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Explanatory factors for recent trends in French business failures: an econometric analysis

- The monthly index of business failures released by INSEE (France's National Statistical Institute) measures the number of enterprises for which a court-ordered reorganization has been initiated. Although it does not cover all terminations, the index-besides supplying information on business demography-acts as a reliable barometer of the financial health of firms. In particular, it helps to identify the determinants of business failures in the recent economic crisis.

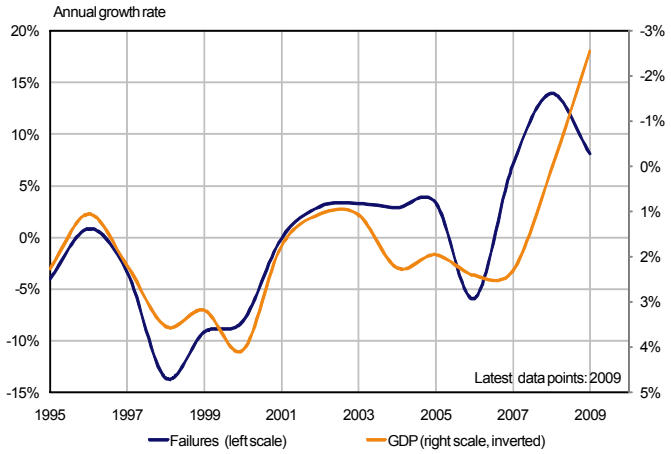
- Using a vector error-correction model linking failures, business creations, and GDP, we find that the pattern of business failures is rather well explained by two factors: a short-term factor, summarized by GDP, and a demographic factor, summarized by past business creations. The causal analysis shows that (1) GDP has a short-term negative influence on business failures (more firms fail in an economic downturn) and (2) business creations have a long-term influence on business failures (the more enterprises are created, the more some of them are likely to be terminated later).

- The sharp increase in failures between 2007 and 2009 was admittedly due to the economic crisis, but is also explained by the demographic effect of the business-creation wave of 2003-2007 (notably stimulated by the Dutreil Acts). In 2008, the main cause of the rise in failures was a demographic effect.

- In 2009, the demographic effect played a lesser role: the trend in failures was chiefly determined by a macroeconomic effect. However, thanks to the economic stimulus package and measures to support cash flow, the increase in failures in 2009 proved milder than the severity of the economic crisis and the past vigor of business creations would have led one to expect.

- Conversely, failures-which, by definition, concern only firms and exclude self-entrepreneurs-continued to run high in first-half 2010 despite the economic upturn and the more favorable demographics. There are two likely causes: first, the expiration of stimulus measures designed to support cash flow; second, the introduction of the "self-entrepreneur" status.

Business failures and GDP



Source: INSEE

1. Definition and orders of magnitude

1.1 The notion of "business failure"

The failure of a business (or bankruptcy) is the legal event that officializes its inability to pay its creditors. The INSEE (National Statistical Institute) indicator of business failures measures the monthly number of enterprises for which a court-ordered reorganization has been initiated. It therefore does not cover all business closures, i.e., outright terminations of economic activity. According to INSEE, liquidations due to failure account for only a part of total terminations[1] -on the order of 20% but variable over time and according to economic sector.

In this study, we take the number of failures at the date of the court ruling, i.e., failures recorded at the date when the court-ordered reorganization has been effectively initiated in a commercial court or court of first instance (tribunal de grande instance).

1.2 Basic data on failures during the economic crisis

French business failures rose briskly during the crisis, gaining 13.8% in 2008 and 8% in 2009 versus 2.1% average annual growth in 2003-2007. By comparison, business creations had posted a vigorous annual average increase of 10.4% a year in 2003-2007, thanks to the implementation of the Dutreil Acts. Their growth rate dropped to 1.0% in 2008 then rebounded to 76.8% in 2009 as a result of the introduction of the "self-entrepreneur" (auto-entrepreneur) status. Excluding self-entrepreneurs, business creations fell 20.2% in 2009.

