Haut Conseil des Finances Publiques

HCFP Permanent Secretariat

The high inflation observed since 2021 is pushing up the household savings rate, but only temporarily

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Staff report n°2023 - 1

July 2023

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Summary

The evolution of the savings rate influences that of activity: in the long term, a lasting rise in the savings rate is favorable to the accumulation of productive capital and therefore generally to growth, but in the short term, it weighs on demand. Assessing households' trade-off between consumption and savings is therefore a key element in the development of a macroeconomic scenario.

Today, the impact of inflation on this trade-off raises questions. Faced with high inflation, will households devote a greater part of their income to immediate consumption, in order to avoid future price rises, or on the contrary, as empirical studies carried out in France in the 1980s pointed out, to their savings, in order to protect their real value? Is this behavior, known as the real balance effect, likely to delay the return of the savings rate to its pre-health crisis level?

In order to assess the impact of inflation on the household savings rate, this note proposes an estimation of the consumption function over the long term, using data available since 1949. The early 1980s, characterized, like the current period, by a high household savings rate and strong inflation, is thus included in the analysis.

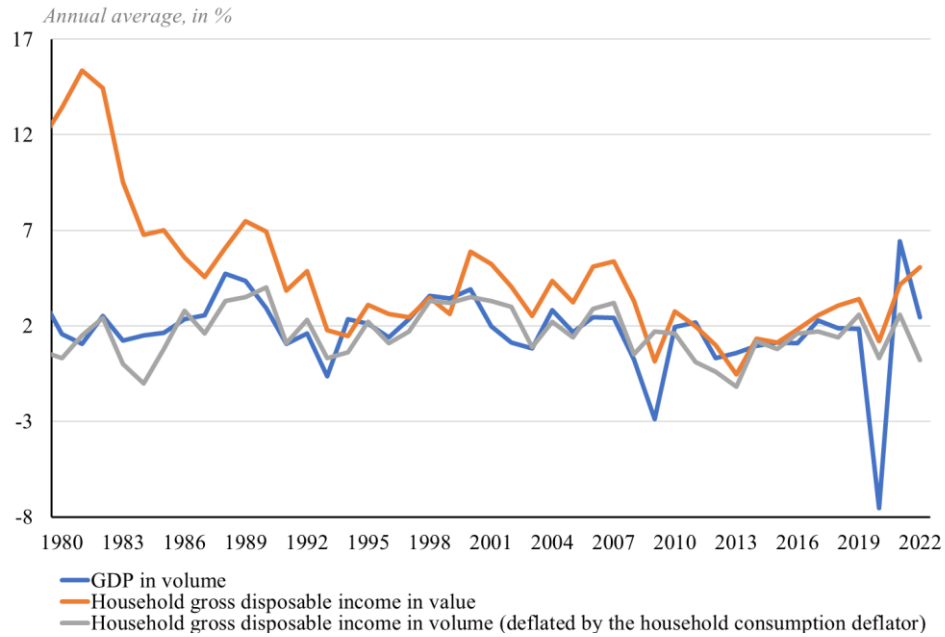
This modelling shows that, over the estimation period, inflation does not have an impact on consumption in terms of level, but rather in terms of variation, with a rise in inflation leading to a temporary decrease in household consumption in volume terms. Conversely, the level of inflation does not seem to have a lasting significant impact on consumption and therefore on the savings rate, which calls into question the existence of a real balance effect in France.

As a consequence, the post-Covid rise in the savings rate could be explained in part, but only in part, by the surge in inflation. This impact would be purely temporary, and inflation should therefore gradually cease to support the savings rate. However, the evolution of the savings rate in the coming years will depend primarily on the other, as yet unexplained, factors that have led to its increase from its pre-Covid level.

[1] Permanent Secretariat of the High Council of Public Finance. The author would like to thank Éric Dubois for his many suggestions, as well as Ekrame Boubtane, Guillaume Gilquin, Pascal Helwaser, Emmanuel Jessua, Caroline Lebrun and Olivier Vazeille for their comments on a first version of this note.

While the Covid-19 pandemic has had a very negative impact on GDP, down 7.5% in volume terms in 2020 in France, the impact on the household gross disposable income (GDI) has remained weak[2], thanks to the implementation of budgetary support measures, and in particular furlough scheme.

