarter were highly correlated ($\rho = 0.84, P < 0.01$). Income received for the first quarter and debt repayment for the first quarter were moderately correlated ($\rho = 0.45, P < 0.01$). Beginning and ending funds available for living expenses/saving had a good correlation ($\rho = 0.75, P < 0.01$). The correlation between age and income was weak but positive ($\rho = 0.21, P < 0.01$). Correlation between age and debt repayment was nullifiable ($\rho = 0.04, P < 0.01$). The correlation between the beginning and the ending debt repayment ($\rho = 0.59, P < 0.01$) was less than the correlation for income received. This indicated that initial debt repayment status is less predictive of the future debt repayment status.



Table 3. Correlation coefficients for income, debt repayment, debt repayment to income ratio, funds for living expense/saving, its income ratio and age.

Variable 1	Variable 2	Spearman's rho
Income for the first quarter	Income for the fourth quarter	0.84**
Income for the first quarter	Debt repayment for the first quarter	0.45**
Debt repayment for the first quarter	Debt repayment for the fourth quarter	0.59**
Debt repayment to income ratio for the first quarter	Debt repayment to income ratio for the fourth quarter	0.55**
Income for the first quarter	Funds for living expense/saving for the first quarter	0.84**
Funds for living expense/saving for the first quarter	Funds for living expense/saving for the fourth quarter	0.75**
Funds for living expense/saving to income ratio for the first quarter	Funds for living expense/saving to income ratio for the fourth quarter	0.51**
Age of main account holder	Income for the first quarter	0.21**
Age of main account holder	Debt repayment for the first quarter	0.04**
Age of main account holder	Funds for living expense/saving for the first quarter	0.12**

Two-tailed significance, ** - <0.01

Most of the Mann-Whitney tests conducted showed significant differences between different groups in income received, debt repayments, debt repayment to income and funds available for living expenses/saving (Table 4). Exceptions were in funds for living expense/saving to income for the fourth quarter ($Z = -0.63, P = 0.53$) and debt repayment for the fourth quarter between participants with children and without children ($Z = -1.17, P = 0.24$).

Table 4. Results of testing the differences in distribution of income, debt repayment, debt repayment to income ratio, and funds available for living/saving using Mann-Whitney U test.

Variable	Za	Zb
Income for the first quarter	-42.35**	-26.02**
Income for the fourth quarter	-40.32**	-23.62**
Debt repayment for the first quarter	-18.44**	-4.13**
Debt repayment to income ratio for the first quarter	-2.32*	-9.72**
Debt repayment for the fourth quarter	-13.21**	-1.17 ($P = 0.24$)
Debt repayment to income ratio for the fourth quarter	-3.59**	-9.84**
Funds for living expense/saving for the first quarter	-37.33**	-26.5**
Funds for living expense/saving to income ratio for the first quarter	-3.01**	-4.11**
Funds for living expense/saving for the fourth quarter	-33.33**	-22.02**
Funds for living expense/saving to income ratio for the fourth quarter	-0.63 ($P = 0.53$)	-3.36**

Two-tailed significance, ** - <0.01

Z^a - between single and joint accounts

Z^b - between having children or not in the family unit



Out of 4,256 participants only 1,770 (42%) increased their debt repayment for the quarter and 2,419 (57%) increased funds available for living expenses/saving. As shown in Table 5, the Wilcoxon signed rank test indicated that there was no significant difference in income received for the first quarter and for the fourth quarter for the whole dataset ($Z = -0.68, P = 0.49$). The only exception was for the group with children ($Z = -1.99, P < 0.05$). On the other hand, there were significant differences for debt repayment ($Z = -8.82, P < 0.01$), debt repayment to income ratio ($Z = -8.10, P < 0.01$), funds available for living expenses/saving ($Z = -12.25, P < 0.01$) and funds available for living expenses/saving to income ratio ($Z = -15.35, P < 0.01$) indicating that while there were no significant changes in income received, there were significant reductions in debt repayments within a year and increase in funds available for living expenses/saving. A similar pattern followed for groupings based on the single/joint account, whether participant had children or not. We provide median values for income received, debt repayment, funds available for living expenses/saving and their income ratios in Table 6.

