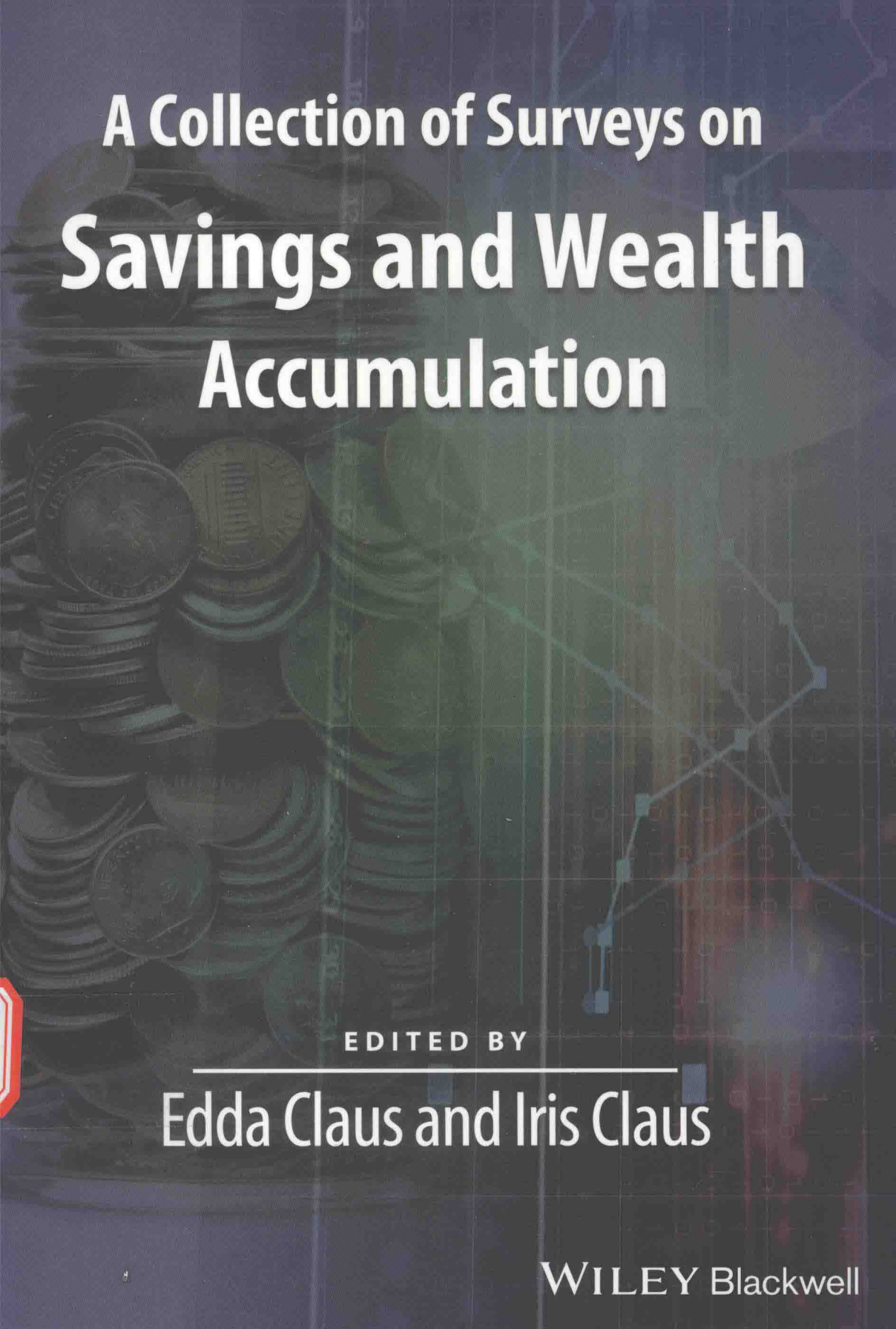
A Collection of Surveys on Savings and Wealth Accumulation



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1

SAVINGS AND WEALTH ACCUMULATION: MEASUREMENT, INFLUENCES AND INSTITUTIONS[1]

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> The financial crisis and the Great Recession demonstrated, in a dramatic and unmistakable manner, how extraordinarily vulnerable are the large share of American families with very few assets to fall back on. (J. L. Yellen, 2014)[2]

We tend to not think about savings and wealth accumulation when times are good and incomes are rising. But when income growth stops and rainy days arrive, savings and wealth jump back to the forefront of our minds, as individuals, policy makers and researchers.