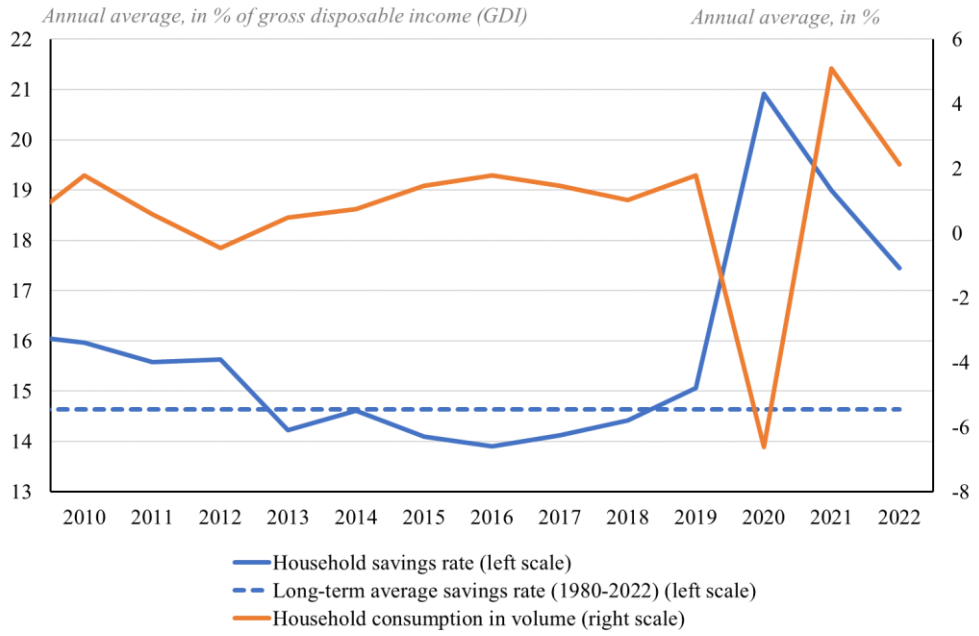
Chart 1: GDP and household GDI



Source: Insee

As household consumption was constrained by various health restrictions (lockdown, curfews, bans on public gatherings, etc.), the household savings rate rose sharply. However, even though these restrictions have been fully lifted, the savings rate remains higher than before the health crisis.

Chart 2: household consumption and household savings rate

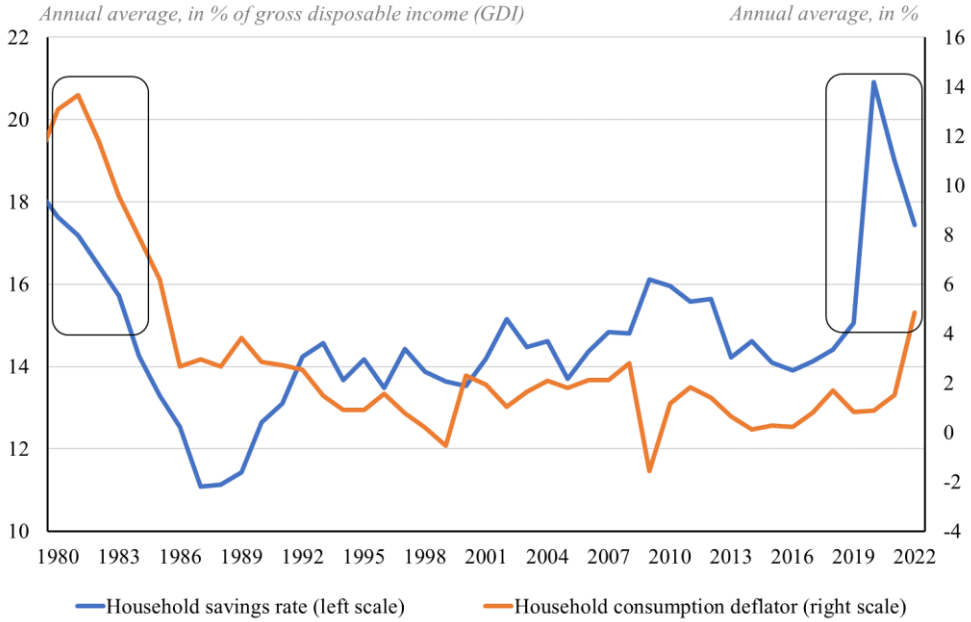


Source: Insee

[2] Household GDI increased by an annual average of 1.2% in 2020. Its purchasing power increased by 0.3 %.

Since the beginning of 2021, the French economy has thus been characterized by a high savings rate and dynamic inflation, a situation close to that seen in the early 1980s.

Chart 3: household savings rate and household consumption deflator



Source: Insee

The evolution of the savings rate influences that of activity: in the long term, a lasting rise in the savings rate is favorable to the accumulation of productive capital[3], and therefore generally to growth, but in the short term, it weighs on demand. Assessing households' trade-off behavior between consumption and savings is therefore a key element in the development of a macroeconomic scenario.

While forecasters seem to agree that the savings rate will decrease in the medium term, the extent of this fall is a matter of debate. Some forecast a significant drop, as in the 2023-2027 Stability programme presented by the Government in April 2023 (from 17.4% of GDP in 2022[4] to just over 15% in 2027). This is one of the assumptions underpinning the closing of the output gap, estimated by the Government to be very wide in 2022 (-1.1 points of potential GDP). Others make a different forecast, assuming a more moderate decline in the savings rate, leading, all other things being equal, to lower growth in activity over the period.

Table 1: medium-term forecasts for the household savings rate

	2023	2024	2025	2026	2027
Banque de France	16.5	16.3	15.8		
Rexecode	17.4	16.8	16.3	15.9	15.6
Stability programme	16.8	16.5	16.0	15.6	15.1

Sources: Rexecode, Banque de France macroeconomic projections of March 2023, 2023-2027 Stability programme

[3] On the impact of savings on investment, see for example Feldstein M. and P. Bacchetta (1989), "*National Saving and International Investment", National bureau of economic research, Working paper* no. 3164, November.
[4] Estimate taken from Insee's national accounts for 2022, published on May 31, 2023.

In particular, the impact of inflation raises questions. If inflation remains at a higher level than over the last three decades, will households:

- consume immediately, to avoid future anticipated price rises[5] (flight from money behaviour);

- or, on the contrary, will they save more, to protect the real value of their savings? This "Pigou" or "real balance" effect, which was significant in econometric estimates of consumption equations in the 1980s, would increase the savings rate if it were to appear again.