Table 5. Comparing beginning (first quarter) and ending (fourth quarter) income received, debt repayment, debt repayment to income ratio, and funds available for living expenses/saving and its income ratio.

Variable	Z (no grouping)	Z (single)	Z (Joint)	Z (no children)	Z (children)
Income received	-0.68 (P=0.49)	-0.11 (P=0.92)	-0.81 (P=0.42)	-1.44 (P=0.15)	-1.99*
Debt repayment	-8.82**	-4.53**	-7.86**	-4.03**	-8.20**
Debt repayment to income ratio	-8.10**	-4.24**	-7.58**	-3.71**	-7.82**
Funds available for living expenses/saving	-12.25**	-7.57**	-9.71**	-9.09**	-8.32**
Funds available for living expenses/saving to income ratio	-15.35**	-9.19**	-13.19**	-10.10**	-11.70**

Two-tailed significance, * - <0.05, ** - <0.01

Table 6. Beginning (first quarter) and ending (fourth quarter) income received, debt repayment, debt repayment to income ratio, and funds available for living expenses/saving and its income ratio. Ratios are given in percent and we observed similar trends in mean values also.

Variable	Quarter	Z (no grouping)	Z (single)	Z (Joint)	Z (no children)	Z (children)
Income received	First	5,516	4,308	7,724	4,397	6,716
	Fourth	5,502	4,302	7,674	4,458	6,649
Debt repayment	First	639	513	863	598	673
	Fourth	567	478	732	563	570
Debt repayment to income ratio	First	11.63	11.97	11.30	13.28	10.40
	Fourth	10.57	11.21	9.93	12.62	9.11
Funds available for living expenses/saving	First	2,624	2,060	3,603	2,099	3,216
	Fourth	2,821	2,184	3,951	2,255	3,444
Funds available for living expenses/saving to income ratio	First	48.22	48.89	47.64	47.21	48.98
	Fourth	51.68	51.64	51.73	50.67	52.48



Discussion and conclusion

While there is publicly available research on personal budgeting in general (for example, (Heath and Soll, 1996, Antonides et al., 2011, Yin and Özding, 2018, Xiao and O'Neill, 2018, Galperti, 2019)), to the best of our knowledge there is no prior research addressing the effects (particularly on debt) of budget management services offered and actively managed by a financial institution. As expected, there was very high correlation between the income received for the first quarter and for the fourth quarter ($\rho = 0.84$). It is interesting to note down that the correlation between the beginning and ending debt repayment ($\rho = 0.59$) and the correlation between the beginning and ending funds available for living expenses/saving ($\rho = 0.51$) were not as high as that of the correlation between the beginning and ending income received, possibly pointing toward the effect of spending in a budgeted fashion. It is also interesting to note down that the weak but positive correlation between age of the participants and their income ($\rho = 0.21$) and even the weaker but positive correlation between age and funds available for living expenses/saving ($\rho = 0.12$).

Also, as expected, among the groups compared (with or without children and single/joint accounts, as shown in Table 4) there were significant differences in levels of income, debt repayment and funds available for living expenses/saving and their income ratios. The exceptions were for the fourth quarter debt repayment and funds available for living expenses/saving for the groups with and without children.

Our key findings show 57% of individuals and families reduced debt repayments over a period of one year after subscribing to the services. They also reduced debt repayment to income ratio over a period of one year. On the other hand, the additional funds are diverted toward living expenses which includes various insurance payments, groceries, utilities, clothing, medical services, personal care, school fees, childcare, leisure, and savings. Although, we cannot obtain transactions depicting debt repayment or spending behaviours of these participants before entering the service, we are of the opinion that people who subscribed to the service (which incurs a recurring fee), have done so to resolve their financial issues and improve finance by curtailing unbudgeted spending and by prioritising certain bills over others. Our data spanned from July 2016 to April 2018. The publicly available data from Reserve Bank of Australia and Australian Bureau of Statistics show that household debt to income ratio for the nation continually increased from 175 percent to 185 percent during that period (Reserve Bank of Australia, 2021c). Also, for the same period, credit and charge card repayments steadily increased from 22.3 billion dollars to 23.7 billion dollars (Reserve Bank of Australia, 2021a), underscoring the fact that the overall trend during our data period was steadily increased household debt and debt to income ratio. Although a direct comparison is not strictly possible, our analyses show that the customers subscribed to the service had a reduction in debt repayment and debt repayment to income ratio during the period.

