Reacfin White Paper on Retail Banking:

Retail deposit modelling
Application to Belgian Saving accounts

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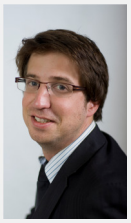
Know-How to Risk

Savings deposits play a major role in today's economy. They are one of the most important sources of funding for European banks. For this reason, banks want to assess the stability and monitor the evolution of their deposits.

In this paper, we present a multivariate model for the savings deposit volume. It allows assessing elasticities to savings products and forecasting the deposit volume over specified time horizons. We consider here the case of the regulated Belgian market.



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INTRODUCTION

Retail savings deposits are a crucial part of the European economy (and a particularly important element in Belgium). Their importance is twofold, impacting both demand and supply sides of the money market.

On one hand they serve as a refuge investment for households, as Figure 1 shows in the case of Belgium. The reasons driving their interest are multiple. Of course, savings deposits are highly liquid, as the depositor can withdraw his money whenever he wants. In the case of Belgium, another valuable feature is certainly the tax exemption they offer. The interests paid on regulated savings accounts are indeed exempt from withholding tax (currently 15%) up to an amount defined by legislation, equal to 1880 euros for 2013. As can be seen on the graph, the financial crisis of 2008 has greatly increased savings deposits' weight within the total assets of the households, proving their "secure investment" role for the Belgian individuals.

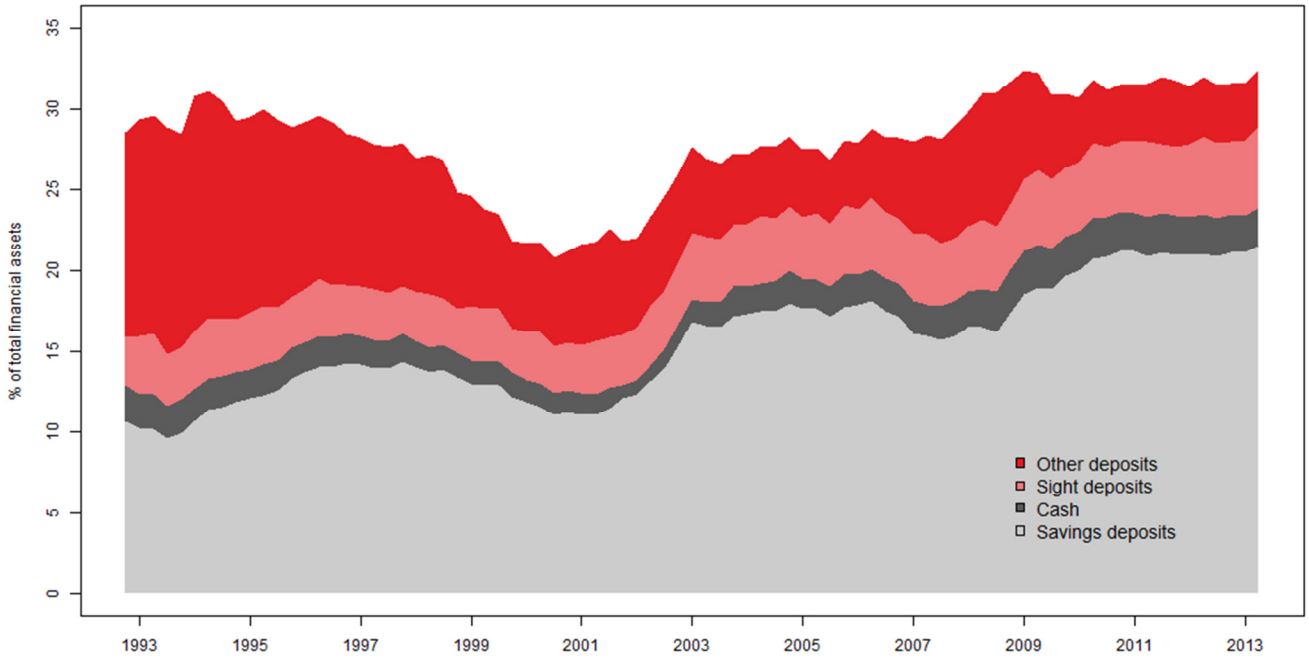

Figure 1: Relative weights of the Belgian households' deposits within their total financial assets (source: NBB)

On the other hand, savings deposits are a very significant portion of the retail banks' funding, as Figure 2 shows. The major advantage of deposits with respect to other funding sources is their very low cost. The price paid by retail banks for this part of their funding is indeed very cheap. Several Belgian banks maintain multiple savings products for different reasons. First it allows them to offer different savings profiles to their clients, e.g. products focusing on the basis rate or on the contrary focusing on the fidelity premium. Second this multiplicity is an effective bank management device, as a higher rate on some product attracts clients from inside (i.e. from other products of the same bank) but also from outside (i.e. from competitors). Having (at least) two products in competition within the same bank should lead, *ceteris paribus*, to a significant growth of the savings deposits portfolio (as each rate increase draws in new customers coming from other banks).