Developments over the past twenty-five years are a case in point. During the boom years of the 1990s and early 2000s, incomes grew rapidly reflecting sustained high growth rates of economic activity and an unprecedented rise in commodity prices. Furthermore, historically low interest rates in many advanced economies reduced the return on savings and lowered the cost of borrowing, contributing to higher household consumption and indebtedness and low savings rates.[3] Savings rates, measured as the difference between income and consumption, have not only been low and indebtedness rising at the household level, but also at the country level, demonstrated by large and sustained current account deficits and rising debt in many advanced economies.

When the boom ended with the onset of the global financial crisis in 2007, it became clear that much of the wealth created over the previous two decades was all but on paper and individuals and countries had very few assets to fall back on. Chair Yellen's quote at the beginning of this article is applicable not only to American families but to families and governments around the world. The lack of assets has played an important part in the painfully slow economic recovery post crisis. Consumers have been hesitant about spending and high government indebtedness has raised concerns about debt sustainability. This has hindered

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fiscal expansions and worsened the economic downturn through a full blown sovereign debt crisis in Europe.

Moreover, many countries, some high and some medium income economies, are experiencing a demographic transition with an aging population and falling fertility rates, raising concerns about the adequacy of people's retirement savings and the sustainability of public pension funds.

It is therefore high time that we turn our attention to savings and wealth accumulation, which is the theme of this book. The nine papers presented here critically review topical issues in the recent policy and research debates ranging from the effects of access to credit, the rise of Islamic finance and sovereign wealth funds, the measurement of wealth inequality and genuine savings, the distribution of wealth across generations and retirement savings.

A fundamental principle in economics is that of utility maximization–each period people choose a bundle of consumption goods and services, including leisure, to maximize lifetime utility. The way in which people maximize lifetime utility, which represents their preferences over goods and services, is by ensuring a balance between consumption and savings during the different phases of their life. Generally people prefer stable levels of consumption to large variations, meaning that similar levels of consumption today, tomorrow and the day after are preferred to a pattern that more closely matches a person's lifetime income of no or low income when young and when retired and high earnings during working years. This desire to smooth consumption and maintain accustomed living standards typically leads to three stages of savings and wealth accumulation during the lifetime of an individual. The first stage is a period of dis-savings or borrowing in early adulthood that is marked by post-secondary education expenditures, low income and debt accumulation. The second stage is a period of savings when income is high and assets are accumulated. The third stage again is a period of dis-savings and a decline in assets during retirement when earnings are low.

Access to credit is an essential tool for consumption smoothing and the topic of the first two articles in this book. The first article by Igor Livshits (2015) reviews "Recent developments in consumer credit and default literature." Consumer credit rose sharply during the 1980s but this increase in personal debt coincided with an acceleration in bankruptcy filings in the United States and other countries with personal bankruptcy systems. The dramatic rise in household indebtedness and default raised concerns with policy makers and became a focus of attention for economists seeking to understand the driving forces behind them. Since then the quantitative literature on unsecured consumer debt and default has made great strides. In the basic model of default the key assumption is that borrowers face an interest rate that is a function of the amount borrowed and that includes a risk premium–the risk premium reflects the probability of default and is also a function of the amount borrowed. Underlying the design of bankruptcy systems is a basic tradeoff between the partial insurance of being able to walk away from debts (i.e., greater ability to smooth consumption across states of the world) and the inability to commit to repaying loans in future, which makes borrowing more expensive and reduces the scope for consumption smoothing over time. There are four possible explanations for the rise in personal bankruptcies and consumer credit. The first is increased risk exposure of borrowers: Existing borrowers face more adverse shocks. The second is increased risk exposure of lenders: Lenders advance loans to riskier borrowers. The third explanation is compositional changes in the population and the fourth is greater willingness of borrowers to file for bankruptcy. The empirical evidence reviewed by Livshits suggests that the rise in personal bankruptcies and consumer credit was due to two reinforcing factors: a decline in the cost of bankruptcy and a decline in the cost of lending as a result of interest

rate deregulation and improvements in information processing technology. Moreover, welfare analysis suggests that information improvements have raised average welfare despite leading to greater bankruptcy rates. Livshits also discusses delinquency and informal default, debt restructuring and collection, and the cyclical behavior of credit and bankruptcy. He concludes with key challenges and future research directions including the need to model the interaction of borrowers with multiple lenders and combining secured and unsecured debt.

