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Transforming personal finance thanks to artificial intelligence: myth or reality?

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1 What is personal finance?

Personal banking pertains to the way households manage their finances and leverage the associated eco-system to meet their needs (Campbell, 2006; Collardi, 2012; Maude, 2010; Tilmès & Schaubach, 2006). Those needs have traditionally been articulated around four pillars or product categories: payment, loans, investments products & insurances. This has given birth to an industry structured around two core activities. On one hand, advisors and brokers distribute/sell financial products. On the other, asset managers, banks and insurers process the associated orders and produce the associated services.

Personal banking has, however, been the subject of recent critics as the associated services are not only considered expensive but also have not fundamentally changed over the past decades. For instance, investments products (e.g. private retirement plans based on equity) which yield, on average, a 5% return, have been subject to a 2-3% fee every year (Bazot, 2018; Philippon, 2016). As a result, for every \$ invested, only 2 or 3 cents are earned by a household, which barely covers the inflation (currently running at a 1-2% rate in most mature countries).

Those longstanding critics have thus given birth over the past decade to the Fintech movement (Philippon, 2022), an entrepreneurial stream aimed at leveraging automation technology (and notably artificial intelligence tools) to make personal banking more efficient. And of course, this entrepreneurial movement has had its academic counterpart (see (Knewton & Rosenbaum, 2020) for a definition). Fintechs nowadays target both households and financial professionals. When it comes to households, the questions fintechs are trying to address are mainly one of speed. Recent evidences, for instance, show that automation technologies have proven useful to reduce by about 30% the time it takes to get loans and insurances. When it comes to professionals, fintechs have been aiming at providing tools to increase workers' productivity. This has been done by reviewing the value chain of professions (Grossman & Rossi-Hansberg, 2008) and automating as many activities as possible so that professionals can serve more households (Chatterjee & Grable, 2022; Todd & Seay, 2020). Note that this should, in principle, also lead to a reduction in the price of the financial products/services.

2 Do we need more of it?

Looking at the current personal banking landscape ("Discussion Paper on the EBA's approach to financial technology (FinTech)", 2017; Navaretti, Calzolari, Mansilla-Fernandez, & Pozzolo, 2018; Vives, 2017), a lot has already been done over the past decades when it comes to loans, insurances and payment. However, the use of technology has been rather limited when it comes to investments. Most examples indeed focus on the topic of robo-advisors, tools helping individuals to automatically allocate their investments in order to boost their returns. If efficient, those tools are not adopted in a wide fashion as their usage suffers not only from black-box considerations (Polansky, Chandler, & Mottola, 2019) & lack of trust (Cull, 2022; Mutual, 2017) (for instance, studies show that only 29% (resp. 53%) of babyboomers (Gen X/Y) trust robo-advisor) but also is not so frequent (most financial portfolios associated to investments are indeed only re-balanced one every year).

To understand why more investment may be needed, one must first look at the associated goals. First, capital is accumulated by individual through their working life to prepare for retirement (Ando & Modigliani, 1963).

The annuities generated through the capital replace about 60% (Blöndal & Scarpetta, 1999) the wages one could earn while active in the labor market. Second, investments are used as a strategic instrument (Bernheim, Shleifer, and Summers (1986) and an alternative to long term care insurances (Cagetti, 2003). In this set up, families are incentivized to take care of the elderly (Dobrescu, 2015; Ribes, 2021) for instance, through bequests. Finally, capital is used in an altruistic fashion (Masson & Pestieau, 1997) as a mean to smooth consumption across generations via various inheritance mechanisms. Note that, all things considered, investments are, for most individuals, about preparing for retirement.

Now, looking at the current societal trends, notably across mature countries, personal investments appear more then ever needed. In the context of ageing societies and a general reduction in fertility, public pension schemes, which now support most of the retirees, are seeing their efficiency being eroded (Fanti & Gori, 2012; Fanti et al., 2015). For example, the replacement rate provided by states are forecasted to shrink by 1 to 2 point a year (Ribes, 2022) as a result of the growing share of older individuals (some scenarios point at a replacement rate moving from 60% in the 2020s to 30% in the 2050s). Individuals therefore need to reinforce their investments in private retirement plans to brace for the change. Besides, the increasing life expectancy and the rising healthcare costs (Berchick, Hood, & Barnett, 2019), notably in the later stages of life (Shang & Goldman, 2008), require more and more individuals to find alternative solutions to have a decent quality of life during their latter years. Increasing precautionary savings and build up dedicated capital will therefore here be crucial over the coming years. If the use of investments products is for now rather limited in a number of mature country, the aforementioned trends call for a large and quick democratization of those instruments.

3 How can artificial intelligence help?

Given the current trends, personal finance and notably the architecture and distribution of investments products would benefit from an acceleration. As per how artificial intelligence, defined as a set of automation tools, can help: there is no ready answer. Some solid leads can yet be generated by decomposing the value chain inherent to the field into tasks (in a fashion similar to the methodology described in (Grossman & Rossi-Hansberg, 2008)).

The activities associated to the distribution of financial investments products are articulated around four main steps (Maude, 2010). First, individual contacts (generally representatives of entire households) are garnered and qualified (e.g. level of revenue, financial objectives etc...). Based on this qualification, pre-sales activities then occur to match the clients needs with one or two products based on both financial & fiscal considerations. If interested, households then subscribe to a product. Finally, post subscription, households embark on a cycle of yearly reviews with their financial advisor. Here artificial intelligence could help in several ways. First, the qualification of contacts could be accelerated. For instance, classifiers could be trained to predict which household may benefit from financial advice based on multiple and sparse information sources. Second, pre-sales activities could also be improved. Here time series analysis could be of use to help individuals better plan for the future and to help households find the right level of savings and investments supporting their needs. Additionally, clustering methods could also be used to match individuals with the savings profile of their peers and thus accelerate investment decisions. Third, clients review may also be enhanced by leveraging predictive techniques (such as classifiers) to understand who may benefit from a review (which usually represents less than 10% of an advisor's portfolio). Financial advisors have indeed about 100 clients (Foerster, Linnainmaa, Melzer, & Previtiero, 2017) in their rooster and loose in efficiency when they do not focus their efforts on selected clients. More micro-economic research will certainly be seen burgeoning on this front.

As seen above, artificial intelligence certainly has a role to play in the transformation of personal finance. But it is merely one of the numerous tools which will be needed to address our upcoming societal challenges in terms retirement preparation and old age management. An important element to consider is that savings capabilities (and therefore investments opportunities) differ not only from one country to another (Rocher, Stierle, et al., 2015) but also across income categories (Kessler, Perelman, & Pestieau, 1993). This calls for heterogeneous and localized solutions. For example, the top households (income wise) can save up 20% if not more of their income, whilst the more than half of mature countries population do not have currently the ability to save and invest - see O.E.C.D database. This implies that, beyond questions of investments, there is a real societal challenge to avoid a further polarization of the society in the upcoming years. Macro economic studies will thus be required to assess how a mixture of additional public programs and highly differentiated reforms on the existing public pension and healthcare schemes can ensure decent living standards within entire populations.

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