FUNDAMENTALS OF OUR SOLUTION

The model presented here is aimed at explaining the variability of the savings deposit volume of retail banks. It consists in a multivariate non-linear regression of the volume changes on several variables. These variables (or regressors) can be classified into several categories (or building blocks) as can be seen in Figure 3. This modelling methodology is a banking management tool allowing to project volumes and providing many useful insights into the savings activity of the bank.

Retail banks have various policies regarding the record of the past deposit cash-flows. Hence the volume data can come in different levels of details and granularities. Dealing with weekly data is the best granularity choice, as a model based on monthly data would fail to capture intra-month patterns, while a model based on daily data would misunderstand customers actions (as it often takes a few days to process them).

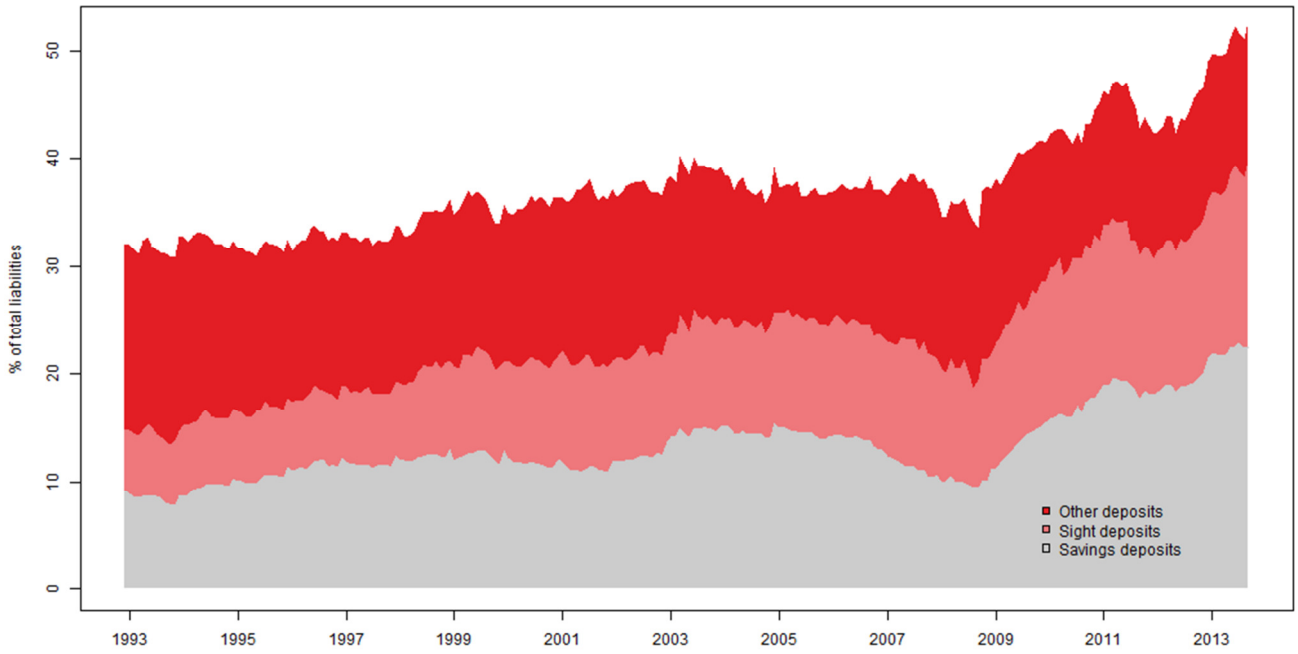

Figure 2: Decomposition of the Belgian retail banks' liabilities (source: NBB)