The second article by William Elliott and Melinda Lewis (2015) focuses on "Student debt effects on financial wellbeing: research and policy implications". Student debt has been rising since the mid-1980s in the United States and the authors conjecture that wealth inequality has become a more pressing problem among young adults than income inequality. Presently about 75% of young adults in the United States aged 30–40 years have higher incomes than their parents had, but only about 36% have accumulated more wealth than their parents did. A contributing factor to the lower wealth accumulation is student debt–young adults with student debt are more likely to have less wealth than their parents had despite earning higher incomes. Student debt started rising when needs based financial aid and state support for public, higher education institutions were reduced, shifting the cost of tertiary education from the government to individuals. This has had important effects on wealth accumulation. Households with student debt tend to have lower net worth and lower retirement savings than those without student debt. They also tend to have lower credit scores making it more difficult for them to gain access to productive capital to finance wealth creation, in the form of homeownership or business development. Student debt also influences other lifetime decisions. For instance, it can affect career planning (driving graduates away from lower paying, public sector jobs) and it can lower the probability of marriage and delay having children. The authors contend that schemes designed to prevent student debt burdens, such as income based repayment and pay as you earn plans, may in fact be *adding* to the student loan problem rather than solving it. They argue that the rebuilding of the U.S. financial aid system must begin with a more complete accounting of the true costs of student loans, both to students and to the larger economy. They also advocate for more research to be done in particular on how much debt is too much debt.

Access to credit is rising around the world including in Islamic countries and Pejman Abedifar, Shahid Ebrahim, Philip Molyneux and Amine Tarazi (2015) examine in the third article in this book the recent empirical literature on "Islamic banking and finance: recent empirical literature and directions for future research". In Islamic banking and finance the key underlying principles are the prohibition of *Riba* (narrowly interpreted as interest) and the adherence to other *Shariá* (Islamic law) requirements. A ground breaking experiment of incorporating Islamic principles into financial transactions was conducted during the 1960s in Egypt and the first Islamic financial institution with "bank" in its name was established in 1971. Since then the Islamic financial industry has developed as an alternative model of financial intermediation and Islamic banking is practiced by conventional commercial banks (via Islamic windows), traditional Islamic banks as well as non-bank financial institutions and multinational financial institutions (like the Islamic Development Bank). Reviewing the empirical literature on the performance of Islamic versus conventional banks the authors conclude that apart from key exceptions, there are no major differences between Islamic and conventional banks in terms of efficiency, competition and risk features although small Islamic banks are found to be less risky than their conventional counterparts. However, there is suggestive evidence that Islamic banking and finance may aide inclusion in wealth accumulation to a greater extent than conventional financial institutions, which may, at least in part, reflect the core principles

of Islam of social justice, inclusion and sharing of resources. However, much more research is needed on the features and (socio)economic effects of Islamic financial instruments and institutions.

Frank Cowell and Philippe Van Kerm (2015) expressly examine the distribution of wealth. In their article "Wealth inequality: a survey" they address three main questions. What is the appropriate definition of wealth? How does the measurement of wealth inequality differ from that of income inequality? What are the appropriate procedures for analyzing wealth data and drawing inferences about changes in inequality? To answer these questions Cowell and Van Kerm summarize the main issues concerning wealth data, inequality estimation and inference. They outline standard methods, practical solutions and convenient remedies for potential problems and illustrate some of the concepts and methods using data from the Eurosystem Household Finance and Consumption Survey. The authors propose that the most appropriate definition of wealth in empirical analysis is current net worth or net wealth, measured as the difference between assets and debts. A particular feature of current net worth or net wealth is that a large proportion of households or individuals have negative net wealth. Furthermore, wealth distributions are characterized by skewness and fat tails resulting in sparse, extreme data in typical samples. These features of wealth distributions render traditional measures of inequality inadequate and require adjustments in measurement, estimation and inference. Making the appropriate adjustments wealth inequality typically is found to be (much) larger than income inequality. Moreover, life cycle dynamics tend to be more pronounced in the case of wealth inequality compared to income distributions. The authors conclude that measuring wealth inequality is beyond estimations of wealth concentration among the extremely wealthy, which recently have become popular measures of inequality, and should take into account entire distributions. However, taking into account entire distributions requires a broader set of concepts and tools than are used in income inequality measurements.

Beyond consumption smoothing and wealth accumulation at the individual or household level, intergenerational equity considers the extent to which living standards are equalized across generations. In this respect, government expenditures and savings are important influences. Public expenditures that are financed by issuing government debt are a transfer of obligations from current to future generations. Such transfer of obligations may be appropriate, for example, to finance the purchase of assets that are used by current as well as future generations or if sustained economic growth over time means that better off future generations are more able to afford the cost of repaying inherited debt. Respectively, future obligations may be met by generations accumulating assets to prefund future payments, such as pension payments, or to share revenues from the extraction of non-renewable resources with future generations, e.g. sovereign wealth funds.