In order to inform this debate, this note proposes:

- in the first part, a brief review of the concepts of the real balance effect. This effect was highlighted in the 1980s, a period which is close in some respects to the current period, but has since disappeared from most estimates;

- in the second part, to present an econometric equation of household consumption behavior that takes into account the impact of inflation on household trade-off behavior between consumption and savings. The equation is estimated over a very long period, in order to incorporate data from the early 1980s and observe whether or not there has been a change in household behavior since then;

- in the third part, to check whether household consumption behavior in the face of inflation is dependent on the context of price evolution.

1. A real balance effect highlighted in the 1980s, which has since disappeared from empirical work

The real balance effect, also known as the "Pigou"[6] effect can be defined as the need to rebuild the value of liquid assets eroded by inflation through savings. When inflation is high, saving is thus favored in order to reconstitute its purchasing power. Conversely, in a period of deflation, households' real savings increase, pushing them to consume, leading to a rise in prices and a return to equilibrium.

Discussed in the literature[7], this effect was frequently put forward in the 1980s[8]. In his 1992 article[9] on modeling the macroeconomic behavior of household consumption and savings in France, P. Allard outlined the main features of the consensus reached in the 1980s: "use of error-correction models, demonstration of robust effects of real income and price growth on the savings rate". Despite the many benchmark revisions of the national accounts since then, re-estimation of these equations over the same period but with current data leads to very close point estimate of the inflation impact on the savings rate, albeit sometimes insignificant (see Appendix 1).

However, the real balance effect has since disappeared from most estimates:

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[5] In the case of immediate and perfect indexation of incomes, maintaining household consumption expenditure in volume terms certainly implies an increase in consumption expenditure in value terms, but the share of this consumption in income remains constant. In this case, it is the effect of anticipating future price rises that influences the share of income devoted to consumer spending. Households use more of the money they fear will lose its value for consumption purposes. In the case of imperfect indexation of incomes, two different behaviours can push the savings rate downwards: on the one hand, maintaining a level of consumption in volume terms, and on the other, "flight from money behaviour".

[6] Pigou, A. C. (1943), « *The Classical Stationary State* », Economic Journal, December

[7] See for example Patinkin, D. (1948), « *Price flexibility and full employment* », *The American economic review*, September and Cohen, M. (1954) « *Liquid assets and the consumption function* », *The review of economics* and statistics, May.

[8] Two examples of consumption-savings trade-off equations used in France in the 1980s, highlighting a real balance effect, are presented in Appendix 1.

[9] Allard, P. (1992), « *La modélisation de la consommation des ménages en France* », Rev. Econ.pol., Sept.-Oct.

- it does not appear in the equation for total household consumption in volume terms in Insee's Mésange model. Aggregate household consumption is perfectly adjusted to long-term purchasing power, to reflect a stable savings rate. In presenting its equation[10], Insee states: "Other determinants of long-term consumption have been tested (precautionary behavior to insure against income shocks, notably unemployment, the real interest rate, Ricardian substitution effects between private and public savings, the level of inflation supposed to capture real balance effect, real estate or financial wealth effects) but have not proved statistically robust";

- it does not appear in the household consumption equation of Opale[11], the macroeconomic model of the French Treasury used to forecast growth over a 2-3 year horizon for the budget bills and Stability programmes. Household consumption depends on household GDI (excluding dividends), the unemployment rate, temperature differentials and dummies ;

- and it does not appear as such in the equation used to model household consumption in the Banque de France's FR-BDF model[12]. The main long-term driver of household consumption is permanent income, which, combined with a deviation of the real bank lending rate to households from a so-called stationary state, determines the consumption target.

This observation leads to question the reasons for this disappearance. Three assumptions are possible:

- the link between the savings rate and inflation would be a statistical artefact, linked to the concomitance over a relatively short estimation period of similar movements in inflation and the savings rate, which taking into account a longer period would restore to its true value, zero;

- on the contrary, estimates carried out over a period that largely excludes the high-inflation period of the 1970s-80s would not be able to highlight this determinant of household savings behavior, due to the lack of sufficient inflation variance;

- household behavior changed at the end of the 1980s, for example as a result of financial liberalization, which enabled households to better protect the value of their assets against inflation.

The diagnosis that will be made will determine whether or not to anticipate a return of the real balance effect with that of inflation.

2. Over the long term, inflation has a significant but transitory impact on consumption

In order to assess whether the disappearance of the real balance effect is due to the choice of estimation periods that are too short and do not include a real episode of high inflation, estimates of the consumption function over a long period including price variables were carried out. The wish to model the equation over a long history limited the number of explanatory variables available.

[10] Direction des Études et Synthèses Économiques (2017), « *Le modèle macroéconométrique Mésange : réestimation et nouveautés* », May.
[11] tresthor Package R pour la prévision économique Utilisation d'Opale sur R (economie.gouv.fr).
[12] M. Lemoine et al. (2019), « *The FR-BDF Model and an Assessment of Monetary Policy Transmission in France* », Working paper, October.

The endogenous variable is total household consumption in volume terms, from INSEE's quarterly national accounts, available since 1949.

The explanatory variables used are real household GDI and the household consumption[13] deflator[14]. They are also available in Insee statistical databases since 1949. The household consumption deflator was preferred to the consumer price index, which has only been available since 1991.