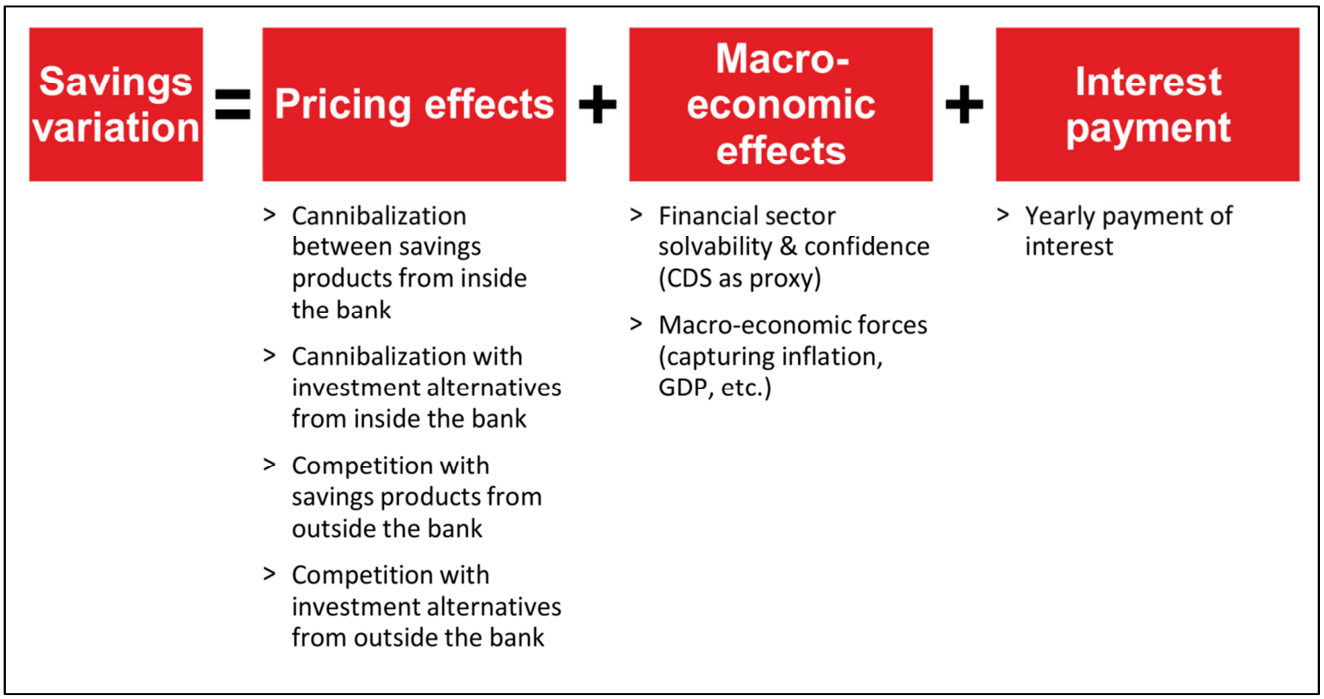

Figure 3: building blocks of the model

FIRST BUILDING BLOCK: PRICING EFFECTS

The first building block of the model is composed of regressors which depend on interest rates.

On one hand, we have to take into account the internal cannibalization, i.e. the capacity of one savings product to capture deposit volume from other products of the same bank. As can be seen in Figure 4, the data clearly show cash flowing from one product to another when the interest rates they offer are different.

The internal cannibalization terms are proportional to two factors. The first one is the rate differential between the two products (i.e. the capturing product's rate minus the losing product's rate). The second factor is the volume of the latter product.