The measurement of government debts and deficits is the topic of the article by Timothy Irwin (2015) "Defining the government's debt and deficit". Irwin notes that despite international accounting standards, there are still many differences in how governments measure debts and deficits. They can be defined for central government, general government and the public sector, and, for any definition of government, there are different measures of debt and deficit, including those generated by four kinds of accounts–cash, financial, full accrual and comprehensive accounts. The different measures of debt and deficit all contain different information about public finances and they all are susceptible to mismeasurement. Narrow definitions of government encourage the shifting of spending to entities outside the defined borders of government, while narrow definitions of debt and deficit encourage operations involving off balance sheet assets and liabilities. Broad measures of debt and deficit on the

other hand are susceptible to the mismeasurement of on balance sheet assets and liabilities. Moreover, measures of debt and deficit are more likely to be manipulated if they are subject to binding fiscal rules or targets. In contrast, governments with greater budgetary transparency are less likely to engage in budgetary manipulations as these are more likely to be discovered and publicized. Irwin concludes with two lessons for accountants, statisticians and budget officials. First, he advocates that debt and deficit measures need protection from manipulation, such as independent measurement, independent auditing, the use of standards set by independent bodies and the publication of the assumptions underlying the measurements so that calculations can be verified. Second, several measures of the deficit and debt should be produced and reconciled to provide more complete assessments of public finances and to help reveal manipulation in targeted measures.

William Megginson and Veljko Fotak (2015) in "Rise in the fiduciary state: a survey of sovereign wealth fund research" review the literature on sovereign wealth funds (SWFs), which are investment vehicles that transfer wealth from current to future generations. Since January 2008 more than 25 countries have launched or proposed to set up sovereign wealth funds–usually to preserve and protect new monetary inflows from transfers of oil (and natural gas) revenues or from transfers of excess foreign exchange reserves earned from exports. Norway's Government Pension Fund Global (GPFG) is the largest sovereign wealth fund and the second largest pension fund after Japan's Government Employees Pension Fund. Almost without exception all of the recently established funds are modeled after the GPFG with respect to organizational design, transparency, managerial professionalism and investment preference for listed shares and bonds of international companies. The defining characteristic of SWFs is that they are state owned and Megginson and Fotak discuss the existing literature on state ownership and what it predicts about the efficiency and beneficence of government control of SWF assets. Findings from a review of the empirical literature suggest that private funds generally outperform sovereign wealth funds across the board in their investments. Moreover, announcement period abnormal returns associated with SWF stock purchases are positive but they are significantly lower than those observed for private sector investments. This finding implies the presence of a sovereign wealth fund "discount", which the authors suggest is due to the state ownership. They conclude with unresolved issues in SWF research. With the notable exception of the activities of Norway's GPFG, they argue, far too little is known about the details of SWF investments and the returns that the investments achieve. It is also unclear what will be the long-term impact and effects of sovereign wealth funds. In particular, they question whether it is reasonable to expect markets to efficiently and accurately assess the value impact of investments which are intentionally kept opaque by a group of funds that are themselves often little understood.

Nick Hanley, Eoin McLaughlin and Louis Dupuy (2015) consider "Genuine savings and sustainability". Genuine savings is an empirical indicator of sustainable development and hence intergenerational well-being. It measures how a nation's total capital stock changes from year to year, where capital includes all assets (or instruments of wealth) from which people obtain well-being. It comprises physical capital (machines, buildings, infrastructure), human capital, natural capital (renewable and non-renewable resources, ecosystems) and social capital (institutions, social networks). The literature distinguishes between weak sustainability, which requires non-declining total wealth, and strong sustainability, which requires non-declining natural wealth. Genuine savings is typically viewed as an empirical measure of the weak sustainability of an economy. It is forward looking and provides information about the sustainability of a given consumption path or pattern of resource use and hence future

sustainability. Genuine savings thus gives an indication about variation in intergenerational well-being. Estimates are available for many countries and regions but the authors find that they are typically not directly comparable because of different concepts of genuine savings being used across countries. However, as a general rule, the results suggest that economic development is probably sustainable in many countries over the long run when accounting for all instruments of wealth including human capital and total factor productivity growth. Moreover, longer time horizons and the addition of measures of the gradual improvement of productivity and technology tend to enhance the ability of genuine savings to predict future consumption. The authors conclude that genuine savings is a useful concept but its measurement requires further improvement. An interesting area of future research they suggest would be the investigation of the impact of an asymmetric distribution of wealth instruments on sustainability.

The last two articles in this book focus on retirement issues. In the context of retirement income policies, intergenerational equity implies that government services received by generations throughout their lifetime match the amount of taxes they have paid. A recent wave of pension reforms in several countries has led to cuts in public pension programs partly because pension policy had tended to favor current over future generations. Moreover, rising pension expenditures as a result of ageing populations have exacerbated the problem of unsustainable government finances.