By sector, the highest percentage of failures in 2009-measured against the total stock of enterprises in the sector as of January 1, 2009-was recorded in the construction industry, with a failure rate of 3.5% (see Chart 1). The accommodation and restaurant sector came second at 2.6%. By contrast, the sectors that posted the lowest proportions of failures relative to the total stock of enterprises were the market sector for education, health, and social services (0.3%) and financial activities (0.7%).

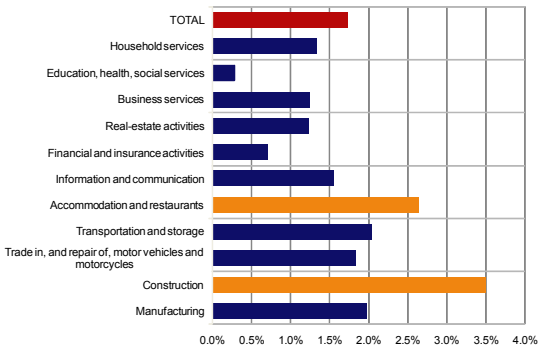
Table 1: Annual changes in business failures (by date of court decision), business creations, and GDP

	Failures	Creations	GDP
2009	8.1%	−20.2%[a]	−2.5%
2008	13.9%	1.0%	0.1%
2007	6.9%	13.6%	2.3%
2006	−5.9%	5.8%	2.4%
2005	3.4%	1.8%	2.0%
2004	2.9%	11.4%	2.3%
2003	3.3%	11.3%	1.1%
2002	3.0%	1.0%	1.1%
2001	−0.1%	−2.0%	1.8%
2000	−8.1%	3.8%	4.1%
1999	−9.2%	2.6%	3.2%
1998	−13.6%	−2.3%	3.5%

a. Excluding self-entrepreneurs (+76.8% including self-entrepreneurs)

Sources: INSEE, DG Trésor calculations.

Chart 1: Failures by sector in 2009, as percentage of enterprises in sector recorded at January 1, 2009



Interpretation: Of 100 enterprises active on January 1, 2009, in all sectors combined, more than 1.5 failed in 2009.

Sources: INSEE, DG Trésor calculations

(1) The other reasons for terminations are retirement (approximately 25% of terminations), return to paid employment, transfer or sale of the business, and economic causes not resulting in failure, such as financial problems or a worsening business outlook for the enterprise. Conversely, failures do not always entail business terminations.

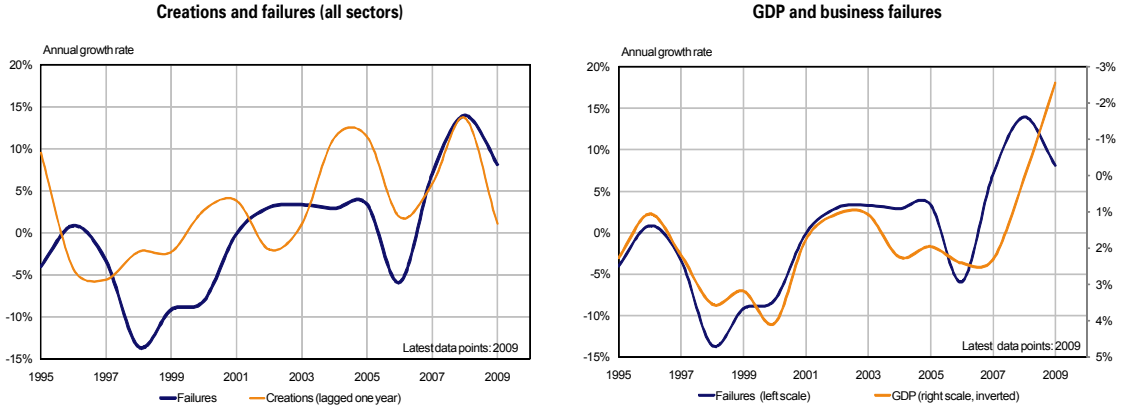
2. Empirical analysis with the use of a vector error-correction model linking failures, business creations, and GDP[2]

2.1 Econometric modeling of relationship between failures, creations, and GDP

The charts show that annual variations in failures are correlated negatively with those in GDP and positively with those in business creations lagged by one year (see Charts 2).

