Smart tools? A randomized controlled trial on the impact of three different media tools on personal finance

Stefan Angel

WU Vienna University of Economics and Business, Institute for Social Policy, Welthandelsplatz 1, Wien 1020, Austria

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By using a randomized controlled trial we test the impact of three treatments on financial literacy (knowledge, attitudes, reported behavior) among adolescents in Austria. Treatments comprise a documentary movie on debt, an internet exercise and a budgeting smartphone app. It is investigated if particularly the latter two instruments could serve as standalone alternatives (nudges) to conventional teaching interventions. Users of the budgeting app report to check their current account balance significantly more often than the control group. The web exercise, however, neither raises interest in personal finance issues nor significantly increases basic financial knowledge. The documentary movie did not affect attitudes towards saving or private credits. Even if it is only about raising awareness and interest in financial matters among adolescents, the ICT applications tested in this study thus do not lend strong support to policies solely relying on digital "stand-alone" solutions of similar design.

1. Introduction

Both demand for consumer finance products and the range of products have been continuously growing since 1950 (Ryan et al., 2011). These developments came with an overall trend toward more debt, less savings and a general risk shift to private households (Ryan et al., 2011; Guiso and Sodini, 2013; Guiso et al., 2002; OECD, 2015, 2005). Consequently, consumers face higher demands on their skills in personal finance nowadays.

Against this background, cross-country comparative surveys have repeatedly documented low levels of financial literacy for most consumers in the OECD area. (OECD, 2005; Lusardi and Mitchell, 2008; Lusardi and Mitchell, 2011; Lusardi and Mitchell, 2014). Financial skills and numeric ability, however, are found to be negatively correlated with various measures of financial delinquency and default (Lusardi and Mitchell, 2014; Dick and Jaroszek, 2013; Gerardi et al., 2010; Hilgert et al., 2003). Higher levels of financial literacy also help consumers to deal better with macroeconomic shocks (Klapper et al., 2013).

Large differences between countries can also be found for financial skills of teenagers. In Shanghai-China and the Flemish Community of Belgium, students achieve the highest average financial literacy scores whereas Colombia, Italy and the Slovak Republic are located at the low end of the spectrum (OECD, 2014). Major financial decisions like whether to continue with formal education and how to finance such study, however, are particularly relevant for younger people. It is also

argued that younger cohorts will bear higher financial risks in the future due to increased life expectancy, an expected decrease in public welfare provision and occupational benefits, and uncertain economic and job prospects (Lusardi, 2015).

Yet, despite growing demands on financial skills of consumers and rising political awareness (OECD/INFE, 2015) there is still only limited research, particularly randomized controlled trials, on the relative effectiveness of different policy instruments in terms of format, design, timing, cost, social context of presentation and usability (Hastings et al., 2013; Fernandes et al., 2014; Sherraden and Grinstein-Weiss, 2015). Moreover, it is sometimes not clear whether policies (should) aim at affecting actual financial behavior mainly through targeting either knowledge ("I know how to calculate the real interest rate"), awareness ("The real interest rate is crucial for my total credit cost") or attitudes ("I can't actually do it but I think it is important to know how to calculate real interest rates"). Furthermore, most program evaluations focus on the USA. Financial markets and the education system in the US, however have distinct attributes and may not be completely comparable to European welfare states. Finally, conventional education programs based on instructor-student setups are found to have mixed or small effects on financial literacy (Kaiser 2016, Section 2). It can thus be asked, whether self-contained education tools can also be effective outside such a setup (e.g. stand-alone web applications, e-Learning) and which dimensions of financial literacy can be targeted most effectively with such tools. A benefit of such policy treatments, for instance, could be that marginal costs are likely to be lower compared to instructor-

based training courses.

This paper focuses on these research gaps and tests the effects of three different media tools on financial literacy, attitudes (e.g. towards debt) and reported financial behavior (saving, budgeting) among adolescents in Vienna, Austria. In line with the international literature, substantial knowledge gaps on financial topics are also documented for the Austrian youth (Silgoner et al., 2015). The research design is a randomized controlled trial with pre and post measurement in three treatment groups and one control group. Treatments comprise (a) the screening of a documentary movie on over-indebtedness in Austria, (b) a web research exercise (five financial education websites had to be reviewed by the study participants) and (c) the utilization of a budgeting app on the participants' smartphones (Toshl®) between pre and post measurement.

Section 2 illustrates the multidimensionality of financial literacy and stresses that policies should be accordingly designed to effectively impact on particular dimensions. Furthermore, recent literature on policy effectiveness in the field of financial literacy is summarized and how it relates to the current paper. Section 3 contains a detailed description of the three treatments tested in this study. Arguments why we would expect an effect for the three treatments are presented and hypotheses related to particular dimensions of financial literacy are derived. Section 4 provides a detailed description of the research design. The fifth section presents the results of the experimental study. In general, an effect is only found for the budgeting treatment. Using this app significantly increases the frequency study participants check their current accounts. The other two treatments do not impact on interest/attitudes or knowledge indicators compared to the control group. Section 6 contextualizes this outcome and discusses limitations and directions for further research.