The improvement in debt repayment is noticeable across different participant types such as households with and without children and single and joint accounts. The decrease in median debt payment and debt repayment to income ratio as shown in Figure 1 is interesting, considering that the participant base had varying income (IQR 47,779 – 90,483 annually), age (IQR 31-46), different stages in life, family structure (single, couple, partnership, with and without children) and household styles (e.g., renting/owning property, owning a car or not). On the other hand, the income roughly remained the same during the period and the funds available for living expenses/saving increased



during the period (Figure 2). More importantly, these participants subscribed to the service at different points in time from July 2015 to May 2017 and our design of organising the data nullified the seasonal effects, resulting in more robust results.

Some previous studies have shown that lack of financial management practices and careless budgeting can lead to personal debts Lea et al. (1995), Lunt and Livingstone (1991) and Walker (1996). Hence, having a disciplined budget can help in this regard. In addition to the usual benefits of having a personal budget managed by consumers by themselves, budget management services provided by an external party with the added control on the access to the disposable income may help minimise the chances of overspending and can be a key differentiator for those with strong present-bias. Reduction in debt repayment for the majority of the participants may also indicate reduced indulgence in undesirable borrowing by the participants during the subscription period. Moreover, the spending carried out by the individual and families were mostly in a budgeted manner and thus curbing overspending as well as wasteful spending. Several studies have shown the link between materialism and debt that the chances of getting into debt is more for materialistic individuals (Nepomuceno and Laroche, 2015, Pirog and Roberts, 2007, Watson, 2003) and such individuals may also benefit from having a budget prepared with external help and actively managed by an external party. As noted by many participants in Ajerle et al. (2015) that budgeting is time consuming and that they were not monitoring their level of income and expenses in a consistent manner, a budget actively managed by a financial institution on behalf of their customers can be helpful in that aspect as well.

No study is without limitations. It may be the case that our data is not representative of Australian working age population, or even the targeted population. Since we were provided with a small section of sociodemographic variables, we made a comparison with the 2016 census (Australian Bureau of Statistics, 2016) using median values for participant age and number of children in the family unit. The comparison shows no vast difference in the median (for age, census median: 47, sample median: 42, for number of children in the family, census median: 1.80, sample median: 2.02). Another limitation of our study is self-selection bias, that the characteristics (especially, willingness to seek external help and the degree of present bias) of the participants in the study may be different from that of non-participants. It may be possible that most of the participants shared some common traits differing from the non-participants. However, we are of the opinion that the study findings may find helpful to those undergoing financial difficulties, primarily due to debts and are willing to seek external help. Due to the nature of the raw data provided, we were not also able to separate funds for living expenses from funds allocated for savings, which would have enabled us to analyse saving behaviour separately. Future work can be in the direction of addressing these limitations and bringing further insights into the personal financial management services enabled by financial institutions.

Considering the effects of personal debts on the well-being of individuals and families and macro effects on the economy (Garman et al., 1996, Joo, 1998), some financial institutions have recognised the need for services such as budget management services to make necessary behavioural changes in matters affecting finance. We are of the opinion that public policy makers should make greater notice of such services and as a practical and hands-on approach, they should formulate plans to incentivise (such as paying service charges on behalf of participants) for those struggling with over-indebtedness to join such services. This can be done in addition to the existing practice of providing advice on money matters. In conclusion, in our first-of-its-kind investigation using 4,256



customers of budget management services and three years of real data of income and expenses, we investigated the trajectories of debt repayments and funds available for living expenses/saving over a period of one year. Our results show a reduction in debt for the majority of the participants within a year, across different customer groups and increase in funds available for living expenses/saving. Thus, this research adds insight into behavioural patterns of those customers subscribed to the service. We conclude that the service may be beneficial for those individuals and families in need of external help for setting up and follow through realistic and goal-oriented budgets and those who suffer from strong present-bias and higher degree of materialism.



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