We define a vector error-correction model (VECM) to analyze the changes in failures in a multivariate framework with three variables: business failures, business creations excluding self-entrepreneurs, and quarterly real GDP levels[3] (see Box 1).

Chart 2: Annual growth rates of business failures, business creations, and GDP



Source: INSEE.

Box 1: **Vector error-correction model (VECM) estimation procedure**

The preliminary stage consists in backcasting the business-creation series (excluding self-entrepreneurs) from the old series under the NAF-Rev1 classification of economic activities, so as to make it available in the same time interval as the failure series (from January 1993 on).

We then transform the three variables of interest into quarterly log levels. Unit-root tests show that the three series are integrated at order 1. Applying Johansen and Juselius cointegration tests, we find two equilibrium relationships. The first allows us to take into account the long-term link between the number of failures and the number of business creations. The second describes the long-term link between creations and GDP level. The tests also suggest the existence of a linear trend for each of the two cointegration relationships.

We apply a vector error-correction model (VECM) written as:

$$\begin{pmatrix} \Delta D_t \\ \Delta C_t \\ \Delta Y_t \end{pmatrix} = \begin{pmatrix} \mu_D \\ \mu_C \\ \mu_Y \end{pmatrix} + \begin{pmatrix} \Gamma_{DD,1} & \Gamma_{DC,1} & \Gamma_{DY,1} \\ \Gamma_{CD,1} & \Gamma_{CC,1} & \Gamma_{CY,1} \\ \Gamma_{YD,1} & \Gamma_{YC,1} & \Gamma_{YY,1} \end{pmatrix} \begin{pmatrix} \Delta D_{t-1} \\ \Delta C_{t-1} \\ \Delta Y_{t-1} \end{pmatrix} + \ldots + \begin{pmatrix} \Gamma_{DD,p} & \Gamma_{DC,p} & \Gamma_{DY,p} \\ \Gamma_{CD,p} & \Gamma_{CC,p} & \Gamma_{CY,p} \\ \Gamma_{YD,p} & \Gamma_{YC,p} & \Gamma_{YY,p} \end{pmatrix} \begin{pmatrix} \Delta D_{t-p} \\ \Delta C_{t-p} \\ \Delta Y_{t-p} \end{pmatrix}$$

$$+ \begin{pmatrix} \alpha_D^1 & \alpha_D^2 \\ \alpha_C^1 & \alpha_C^2 \\ \alpha_Y^1 & \alpha_Y^2 \end{pmatrix} \begin{pmatrix} 1 & -1 & 0 & \lambda_D \\ 0 & 1 & \beta_Y & \lambda_C \end{pmatrix} \begin{pmatrix} D_{t-1} \\ C_{t-1} \\ Y_{t-1} \\ T_t \end{pmatrix} + \begin{pmatrix} \varepsilon_{D,t} \\ \varepsilon_{C,t} \\ \varepsilon_{Y,t} \end{pmatrix}$$

for $t=1,\ldots,T$ with D the quarterly number of failures, C the number of creations, Y quarterly GDP (real, at chain-linked prices), and T the linear trend.

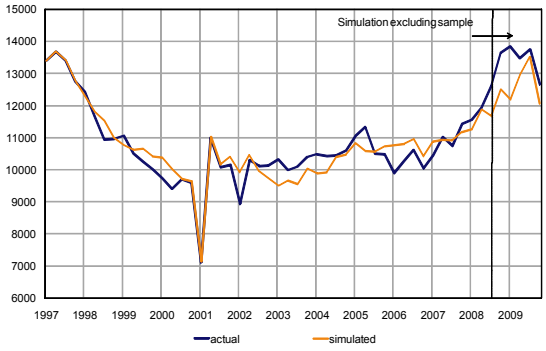
We assume unit elasticity of failures relative to creations-a choice validated by econometric tests. We have specified two lags in the short-term dynamics on the basis of the Akaike information criterion (AIC). We add two dummy variables to the specification in order to take account of (1) the sharp decline in failures observed in first-quarter (Q1) 2001, which seems to be explained in the data neither by an earlier creation surge nor by a GDP increase, and (2) the rebound in Q2 2001.