Estimates have been made for the period from Q4 1951[15] to Q4 2019. The period of the health crisis, from Q1 2020 onwards, was excluded, given the unusual constraints on household behavior during this period.

Savings and income in national accounting

In national accounting, savings are not measured directly, but are calculated as the difference between disposable income and consumption expenditure, measured from independent sources.

Disposable income is the income available to households for consumption and saving.

It includes income from employment net of social security contributions, unemployment benefits, pensions, capital income (real estate and financial) and other social benefits received, net of direct taxes.[16].

a. Selected variables

The equation specification is standard. The variable to be explained is the variation in the logarithm of household consumption in volume.

A classic specification[17] of household consumption behavior is used, in which the explanatory variables are as follows:

- the variable itself (variation in the logarithm of household consumption in volume), with lags;

- the variation in the logarithm of real GDI of households;

- inflation, measured by the year-on-year change in the logarithm of the household consumption deflator, equivalent to the increase in the household consumption deflator to the first-order;

- an "error correction" term, i.e. the logarithm of the ratio of household consumption to real GDI, with a one-quarter lag;

- and dummies for specific events.

The statistical characteristics of the series were checked, in particular their stationarity. The log of total household consumption in volume and the log of real household GDI are non-stationary and

[13] The household consumption deflator is the price index of household consumption in the national accounts sense.
[14] The introduction of the unemployment rate, available since 1975, and household confidence, available since 1972, was also tested, with no noticeable improvement in the equation obtained. The results are presented for information in Appendix 2.
[15] The data used have been available since 1949, but their transformation (calculation of first differences and introduction of lags of up to 6 quarters) very slightly reduces the period over which the equations are estimated.
[16] Insee definition.
[17] See some examples of household consumption modeling on page 5.

integrated of order 1. The first differences of these series have therefore been calculated. The log of the ratio of the consumption deflator to that observed a year earlier (or a quarter earlier) is, on the other hand, stationary and did not require any specific treatment. The log of the ratio of household consumption in volume to real household GDI is associated with an error-correction term, and is incorporated as it stands in the traditional specifications of the consumption equations.

List of symbols used

consuvol: household consumption in volume

realgdi: household GDI deflated by the household consumption deflator

yy_pc: ratio of the level of the household consumption deflator to that observed one year earlier

qq_pc: ratio of the level of the household consumption deflator to that observed one quarter earlier

ratioconspp: log of the ratio of household consumption in volume to real GDI

variable(-x): variable lagged by x quarters

del(variable): variable in first difference

Dummy variables selected ex ante on the basis of events affecting household consumption:

- strikes: DU66 (-1 in Q1 1966, 0 otherwise), DU68 (-1 in Q2 1968, 0 otherwise), DU74 (-1 in Q4 1974, 0 otherwise), DU95b (-1 in Q4, 0 otherwise)

- specific weather conditions: DU85 (1 in Q1 1985, 0 otherwise), DU14 (-1 in Q1 2014, 0 otherwise)

- specific context or measures (fears of Franc devaluation, devaluation as such, scrappage scheme, oil shock): DU68b (1 in Q4 1968, 0 otherwise), DU69 (1 in Q2 1969, 0 otherwise), DU69b (-1 in Q4 1969, 0 otherwise), DU95 (1 in Q3 1995, 0 otherwise), DU00 (-1 in Q2 2000, 0 otherwise)

b. Specification

The search for an equation is based on lagged household consumption, real GDI, the ratio of the level of the household consumption deflator to that observed a year earlier (inflation variable in level), the first difference of the previous term (inflation variable in variation), the ratio of household consumption in volume to real GDI, and the various dummies. Six lags are included for each variable. Minimization of the BIC criterion[18] leads to the equation detailed in Table 2.

[18] The Bayesian Information Criterion (BIC) is a statistical measure used to assess the quality of an econometric model. The aim is to select the model that offers the best compromise between data fit and model complexity. The model with the lowest BIC is considered the best.

Table 2: modeling household consumption

	(1)
Explanatory variables	
del(log(realgdi))	0.275*** (6.923)
del(log(realgdi))(-1)	0.195*** (4.633)
del(log(realgdi))(-2)	0.100* (2.477)
del(log(realgdi))(-5)	0.137** (3.173)
del(log(yy_pc))(-1)	-0.109** (-2.669)
log(ratioconspp)(-1)	-0.043** (-3.115)
du69	0.023*** (3.655)
du69b	0.027*** (4.190)
du74	0.016** (2.643)
Intercept	-0.005* (-2.376)
Regression standard error	0.0061
R^2	0.43
Specification tests (p-values)	
Autocorrelation of residuals (Lagrange multiplier test)	0,3
Heteroscedasticity (Breush-Pagan test)	0,1
Normality (Jarque-Bera test)	$2{,}5^{-9}$
Stability test (break at Q4 1985)	0,7
Stability test (break in Q1 2013)	1,0

*Reading: values in brackets indicate Student's statistics; the R^2 indicates the proportion of the variance of the explained variable, in this case the growth rate of household consumption in volume, which is explained by the explanatory variables (it is only defined when the estimated equation includes a constant); the specification tests[19] check that the residuals of the regression are not correlated with each other (Lagrange multiplier test with 4 lags), not heteroscedastic (Breush-Pagan test) and that the coefficients are stable (Chow tests at half the period - here in Q4 1985 - and at 90% of the period - here in Q1 2013), thus ruling out a major error in the choice of the form of the relationship between the variables or the omission of an important explanatory variable; the residuals do not, however, follow a Normal distribution (Jarque-Bera normality test); the p-value given in the table is the threshold at which we start to reject the hypothesis that the tests are negative; *** indicates a significant value at the 1% threshold (which therefore has less than a 1% chance of being zero).*

All explanatory variables are significant, and the influence of each is of the expected sign in economic terms:

[19] These tests are identical to those proposed by D. Hendry for his pc-gets software (see for example D.F. Hendry and H-M Krolzig (2000): « *Computer Automation of General-to-Specific Model Selection Procedures* », Journal of Economic Dynamics and Control, 25 (6-7), p. 831-866).