In "Savings in times of demographic change: lessons from the German experience" Axel Börsch-Supan, Tabea Bucher-Koenen, Michela Coppola and Bettina Lamla (2015) discuss how German households have adjusted their retirement and savings behavior in response to far reaching pension reforms. Germany, which was the first country to introduce a formal national pension system in the 1880s, embarked on a series of reforms between 1992 and 2007. The reforms encompassed three features. They raised the statutory retirement age, they decreased public pension replacement rates and they transformed the monolithic public pension system into a multi-pillar system by fostering private and occupational pensions. The authors conclude that most Germans have adapted to the changes with both actual and expected retirement ages increasing and the proportion of households without any source of supplementary income in retirement decreasing sharply. But there is a large heterogeneity in the responses. Households with higher income and education responded strongly, while a substantial fraction of households, in particular those with low education, low income and less financial education, did not respond at all. The evidence also suggests important information gaps. For instance, Germans on average underestimate their life expectancy by a substantial margin, women by 7 years and men by 6.5 years, which corresponds to roughly a third of life spent in retirement. The authors conclude with a call for better informing people by providing easier to understand information about life expectancy as well as the eligibility for private and occupational pension schemes and their high subsidy rates. Better informed individuals may also help counter reform backlash, which is appearing in the political climate.

Retirement, which marks the end of labor earnings and the beginning of a drawdown of retirement resources, is probably the most important financial decision people make and Courtney Coile (2015) in "Economic determinants of workers' retirement decisions" reviews the theory and evidence on the influences that have been found important. She discusses the impact of private and public pensions, wealth and savings, health and health insurance and labor demand and concludes with thoughts about future retirement behavior. A persistent trend in labor markets that is expected to continue in the future is the steady increase in the number of older women. It has occurred mainly because of a societal trend of greater female

labor force participation and has offset any movement towards earlier retirement by women. Moreover, economic activity is shifting into the services sector away from manufacturing and other traditional blue-collar industries. The services sector typically requires computer literate workers and the evidence suggests that having computer skills is associated with an increase in the probability of continuing to work at older ages. However, the importance of this factor is expected to abate over time as the gaps in computer use by age are declining. Regarding pension plans, retirement ages have been rising and benefits have been declining for public pensions, while private plans have been shifting from defined benefit to defined contribution plans. At the same time, more responsibility is being put on workers to decide whether or not to participate in a pension plan, how much to contribute, where to invest those contributions, and how to draw down savings in retirement. With respect to the influence of health factors on retirement decisions, continuing health improvements are anticipated to further reduce the number of workers being forced into retirement earlier than planned because of adverse health shocks. However, as Coile points out more research is needed on the effects of retirement on health and well-being. Finally, the impact of equity markets and house prices on retirement decisions has not been strong and is expected to remain moderate.

Savings and wealth accumulation are once again at the forefront of policy and research debates. The nine articles presented here provide critical reviews of some of the most topical private and public sector aspects and discuss policy implications. However, many challenges and unanswered questions remain underlining the need for more analysis and research.

Notes

1. The views expressed in this article are those of the authors and do not necessarily represent those of the International Monetary Fund (IMF), IMF policy, its Executive Board or IMF management.
2. Speech Chair Janet L. Yellen, At the 2014 Assets Learning Conference of the Corporation for Enterprise Development, Washington, D.C., September 18, 2014; http://www.federalreserve.gov/newsevents/speech/yellen20140918a.htm accessed 24 April 2015.
3. This is the substitution effect. The income effect works in opposite direction to the substitution effect for savers, i.e., lower interest rates reduce income from interest earning assets thus increasing savings. For borrowers the substitution and income effects reinforce each other, i.e., lower interest rates increase disposable income because of lower debt payments. Other factors contributing to low savings rates are demographic changes.

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2

RECENT DEVELOPMENTS IN CONSUMER CREDIT AND DEFAULT LITERATURE

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1. Introduction

The last two decades of the 20th century witnessed a dramatic increase in personal bankruptcy filings, which continued into the new millennium. The phenomenon was not limited to the USA, and was present in other countries where the institution of personal bankruptcy is present.[1] Annual personal bankruptcy filings in the USA crossed the 1 million mark in the 1990s, with annual Chapter 7 filings alone exceeding that level in the 2000s. That is, about 1% of American households file for bankruptcy every year.[2] These rising bankruptcy trends in North America seem to have been broken only by the reforms of the bankruptcy system (BAPCPA in the USA in 2005, and reforms of the 1990s in Canada). Not surprisingly, personal bankruptcy received attention not only from policy makers concerned about the large number of filers, but also from economists seeking to better understand the key mechanisms of household debt and default, and the driving forces behind the dramatic rise in both debt and filings. The research in this area has been both very active and very fruitful in the last 10 years, and yet, the only survey of bankruptcy models, Athreya (2005), predates most of these contributions. The current survey aims to highlight the key questions, contributions, and theoretical developments in this burgeoning literature.