(2) This analysis largely follows the methodology developed in-house at DG Trésor by Marie Bessec.
(3) Estimates of the model with nominal GDP yield very similar results.

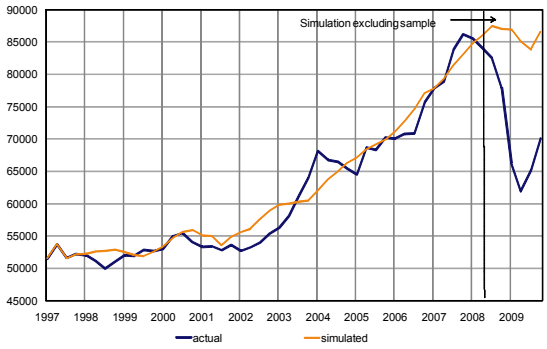
The quality of adjustment for failures is good, as the dynamics of GDP and creations explain a large share of the changes in failures (Charts 3). However, simulated creations diverge significantly from actual creations at the end of the period. Besides the lower quality of the equation for estimated creations, the divergence is certainly due to the announcement of the self-entrepreneur status followed by its introduction on January 1, 2009. We specified actual GDP and creations for the simulation of failures, and actual GDP and failures for the simulation of creations.

Chart 3: Simulated trajectory of failures and business creations excluding self-entrepreneurs

Actual and simulated failure levels



Actual and simulated creation levels (excluding self-entrepreneurs)



Source: INSEE, author's calculations.

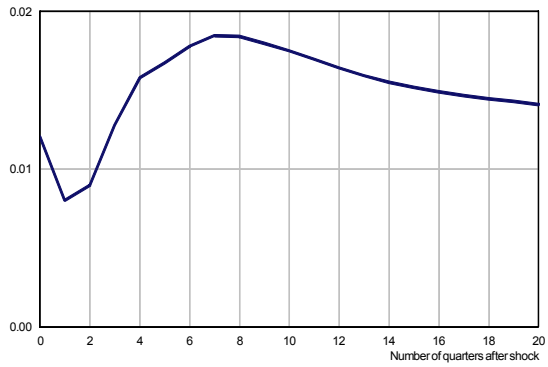
2.2 A causal analysis shows that business failures respond differently to business-creation and GDP shocks

The response functions for failures in the event of a positive shock on the number of creations and on GDP confirm the short- and long-term relationships between the three variables (see Charts 4):

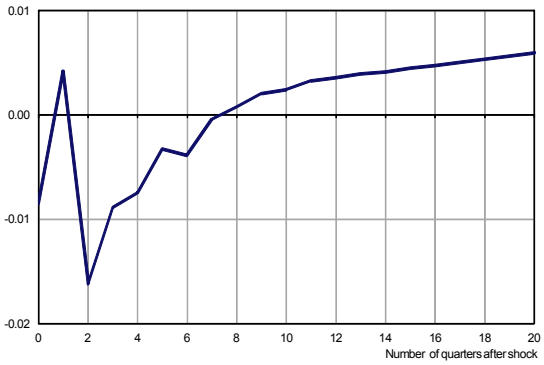
- The number of failures responds positively to a creation shock within a year. The model shows the effect peaks within seven or eight quarters. This result is similar to the one quoted in an INSEE study,[4] which indicates that the failure rate peaks for businesses between two and three years old.
- A positive GDP shock reduces the number of failures by the second quarter after its occurrence. The effect then fades within about six quarters.

Chart 4: Response functions for the number of failures in the event of different shocks

Response of number of failures to transient positive shock on number of creations



Response of number of failures to transient positive GDP shock



Source: INSEE, author's calculations.

Note: The charts show the deviation of the trajectory of the failures series (in level terms) after a shock (in impulse terms) on another variable of the same size as its standard deviation. The X-axis represents the trajectory of the failure series absent a shock.