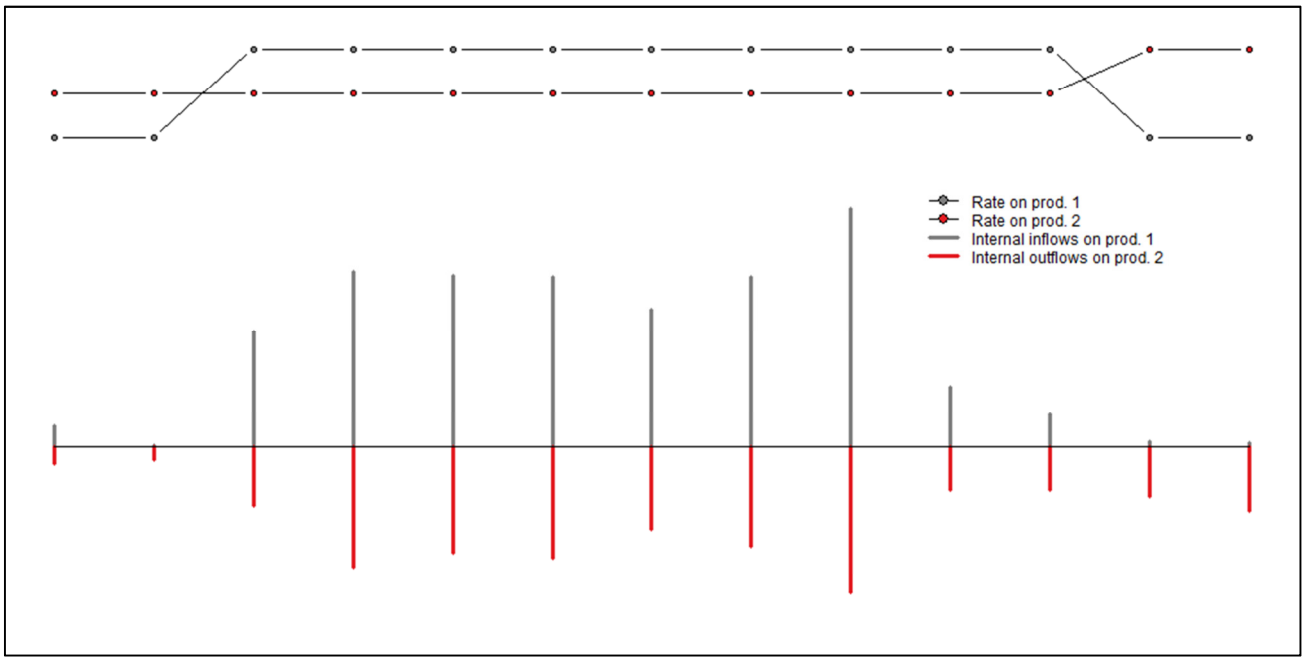

Figure 4: internal cannibalization effect as seen in the data for two products when the rate differential becomes positive

On the other hand, the external cannibalization (i.e. the capacity of competitors savings products to capture deposit volume from the bank) is also a key element of pricing. It seems natural that external cannibalization regressors share the same generic formula as the internal cannibalization regressors. They are thus designed to be proportional to the product of a rate differential and the volume of the losing product.

Doing so, we face one major issue. Every bank (at least in the case of the Belgian market) has its own characteristics, in terms of size, funding, reputation, etc., and also in terms of the interest rates it offers to its clients. Among the market, the four largest Belgian banks (which in terms of retail saving accounts volumes represent about 2/3 of the total Belgian market) clearly form a particular cluster. They are the historical deposit institutions of the Belgian households. When compared to the other Belgian banks, their rather heavy funding structure does generally not allow them to offer very high rates to their clients.

On the contrary, smaller banks (that we call challengers) have lighter structures and therefore can be very competitive with regards to pricing, in the few past years. This suggests splitting the market into two groups: *large banks* and *challengers*. As a result we propose considering two different external cannibalization regressors in the model, with different reference rates. Figure 5 shows the differences between the two pools with regard to pricing strategy.

A cluster analysis has been performed to corroborate this intuitive pooling of the Belgian banks. As shown in Figure 6, the clusters output by the algorithm clearly split large banks from others. At the proximity level given by the red horizontal line, the four large banks are pooled, while each of the six challengers (which are mid-sized banks) is alone in its own cluster.