The recent bankruptcy models have built on the theoretical foundations that had already been in place. The single most important building block in this literature is the incomplete-market model of Eaton and Gersovitz (1981). The key idea, which has been almost universally adopted in the quantitative bankruptcy literature, is that the interest rates (which explicitly depend on the loan size) reflect the probability of an individual borrower's default and compensate lenders in non-default states for the losses they suffer in default. Furthermore, the most basic tradeoff associated with the design of bankruptcy systems – that between the partial insurance afforded by the ability to walk away from debts on the one hand and the inability to commit to repaying loans in the future, which hampers intertemporal smoothing, on the other hand – has been understood since Zame (1993).[3] So, a lot of the recent contributions have been quantitative in

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nature, with quantitative models by Chatterjee *et al.* (2007a) and Livshits *et al.* (2007) being the standard references. But this quantitative research has in turn posed new theoretical questions, and has led to the development of new theoretical models. These quantitative findings and theoretical developments are the subject of this survey. I will forego the discussion of the personal bankruptcy system and characteristics of a typical bankruptcy filer, referring the reader instead to White (2007) and Sullivan *et al.* (2000).[4] For a detailed description of the consumer credit industry and its evolution, please see Evans and Schmalensee (1999) and Livshits *et al.* (2015).[5]

The survey is organized as follows: Before going into specific questions and agendas, the next section lays out the key mechanisms and tradeoffs associated with consumer credit and bankruptcy, and presents the key features of the standard models employed. Section 3 discusses the papers dedicated to explaining the rise in bankruptcies and debt over the last few decades. Improvements in information processing technology figure prominently in this literature, and thus, Section 4 follows up on the importance of information in the consumer credit markets. Section 5 discusses welfare implications of various bankruptcy regimes (including the effects of personal bankruptcy rules on entrepreneurship), as well as those of the recent developments in consumer credit markets. Section 6 turns to papers that study delinquency and informal default, as well as debt restructuring and collection. Section 7 discusses papers on the cyclicality of debt and default. Lastly, Section 8 presents some challenges moving forward and some promising directions for addressing them.

2. Basic Models, Mechanisms, and Tradeoffs

The starting point for a successful model of bankruptcy involves having default on debt occur with positive probability as part of (the equilibrium path of) the model outcome. This seemingly trivial statement rules out a large set of models that study debt under the *threat* of default (most standard references being Kehoe and Levine (1993), Kocherlakota (1996), and Alvarez and Jermann (2000)). The basic idea is exceedingly simple: No rational lender would advance a loan that will certainly not be repaid. In a complete market setting, where every loan is obtained by issuing a promise to pay in a specific state only, lenders will not accept such liabilities if the borrower will not repay in that future state of the world, because they will not be repaid in any other state of the world either. Thus, a complete market setting fails to generate a model of equilibrium default.[6] However, if the markets are (exogenously) incomplete, and loans are not made contingent on the realizations of (idiosyncratic) uncertainty, then lenders may be willing to advance a loan that is *sometimes* not repaid – as long as they are compensated for the losses by a higher interest rate (when the loan is repaid).[7] Thus, the standard approach in the default literature has been to model the debt markets as maximally incomplete, where the only form of debt is a (borrower-specific) non-contingent one-period bond. Of course, the option of default generates some "state dependence" – the return on the bond is constant only across the states where the borrower does not default.

The basic model of equilibrium default goes back to Eaton and Gersovitz (1981). The key assumption in that model and in the literature that followed is that a borrower faces an interest rate *schedule* that makes the rate an explicit function of the amount borrowed. In a competitive setting with risk-neutral lenders, the interest rates include a risk premium, which reflects the probability of default as a function of the amount borrowed (and possibly, the expected recovery rate in the event of default). Such pricing makes the borrower fully take into account the effect of the debt level on the probability of default,[8] and generates an endogenous

borrowing constraint – maximum amount a borrower can receive in exchange for a pledge of future income.

From the most basic model of bankruptcy, let's move on to the most basic tradeoff – the one associated with the concept of bankruptcy itself. Unlike in models with complete markets, full enforcement of debt contracts is not necessarily *ex ante* optimal in the incomplete market models of default. In complete market models, inability to commit to future payments unequivocally shrinks the *ex ante* choice set available to the borrower (and thus, lowers welfare). In contrast, such lack of commitment is associated with a meaningful *ex ante* tradeoff in incomplete market models. The ability to walk away from one's debt in some states of the world introduces some (partial) insurance into the setting where no other insurance is available. Of course, on the other hand, risk of default makes borrowing more expensive (and this is not just a matter of shifting payments from one state of the world to the other ones – at least, not as long as there is some deadweight loss associated with bankruptcy); and the lack of commitment makes certain debt levels simply unattainable. This basic tradeoff was first clearly laid out in Zame (1993), and of course, has been central to the welfare analysis in most subsequent papers (see, for example, Chatterjee *et al.* (2007a) and Livshits *et al.* (2007), where commitment is basically equated to the severity of the bankruptcy "punishment").