2. Financial literacy: dimensions and policy effectiveness

Decomposing financial literacy in its different dimensions is crucial for the development of instruments and education programs. The literature on dimensions of financial literacy is abundant (e.g., see Remund, 2010; Huston, 2010). A good starting point for this paper's research goal derives from the work of Atkinson et al., (2007): "[…] a combination of awareness, knowledge, skill, attitude and behavior necessary to make sound financial decisions and ultimately achieve individual financial well-being." (Atkinson and Messy, 2012). This broad definition acknowledges that financial literacy is a complex construct that cannot easily be measured by a few items (Schuhen and Schürkmann, 2014). Furthermore, it underlines the need for heterogeneous policy instruments designed for and applied at different stages of the financial decision-making process.

Miller et al. (2015) conduct a comprehensive statistical meta-analysis on the effect of financial literacy interventions designed to increase knowledge, skills, attitudes and behaviors. The authors include 188 studies published between 2000 and 2013 in their analysis. This study also contains all papers used in another meta-analysis published briefly before (Fernandes et al., 2014) where the authors find that the financial education interventions included in their sample explained only a minimum share of the variance in financial behaviors and effects often decayed rapidly over time. The majority of interventions included in the sample of Miller et al. (2015) was delivered through direct contact with instructors. Only a relatively small number of interventions examined the use of other media (e.g. TV soap operas). The four qualifying binary dependent variables for the meta-analysis were savings reported in past period, contributions to retirement savings, default on a loan and whether households keep financial records. Results suggest that financial education can influence some financial behaviors like savings and record keeping but does not at all or only marginally affect other areas (e.g. reducing loan defaults). Due to the great heterogeneity of interventions and limited data availability, this analysis, however, could not provide any conclusions regarding the effect of specific

program characteristics on outcome variables. The most-recent meta-analysis from Kaiser et al. (2016) shows that financial education significantly affects financial behavior and financial literacy. The effect size for the former, however, turns out to be very small. Furthermore, intervention impacts are found to be highly heterogeneous depending on the target group and defined outcome variable.

These meta-analyses, however, do not look in detail at the group of adolescents and young adults. Recent studies on the effect of financial education programs on knowledge, attitudes and behaviors among adolescents and young adults reveal mixed results (Sherraden and Grinstein-Weiss, 2015). A positive program effect is found in Loke et al. (2015) who measure the impact of the MyPath Savings initiative that consists of three 90-min financial education workshops. For a sample of 275 participants (who are receiving their first paychecks) aged 14 to 18 they report significant increases in financial knowledge and financial self-efficacy. Gill et al. (2015) investigate the effect of two different financial literacy curricula (Financial Fitness for Life FFFL and "stock market learning" SML) in an experimental research setup. For their sample of 12th and 11th grade students in California, the authors find a positive and significant effect of the FFFL curriculum on a comprehensive measure for financial literacy. Skimmyhorn (2016) studies the effects of an 8-hour personal financial management course for new enlistees in the US Army. The program was found to reduce the probability of having credit account balances, delinquencies and adverse legal actions in the first year after the course. Course attendance also lead to an increase in retirement savings and average monthly contributions (both in the short run and long run).

On the other hand, using difference-in-difference models Becchetti et al. (2011) do not find statistically significant effects of a 16-hour financial education course for Italian high school students on their financial literacy and investment attitudes. Similarly, results from Grinstein-Weiss et al. (2015) indicate that the savings performance of older participants (>35) in Individual Development Account programs is superior to that of younger counterparts (<36 years). Younger participants thus benefit less from this program.

Different effects of financial education programs are also found within studies. Using Diff-in-Diff methods, Lührmann et al. (2015) evaluate the joint effect of three training modules on teenagers in lower stream schools in Germany. On the one hand, the authors reveal that the intervention raised teenagers' interest, self-assessed knowledge and actual financial knowledge in some dimensions. On the other hand, students in the treatment group did not increase their savings. Brown et al. (2016) exploit the variation in the timing of enactment of financial education reforms in high school curricula across and within states between 1999 and 2012 to identify the causal impact of financial education on debt-related outcomes of 19 to 29 year olds. The authors find that both mathematics and financial education decrease reliance on nonstudent debt and improve repayment behavior. Economics training, on the other hand, increases both the likelihood of holding outstanding debt and the prevalence of repayment difficulties.

Summing up, the vast majority of the studies mentioned above focuses on education programs in some kind of teacher-student setup. This paper looks at particular media tools that are implemented outside such a setup and investigates which dimensions of financial literacy can be targeted most effectively with such tools. It is asked whether it suffices to design an attractive mobile app or website to nudge certain behavior and to raise interest and problem awareness. Moreover, as randomization of experimental groups is not always feasible, many of the studies discussed above have to revert to difference-in-difference methods or propensity score matching, while this paper uses randomization techniques to identify treatment effects.

3. Treatments and hypotheses

Mixed evidence on the effectiveness of conventional policy interventions may also be due to a sub-optimal context of presentation, a