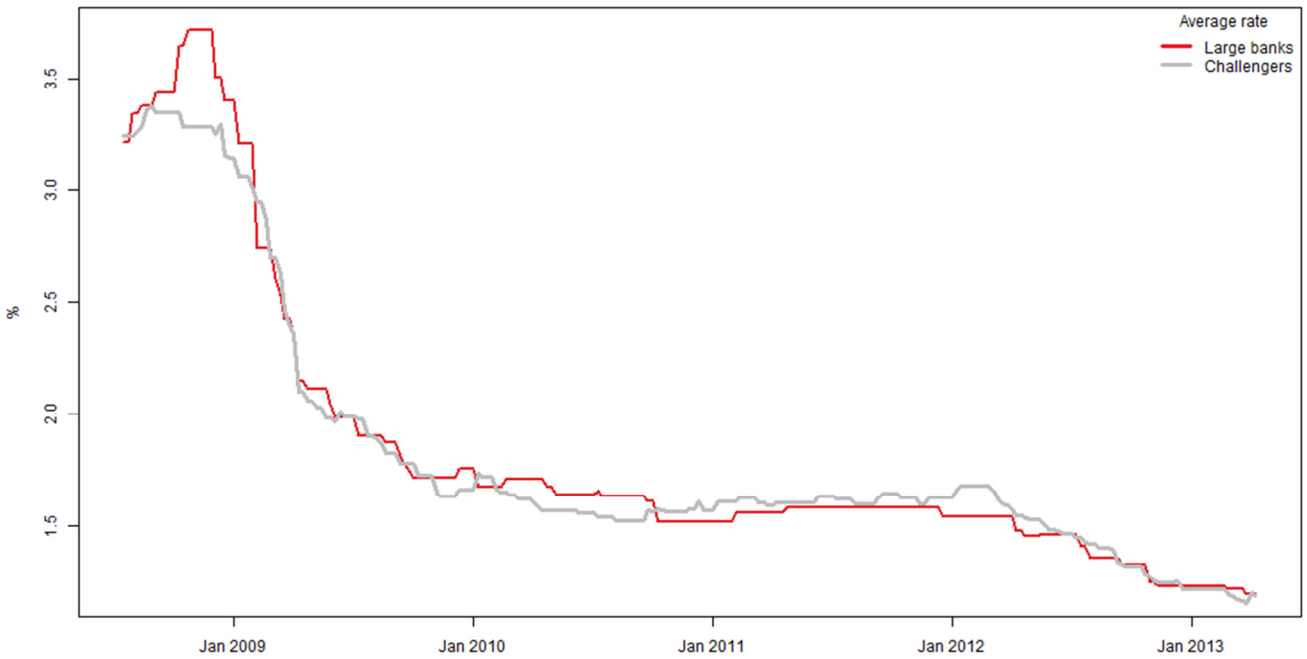

Figure 5: average interest rates offered by the two pools of Belgian banks (large banks and challengers)

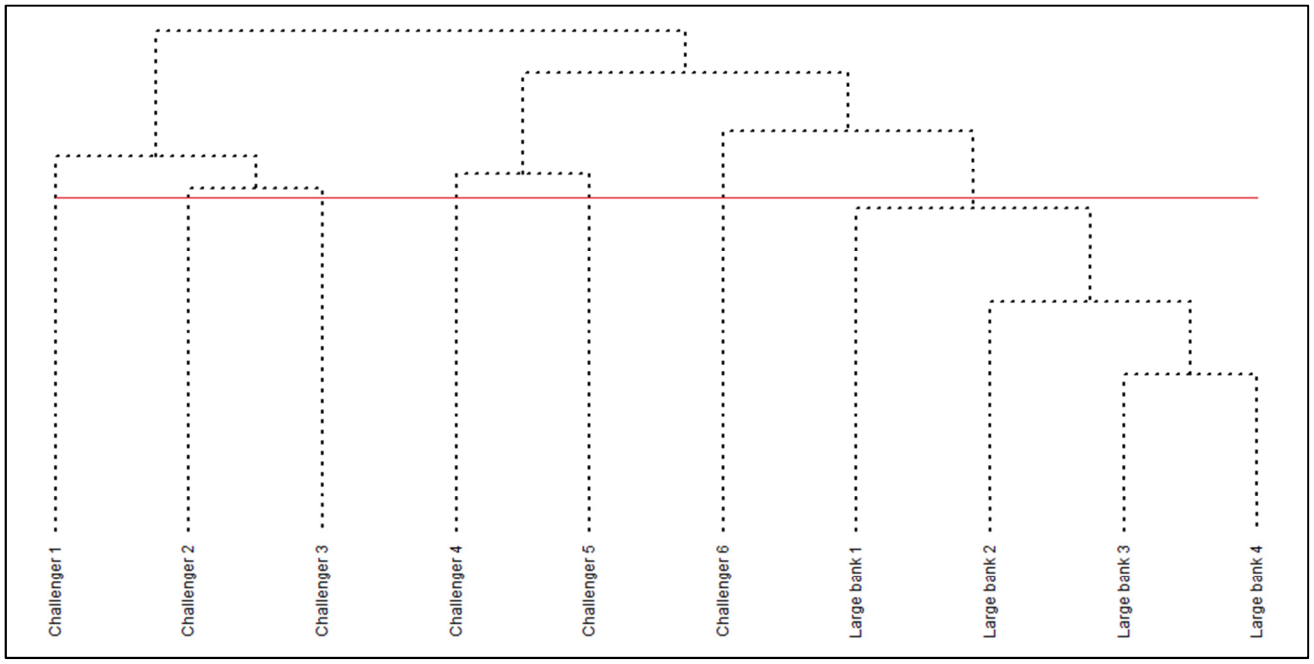

Figure 6: output of the hierarchical cluster analysis performed for the competitors' pooling, showing that the four large banks are pooled together for the displayed proximity level

SECOND BUILDING BLOCK: MACRO-ECONOMIC EFFECTS

Of course the evolution of some macro-economic variables impacts the evolution of savings deposits. Among those variables, the total aggregated amount of savings deposits in Belgium certainly plays a major role. Its evolution, from which one can observe the effect of the 2008 financial crisis, is given in Figure 7.