Another way of formulating this key tradeoff is as a choice between greater ability to smooth consumption over time, which is supported by greater commitment (equivalently, greater cost of bankruptcy to the borrower), and greater ability to smooth across states of the world, which is facilitated by the ability to walk away from debts (i.e., lower bankruptcy cost). Phrasing the tradeoff this way helps understand, for example, the finding in Livshits *et al.* (2007) that the implications of income uncertainty for the choice of optimal bankruptcy system depends on the exact nature of the income uncertainty. While greater variance of persistent income shocks makes lower bankruptcy costs more attractive (as the demand for smoothing across states increases), the same does not hold for transitory income shocks. Households can quite effectively smooth transitory income shocks over time, as long as they are able to borrow (sufficient amounts and at good interest rates). Thus, greater variance of transitory income shocks makes lower bankruptcy costs less attractive, as they limit the borrowers' ability to commit to repayment and make intertemporal smoothing more difficult.

Before discussing specific research topics, I think it is useful to highlight several key mechanisms that are embedded in bankruptcy models, and thus come up in the discussions of a number of topics. The first of these recurrent themes is precautionary savings. The concept, which dates back to Leland (1968), is a very intuitive one – in the absence of perfect insurance markets, risk-averse households "save for a rainy day" (i.e., accumulate more savings than they would if perfect insurance were available). Precautionary savings arise not only in incomplete market settings (Aiyagari (1994) is the most standard reference for this point), but also in models with complete but imperfect markets. That is, when markets are subject to enforcement (or other) frictions, perfect insurance may not be attainable, and thus there is the need to save for the rainy day. This mechanism is present, for example, in the Kehoe and Levine (1993) economy.[9] And naturally, these forces arise in models which have both frictions – both the market incompleteness and the inability of borrowers to commit to repaying their loans. One example of why precautionary savings are important to keep in mind is that an increase in the frequency or size of adverse shocks doesn't simply translate into a greater frequency of default in this class of models, as households respond by accumulating precautionary savings (and reducing their debts).

One consequence of this phenomenon is that a typical quantitative model with a realistic income shock process struggles to generate the observed frequency of defaults. As a result, most of the quantitative models of bankruptcy introduce some additional idiosyncratic uncertainty that drives some households into bankruptcy. Livshits *et al.* (2007) introduce what they call "expense shocks," which affect households' balance sheets directly and are meant to capture out-of-pocket medical expenses and costs of family shocks, such as divorce and unwanted children. Chatterjee *et al.* (2007a) add a preference shock which makes households particularly "hungry" in some periods and serves the same basic purpose. These assumptions of additional shocks are not only useful, but also quite realistic, as a large fraction of filers report expense shocks as (part of) the reason they ended up in bankruptcy (see Domowitz and Sartain, 1999; Warren *et al.*, 2000; Sullivan *et al.*, 2000).

Another model ingredient necessary to reconcile a typical bankruptcy model with the data is some transaction cost of making loans. The gap between the average interest rates charged on unsecured debt and the (risk-free) savings interest rate in the economy is just too large to be attributed solely to the risk-premium on unsecured debt. Again, these transaction costs are not only useful from the model perspective, but also quite realistic (and several recent papers study mechanisms that comprise such transaction costs – see, for example, Drozd and Nosal, 2008; Sanchez, 2010; Livshits *et al.*, 2011; Drozd and Serrano-Padial, 2014). Furthermore, in a setting that has nothing to do with default, Mehra *et al.* (2011) argue that such transaction costs are both realistic and important.

One other common theme in this literature is the "democratization of credit" (including what Drozd and Serrano-Padial (2014) call "revolving revolution") – the extension of credit to new (and seemingly riskier) borrowers in the recent decades. This phenomenon is clearly present in the data, and arises quite naturally in many different models, both in response to various improvements in information technologies (e.g., Sanchez, 2010; Athreya *et al.*, 2012; Narajabad, 2012; Drozd and Serrano-Padial, 2014; Livshits *et al.*, 2015) and even in response to lower costs of advancing loans (Drozd and Nosal, 2008; Livshits *et al.*, 2015). The mechanism is usually quite intuitive – lending to the best (safest) borrowers generates the largest surplus, and thus, takes place even when (information) technology is underdeveloped. As lending technology improves, it makes lending to riskier types (associated with greater expected deadweight losses from default) profitable. Note that this increased average riskiness of the debt is associated with higher welfare in all these models, as it arises from realizing new gains from trade (and comes from the newly realized trades being the relatively risky ones).