- the variation in real household GDI, instantaneous and with a lag of 1, 2 and 5 quarters, has a positive impact on that of consumer spending;

- the variation of inflation, with a one-quarter lag, has a negative impact on consumption;

- the ratio of real consumption to the purchasing power of household income has a negative impact on the variation in consumption.

The introduction of the level of inflation into this equation was tested (table 3). It is not significant: equation (2) tests the introduction of the logarithm of the ratio of the deflator to the deflator observed one year earlier (yy_pc), equation (3) tests the introduction of the logarithm of the deflator to the deflator observed one quarter earlier (qq_pc).

Table 3: test of adding level inflation to equation (1)

	(2)	(3)
Explanatory variables		
del(log(realgdi))	0.275*** (6.904)	0.274*** (6.876)
del(log(realgdi))(-1)	0.190*** (4.438)	0.190*** (4.394)
del(log(realgdi))(-2)	0.096* (2.360)	0.099* (2.445)
del(log(realgdi))(-5)	0.137** (3.190)	0.136** (3.159)
del(log(yy_pc))(-1)	-0.108** (-2.661)	-0.098* (-2.215)
log(yy_pc)(-1)	-0.010 (-0.892)	
log(qq_pc)(-1)		-0.027 (-0.588)
log(ratioconspp)(-1)	-0.051** (-3.140)	-0.049** (-2.958)
du69	0.023*** (3.657)	0.023*** (3.666)
du69b	0.026*** (4.161)	0.026*** (4.153)
du74	0.016* (2.525)	0.016* (2.593)
Intercept	-0.006* (-2.537)	-0.005* (-2.422)
Regression standard error	0.0061	0.0061
R^2	0.43	0.43

These results mean that, over the long term, the impact of inflation on consumption is significant but transitory: it is the variation in inflation, and not the level of inflation, that has an impact on the variation in consumption and therefore on the savings rate. The error-correction term (log(ratioconspp)) acts as a restoring force.

They thus indicate that the higher level of inflation in 2022 can partly explain (up to 0.4 points out of around 2 points in 2022) the persistence of the savings rate at a high level after Covid.

Even if the inflation surge were to prove lasting, its impact should gradually disappear, as illustrated by the following two polar scenarios:

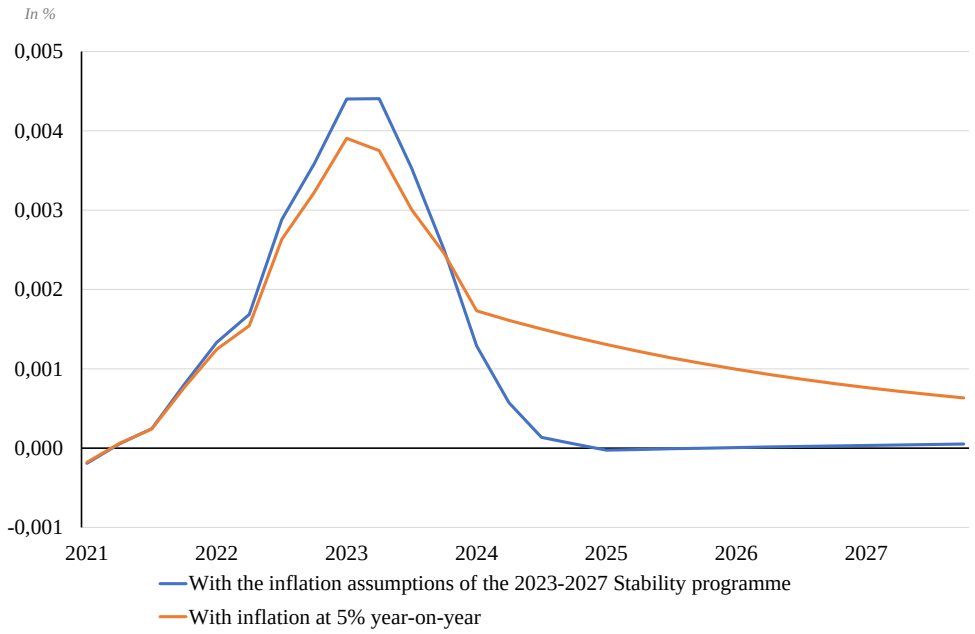
- the 2023-2027 Stability programme scenario. This scenario forecasts a rapid decline in inflation[20]. It would decrease below 3.0% from 2024, to 2.6%, then to 2.0% in 2025 and 1.8% in 2026 and 2027[21];

- a scenario in which inflation remains at current levels, i.e. 5.0% year-on-year, over the next few years.

The scenario presented in the 2023-2027 Stability programme means that the impact of inflation on the savings rate is rapidly reduced to 0 (as early as 2025). Even if inflation were to remain at its current level, its impact on the savings rate would gradually decrease, but would remain slightly positive in 2027 (under 0.1 points) relative to its level at the end of 2019.