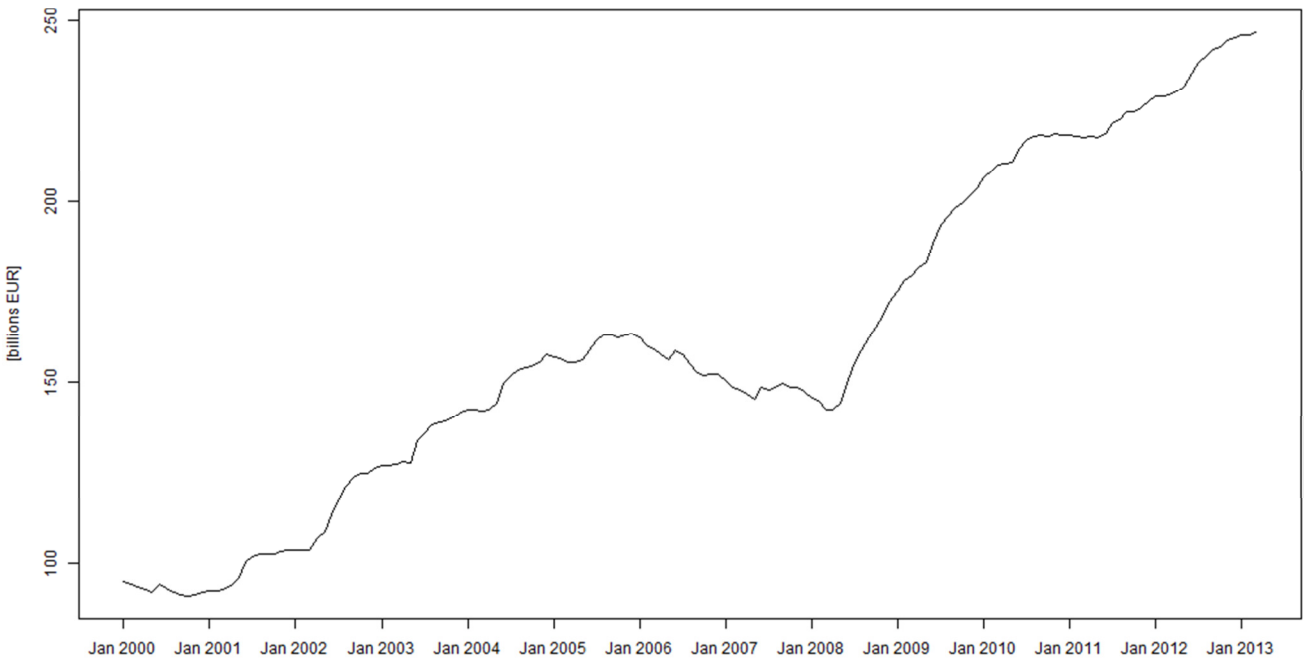

Figure 7: evolution of the aggregated total of regulated savings deposits in Belgium

The 2008 financial crisis has of course impacted the deposit volume of many banks, sometimes positively, sometimes negatively. As some large Belgian banks have experienced major problems during the crisis, some of their clients withdrew money, depositing on other banks' products. This reputation-based effect isn't reflected nor by the pricing, nor by the changes in the total aggregated amount of savings deposits in Belgium (as intra-Belgium deposit transfers are invisible from the global point of view). It is therefore necessary to add regressors reflecting the crisis effects. Several kinds of crisis variables have been tested, and our choice has finally settled on terms constructed upon the CDS prices of the four large banks.

THIRD BUILDING BLOCK: INTEREST PAYMENT

Some other regressors need to be implemented in the model in order to correctly reflect the variations of deposit volumes, even if they correspond to effects which are not straightforwardly related to the market.

The interest payment is such an effect. As we model volume variations, we observe in the data large inflows occurring once a year (as can be seen in Figure 8). This phenomenon has to be captured by a particular seasonal regressor.