To conclude this section, I will use the comparison of the two key quantitative models, Chatterjee *et al.* (2007a) and Livshits *et al.* (2007), to highlight the basic modeling approaches and their respective benefits. First of all, Chatterjee *et al.* (2007a) is a full general equilibrium model, where the risk-free interest rate (as well as individual borrowing rates) is determined endogenously. Livshits *et al.* (2007) argue that, since unsecured consumer credit is just a small part of the overall financial market, a partial equilibrium approach is justified. That is, while individuals' borrowing rates are determined endogenously (as in Eaton and Gersovitz, 1981), the risk-free rate is taken as given. The partial equilibrium approach makes computation of the model less demanding, but may not be appropriate, of course, if one considers general equilibrium effects potentially important (and thinks that financial markets are closed to international capital movement). A second important distinction between the two models concerns the life-cycle of borrowers. Whereas Chatterjee *et al.* (2007a) model individuals as (potentially) infinitely lived, Livshits *et al.* (2007) have overlapping generations of households with an explicit life-cycle both in their earnings and in their family size, which allows them to

explicitly study the age profile of both unsecured debt and bankruptcy filings. The assumption of finite life further reduces computational costs as, instead of looking for a fixed point of a stationary value function (as in Chatterjee *et al.*, 2007a), the model of Livshits *et al.* (2007) can be simply solved by backward induction. The last important distinction I will point to is the choice of a key empirical target for calibration – debt. Chatterjee *et al.* (2007a) map debt in the model to negative net worth in the data, while Livshits *et al.* (2007) interpret it as gross unsecured debt in the data. Of course, the distinction is absent in the model as it has just a single asset (and thus, no distinction between gross and net debt). On the one hand, the negative net worth is the more natural measure of households' indebtedness. But on the other hand, it is the gross unsecured debt that can be discharged in bankruptcy (while some assets are exempt from seizure by the lenders). The literature has not really settled on which data moment is the right target for a model to match; but fortunately, most key findings seem robust to the alternative mappings of debt to the data.

3. The Rise in Personal Bankruptcies and Consumer Credit

The rise in bankruptcy filings has been almost uniformly cited as a motivation for studying default in the consumer debt markets, even in papers that did not address the issue directly. It is not surprising, as in the USA, for example, the personal bankruptcy rate has increased more than three-fold in the last two decades of the last millennium. And while there has been no shortage of proposed explanations for this phenomenon, this is still a very active area of research. As Livshits *et al.* (2010) argue, the mechanisms that are easy to quantify (increases in uncertainty, demographic changes, etc.) account for just a fraction of the rise in filings (and a smaller increase in debt), and one is left with explanations that are much harder to quantify, such as a fall in the "stigma" of bankruptcy and a fall in intermediation costs. Thus, this quantitative paper helps set the stage for future research more than provide specific answer(s). And a number of subsequent papers have offered specific stories that are consistent with the key observations.

The proposed explanations can be loosely categorized into four types: increased risk exposure of borrowers (i.e., existing borrowers face more adverse shocks), increased risk exposure of lenders (i.e., lenders advance loans to riskier borrowers), compositional changes in the population (population of borrowers can thus become riskier without any change in lending standards), and lastly, greater willingness of borrowers to file for bankruptcy. The first category includes both increase in household income risk (as suggested, for example, by Barron *et al.* (2000) and Hacker (2006)), and increase in out-of-pocket medical spending (pointed to by Warren and Warren Tyagi (2003)). The increased willingness of lenders to advance riskier loans may have also come from several sources. It could have been a consequence of changes in the regulation – specifically, the U.S. Supreme Court's 1978 *Marquette* decision, which effectively lifted interest rate ceilings, is most often cited (e.g., Ellis, 1998) as being critical in enabling lenders to go after riskier borrower pools (and be appropriately compensated for it with higher interest rates). Additionally, credit market innovations (such as the development and spread of credit scoring and securitization) may have lowered the cost of lending and/or improved accuracy of targeting specific groups of borrowers, thereby leading to more borrowing and potentially more defaults (Ellis, 1998, Barron and Staten, 2003).[10] Many of the specific mechanisms that have recently been suggested along these lines are rooted in improvements in information technologies (Sanchez, 2010; Livshits *et al.*, 2011; Athreya *et al.*, 2012; Narajabad, 2012; Drozd and Serrano-Padial, 2014), and I will come back to them in the next