However, the evolution of the savings rate will also depend, first and foremost, on the factors that explain around 1.5 points of the increase in the savings rate compared to 2019, and which remain unexplained at this stage. The inclusion over a shorter estimation period of the usual determinants of the unemployment rate and household confidence, alongside income purchasing power and inflation, shows that these do not reduce this unexplained share (see Appendix 2).

Chart 4: simulation of the contribution of inflation to the household savings rate under different assumptions



Source: author's calculations

[20] The consumer price and household consumption deflator forecasts in the Stability programme are identical from 2024 to 2027. In 2023, the inflation forecast is for an annual average of 4.9%, while the deflator is forecast to rise by 5.5%. The scope covered by the household consumption deflator is broader than that covered by the consumer price index. In particular, it includes imputed rents.

[21] As the equation is based on quarterly data, the annual average forecasts in the Stability programme have been restated on a quarterly basis.

Over the long term, therefore, there is no real balance effect in France. Yet this effect was highlighted in the 1980s. Does the real balance effect only manifest itself in periods of high inflation?

3. Is the real balance effect only apparent in periods of high inflation?

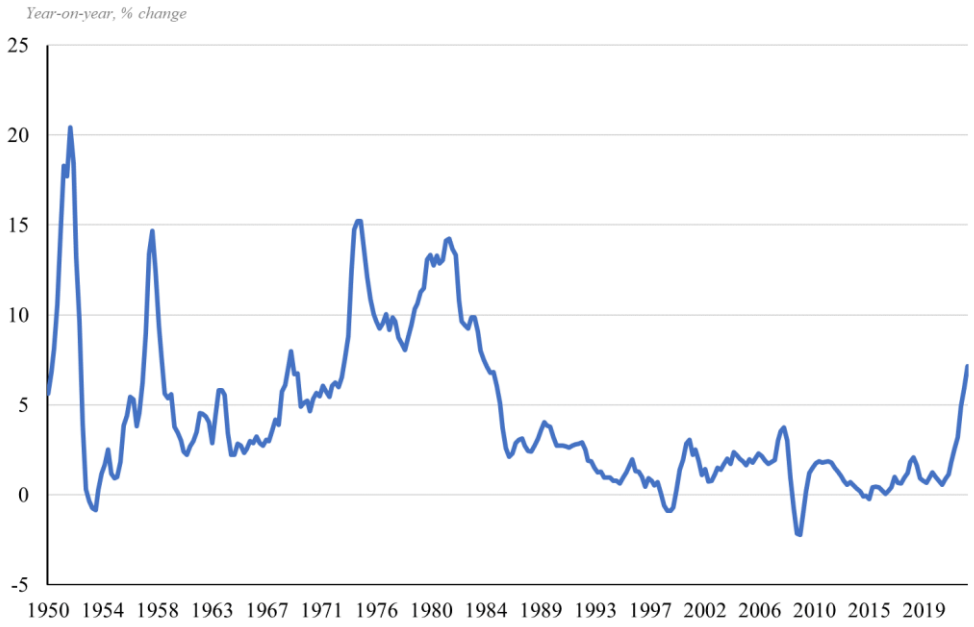
Graph 5 shows the evolution of the consumption deflator over the long term. From the mid-1980s onwards, inflation fell sharply, mainly as a result of restrictive monetary policies, in the wake of the US tightening of the early 1980s and the oil shock of 1986. It has remained at a low level until early 2022.

This change in the price environment raises two questions about the real balance effect:

- has household behavior been impacted by this major change in the macroeconomic context? If so, this would explain why the real balance effect was significant in the 1980s and has not been since;

- is household behavior different when inflation is high? In fact, the real balance effect may only become apparent when inflation exceeds a certain threshold.

Chart 5: household consumption deflator over a long period



Source: Insee

To answer these two questions, several econometric tests are performed.

a. Does the level of inflation only have an effect over certain periods?

The existence of a real balance effect only in certain periods is tested by introducing interaction variables into equation 1:

- the addition of a variable that takes the value of 1 over certain periods, 0 otherwise, and multiplied by the level inflation variable, worth log(yy_pc)(-1). Periods after 1970 and before the structural change in price trends identified in the mid-1980s were chosen, as they represent the last episode of strong price trends, i.e. lasting above the 2% threshold subsequently set by the European Central Bank. Several periods were tested (for example, from 1972 to 1986, or from 1965 to 1981, etc.), and in particular those for which econometric equations showed a significant real balance effect in the 1980s[22]. An example is given below: equation (4) tests the addition of a level inflation variable worth log(yy_pc)(-1) over the period from 1971Q1 to 1987Q4, and otherwise 0;

- the addition of a variable that takes the value of 1 until the presumed date of the change in inflation regime (identified around 1985), then 0, multiplied by the level inflation variable, always worth log(yy_pc)(-1). Various breakpoints were tested. Equation (5) gives the results for tests carried out with a regime change identified in the 1st quarter of 1986 (du86t1[23] *logyy_pc(-1)).