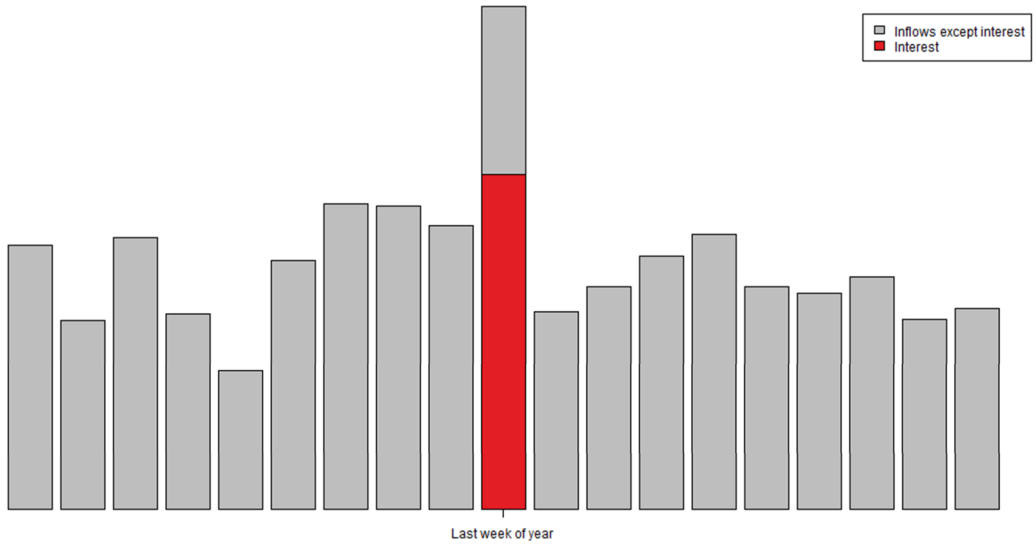

Figure 8: example of interest payment pattern observed in the data

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OTHER REGRESSORS

As the main regressors of the model are proportional to rate differentials, the cash flows in as long as one product's rate is higher than another product's rate. However, one can observe that some products' volume slowly decreases, no matter the interest rate they offer to clients. Indeed retail banks manage their savings products following specific strategies, and some products happen to be deactivated. Customers are then encouraged to transfer their money to other savings accounts and the product slowly dies. This evanescence effect can be captured by a regressor proportional to the absolute deposit volume, leading to some kind of exponentially decreasing factor.

CLASSIFICATION OF THE SAVINGS PRODUCTS

A convenient economic interpretation of the regression coefficients is the following. They can be understood as elasticities of the deposit volume, with respect to the corresponding effects. Calibrating the model thus yields a set of parameters which allows comparing sensitivity among products. A simple classification of savings products is given in Figure 9.

Sleeping, dying product	This product only survives because its clients are sleeping, i.e. its clients are very insensitive to the market conditions. The only regressors proven to be significant in the calibration process are those associated to outflows (mainly to other products of the same bank, less to competitors) and to interest payment.
Classical basis product	This product is the classical savings account offered by the bank to its clients. It is often a regular non-internet account focusing on the basis rate rather than on the fidelity premium. The calibrated regression coefficients show moderated elasticity with respect to internal and external cannibalization, although it often presents a significant elasticity with respect to the global deposit volume changes. The clients are not very sensitive to price movements, but a large interest rate spread with other products can cause (in or out) flows. It can be seen as a macro-economically dependent product. Some client put their money on this savings account for the services it offers rather than for pricing reasons.
Aggressively competitive product	This product is dedicated to "shoppers", i.e. to customers following very closely the market conditions. The bank often offers the highest rates on this product (as the customers are very sensitive to price). It is often an internet account (the structural costs being in this case lower than for a classical product), thus with less services offered to clients. It often focuses on the fidelity premium. Many banks possess two products of this type, making them "fight" for the higher offered rate, in order to attract new clients.

Figure 9: products typology obtained through the elasticities output by the model calibration

PRACTICAL USE OF THE MODEL

The model's outputs have many practical applications, and can be used as a tool of banking management.

First the model assesses the stability of the deposit balance as a whole, as well as the stability of each savings deposit product. As it takes into account the internal cannibalization effects, it allows a precise evaluation of the total volume variance (instead of summing up each product's variance). Moreover, the classification of the products in terms of elasticities can be used to guide strategic decisions.

Second the model allows projecting the savings deposit volume using Monte-Carlo techniques, as shown in Figure 10. This is a very efficient tool for the product management team of the bank, as it estimates the possible impact of price changes over the prediction time window. A more global forecasting of the P&L impact can easily be implemented.

Finally, the model's projections can be used to perform goal-seeking analyses in order to compute the optimal pricing strategy. It consists in computing the interest rate the bank has to offer to its customers in order to increase its deposit volume by a chosen amount. An example is given in Figure 11.