Table 4: test of adding level inflation to equation (1) for certain periods only

	(4)	(5)
Explanatory variables		
del(log(realgdi))	0.275*** (6.865)	0.276*** (6.930)
del(log(realgdi))(-1)	0.193*** (4.399)	0.190*** (4.440)
del(log(realgdi))(-2)	0.099* (2.348)	0.097* (2.365)
del(log(realgdi))(-5)	0.135** (3.107)	0.137** (3.185)
del(log(yy_pc))(-1)	-0.108** (-2.656)	-0.109** (-2.680)
du71t187t4*logyy_pc(-1)	-0.002 (-0.176)	
du86t1*logyy_pc(-1)		-0.008 (-0.808)
log(ratioconspp)(-1)	-0.045* (-2.554)	-0.052** (-2.985)
du69	0.023*** (3.601)	0.023*** (3.657)
du69b	0.027*** (4.182)	0.026*** (4.159)
du74	0.016* (2.574)	0.016* (2.548)
Intercept	-0.006* (-2.115)	-0.006* (-2.456)
Regression standard error	0.0061	0.0061
R^2	0.43	0.43

[22] For example, the METRICX model (1988) showed a real balance effect over the period 1973Q1 to 1985Q4. This period was therefore tested.
[23] The du86t1 variable is 1 until Q4 1985 and 0 afterwards.

The variables introduced are not significant, which leads to rule out a real balance effect that would have materialized only over certain periods. The estimation of a significant real balance effect at the end of the 1980s therefore seems to have been a statistical artefact, which the longer-term analysis of the data, made possible by the availability of data by INSEE since 1949, highlights.

b. Does the level of inflation only have an impact above a certain inflation threshold?

A new variable is introduced into the reference equation (1) to test for a non-linear effect of level inflation. Its value is logyy_pc(-1) when inflation exceeds a certain threshold, and 0 otherwise. Tests were carried out for different inflation thresholds (from 4% to 10%). Equation (6) shown below is the one with the lowest regression standard error, namely that obtained for the test performed with a 7% threshold.

Table 5: test of adding level inflation to equation (1), starting from a threshold of 7%.

	(6)
Explanatory variables	
del(log(realgdi))	0.268*** (6.652)
del(log(realgdi))(-1)	0.184*** (4.253)
del(log(realgdi))(-2)	0.093* (2.262)
del(log(realgdi))(-5)	0.134** (3.106)
del(log(yy_pc))(-1)	-0.106** (-2.614)
effetnonlin7(-1)	-0.012 (-1.188)
log(ratioconspp)(-1)	-0.053** (-3.293)
du69	0.023*** (3.681)
du69b	0.027*** (4.209)
du74	0.015* (2.468)
Intercept	-0.007** (-2.655)
Regression standard error	0.0061
R^2	0.43

The variable introduced is not significant, which leads to reject the hypothesis of a real balance effect that would only materialize once a certain inflation threshold is reached.

Conclusion

Modelling of household consumption in volume terms suggests that inflation may only affect the level of the savings rate temporarily, and not permanently, contrary to what would be predicted by the theory of the real balance effect and what estimates made in the 1980s would suggest.

In any case, inflation should gradually cease to support the savings rate, but as the post-Covid increase in the savings rate is at best only partly explained by the surge in inflation, the evolution of the savings rate will depend first and foremost on the other, as yet unexplained, factors that have led to an increase in the savings rate compared to its pre-Health Crisis level.

Appendix 1: two examples of consumption-savings trade-off equations used in France in the 1980s, showing a real balance effect

With

- C: household consumption in volume terms;
- R: purchasing power of GDI;
- P: price of household consumption;
- DU : dummy variables
    - DU 74b : 1 in Q4 1974, 0 otherwise
    - DU 85 : 1 in Q1 1985, 0 otherwise

- Insee's Metricx model (1988)

Over the period 1973Q1 to 1985Q4, the estimated equation is as follows:

$\log (C_t / R_t) = -0.00797 + 0.539 \log (C_{t-1}/R_{t-1}) + 0.359 \log (C_{t-2} / R_{t-2}) – 1.096 \text{ del}(\log(R_t)) + 0.292 (\text{del}(\log(R_t))-\text{del}(\log(R_{t-1})) – 0.0649 \log(P_t/P_{t-4}) – 0.0291 \text{ DU74b} + 0.0084 \text{ DU85}$

⇨ Given its sign, the price variable can be interpreted as a real balance effect.

- the Cretin and L'Hardy model (1989)

For the period from Q1 1972 to Q4 1986, the estimated equation is as follows:

$\log(C_t/R_t) = -0.0136 – 0.0182 \text{ DU74b} + 0.43 \log (C_{t-1}/R_{t-1}) + 0.39 \log (C_{t-2} / R_{t-2}) – 0.88 \text{ del}(\log(R_t)) – 0.29 \text{ del}(\log(R_{t-1}) – 0.25 \log ((P_{t-1}/P_{t-2})$

⇨ Given its sign, the price variable can be interpreted as a real balance effect.

Re-estimating these equations with current data over a similar period now gives the following results:

- $\log (C_t / R_t) = -0.009 + 0.783 \log (C_{t-1}/R_{t-1}) + 0.107 \log (C_{t-2} / R_{t-2}) – 0.806 \text{ del}(\log(R_t)) – 0.005 (\text{del}(\log(R_t))-\text{del}(\log(R_{t-1})) – 0.073 \log(P_t/P_{t-4}) – 0.012 \text{ DU74b} + 0.011 \text{ DU85}$

Only the variables log (Ct-1/Rt-1) and del(log(Rt)) are significant (Student's t of 5.614 and - 4.511 respectively), the others are not, but the coefficient for inflation remains negative and of the same order of magnitude.

- $\log (C_t / R_t)= -0.005 – 0.014 \text{ DU74b} + 0.673 \log (C_{t-1}/R_{t-1}) + 0.227 \log (C_{t-2} / R_{t-2}) – 0.804 \text{ del}(\log(R_t)) – 0.129 \text{ del}(\log(R_{t-1}) – 0.331 \log ((P_{t-1}/P_{t-2})$

Four variables are significant this time: the dummy and the variables log (Ct-1/Rt-1), del(log(Rt)) and log ((Pt-1/Pt-2) (Student's t of -2.244, 5.235, -9.465 and -2.885 respectively). The other variables are not.

All in all, even if successive changes of base have led to changes in the estimation results, the real balance effect is still apparent when these equations are re-estimated over their initial estimation period.

Appendix 2: modelling household consumption by introducing the unemployment rate and household confidence into the equation

List of new symbols

unrate: log of unemployment rate

conf: log of household confidence. The indicator used is the synthetic indicator of the household business survey published by INSEE, which was quarterly from October 1972 to October 1986, and then monthly. Since 1987, the data have been quarterly averaged.

The suitability of the statistical characteristics of the added series has been verified, in particular their stationarity. The log of household confidence is not stationary and is integrated of order 1. The first difference of this series was therefore calculated. The log unemployment rate, on the other hand, is stationary and did not require any specific treatment.

The search for an equation is based on lagged household consumption, real GDI, the ratio of the level of the household consumption deflator to that observed one year earlier (level inflation variable), the first difference of the previous term (change inflation variable), the log of unemployment rate, the first difference of household confidence, the ratio of household consumption in volume to real GDI, and dummies. Six lags are included for each variable. The equation detailed in the table below is retained.

Modeling household consumption by introducing the unemployment rate and household confidence into the equation

Estimation period: Q4 1976 - Q4 2019

	(7)
Explanatory variables	
del(log(consuvol))(-1)	-0.225** (-3.217)
del(log(realgdi))(-1)	0.219*** (4.014)
del(log(realgdi))(-2)	0.197*** (3.455)
del(log(yy_pc))(-5)	-0.176* (-2.494)
logunrate	-0.004* (-2.047)
del(log(conf))	0.070*** (5.044)
del(log(conf))(-4)	0.043** (3.022)
Intercept	0.012** (2.908)
Regression standard error	0.0049
R^2	0.30

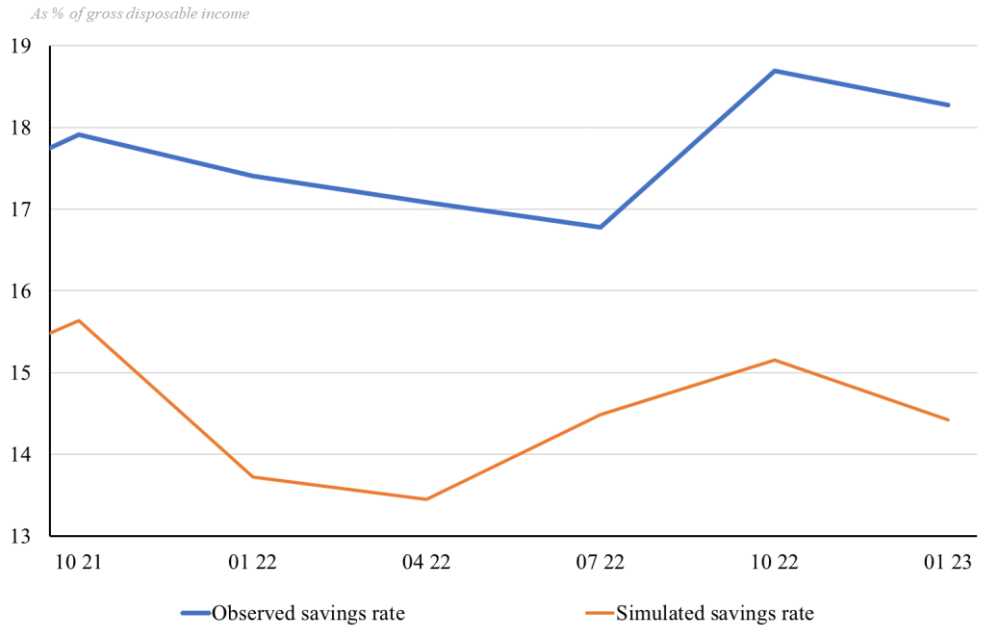
Specification tests (p-values)	
Autocorrelation of residuals (Lagrange multiplier test)	0.5
Heteroscedasticity (Breush-Pagan test)	0.7
Normality (Jarque-Bera test)	0.03
Stability test (break at Q2 1998)	0.2
Stability test (break at Q3 2015)	0.9

This equation makes economic sense, particularly for the two newly-integrated variables: a rise in the unemployment rate leads to a fall in household consumption in volume terms, confirming precautionary saving behavior; an improvement in household confidence, conversely, leads households to consume more.

The equation is also satisfactory from an econometric point of view: the residuals do not follow a normal distribution, but are homoscedastic, non-autocorrelated and the coefficients are stable.

Nevertheless, the introduction of these new variables still leads to an inflation effect in variation and not in level. It does not reduce the gap between the observed and simulated savings rates.

Observed and simulated savings rates



Sources: Insee, author's calculations