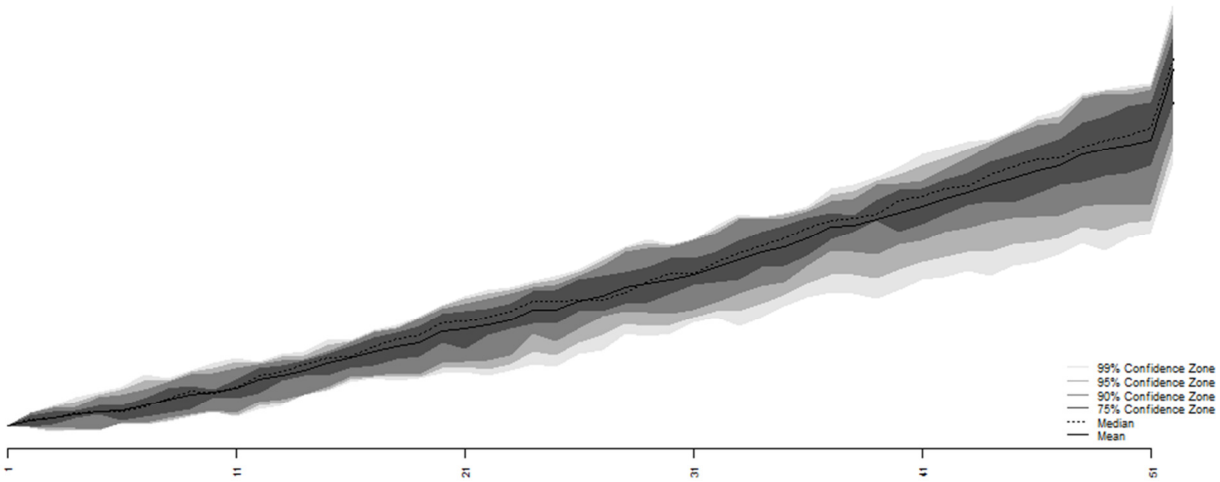

Figure 10: forecasting output of the model (projection of the deposit volume over 52 weeks)

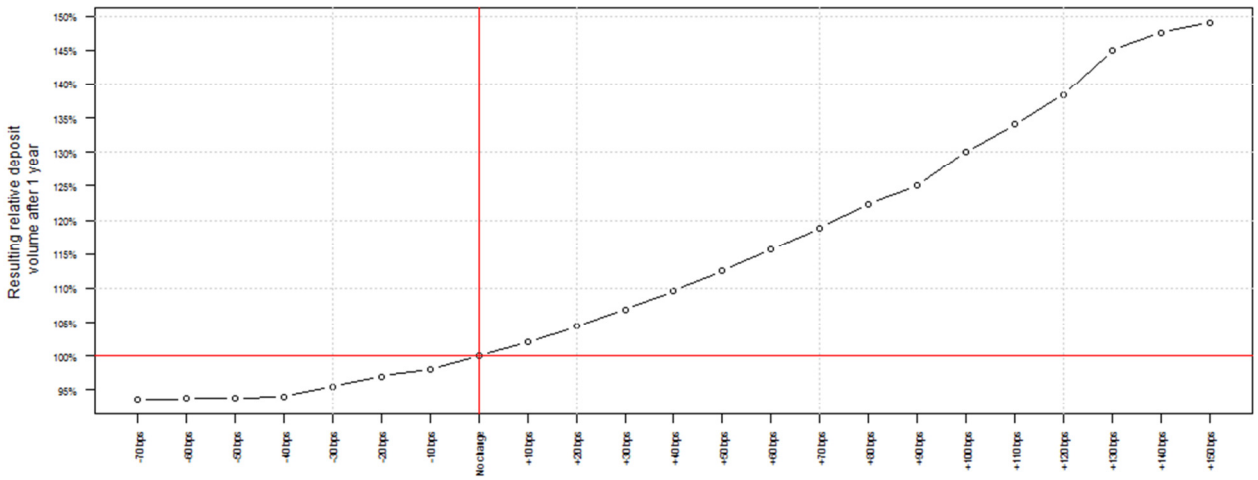

Figure 11: goal seeking output (change in deposit volume resulting from interest rate changes over a projection horizon of 52 weeks)

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About Reacfin

Reacfin is a consulting firm focused on setting up best quality tailor-made Risk Management Frameworks, and offering state-of-the-art actuarial and financial techniques, methodologies & risk strategies.

While we initially dedicated ourselves to the financial services industry, we now also serve corporate or public-finance clients.

Advancements in finance and actuarial techniques are developing at a fast pace nowadays. Reacfin proposes highly-skilled and experienced practitioners, employing innovative techniques and offering expertise in compliance and risk strategies & governance. Our support will allow your firm to reach top performances and gain new competitive advantages.

As a spin-off from the UCL (University of Louvain which ranks eighth in the world for master's degrees in insurance), we maintain a strong link with this institution which enables us to give independent, tailored and robust advice on risk management, actuarial practices and financial models.

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