(4) Rigollot, S. and Bréfort, M. (2008). "Les défaillances d'entreprise en Champagne-Ardenne: une plus grande fragilité dans les premières années d'existence", *INSEE Flash Champagne-Ardenne*, no. 90, June.

Box 2: **Methodology of causality tests**

Each explained variable is expressed as a function of the changes in the other variables and an error term that measures the divergence from an equilibrium relationship and is normally reduced to zero in the long run. The error-correction approach therefore allows us to capture causality links over different horizons.

The dependent variable can respond, in the short run, to variations in other variables when the coefficients of the short-term relationships $\Gamma_{ij,\ l}$ (see Box 1) are non-null. Accordingly, we conclude that a variable *i* does not cause a variable *j* in the short term if $\Gamma_{ij,\ l} = 0$ for all l from 1 to p, p being the number of lags in the VECM..

The dependent variable can also respond to divergences from the long-term relationship if the coefficient of the corresponding error term is non-null. This causal relationship will prevail until the equilibrium as defined by the cointegration relationship is reached. We therefore interpret the non-significance of the error-term coefficient $(\alpha_i = 0)$ (see Box 1) as a long-term non-causality.

The results of the tests for these two types of restrictions (Granger tests for the short-term part, Student tests on the significance of coefficients associated with the long-term relationships) are shown in Table 2. In the short run, GDP causes failures (negatively). In the long run, failures are caused by creations (positively).

Table 2: Causality tests

Horizon	Short terme			Long terme	
Caused variable \ Causal Variable	Failures	Creations	GDP	1st cointegration relationship (D//C)	2st cointegration relationship (C//Y)
Failures	–	no (17%)	yes (1%)	yes (3%)	no (33%)
Creations	no (11%)	–	no (29%)	yes (5%)	yes (2%)
GDP	yes (1%)	no (23%)	–	no (53%)	no (12%)

Source: DG Trésor, author's calculations.

Interpretation: The table shows the existence (or absence) of causality between variables. The critical probabilities of the nullity tests on the $\Gamma_{ij,\ l}$ coefficients (coefficients of short-term relationships) and α_i coefficients (coefficients of cointegration relationships) are given in parentheses. For example, GDP causes failures in the short run at a 5% confidence interval (critical probability, p-value, of 1%, under 5%).

3. Assessment of relative contributions of demographic factors (business creations) and macroeconomic factors (GDP) to fluctuations in failures in the recent years

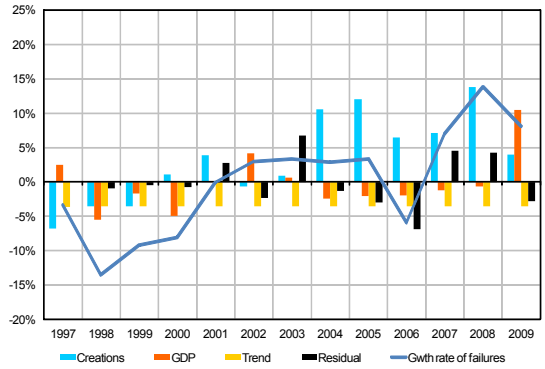
To assess the different contributions to variations in failures in recent years, we shall assume that the introduction of the self-entrepreneur status has no impact on the failure rates of businesses excluding self-entrepreneurs. As self-entrepreneurs do not fail[5] (zero failure rate), our assumption is equivalent to postulating that the relationship between creations excluding self-entrepreneurs, failures, and GDP has not been altered by the introduction of the new status. We can therefore use the model described earlier-with, as input, the series of creations excluding self-entrepreneurs-to calculate the relative contribution of each factor (business creations and GDP) for the period from Q1 2009 to Q2 2010 (latest known quarter). This hypothesis makes the results obtained for 2010 highly uncertain (see Box 3).

Charts 5 plot the contributions of demographic factors (past and current business creations) and macroeconomic factors (past and current GDP variations), the long-term determinist trend, and the residual not explained by our model.

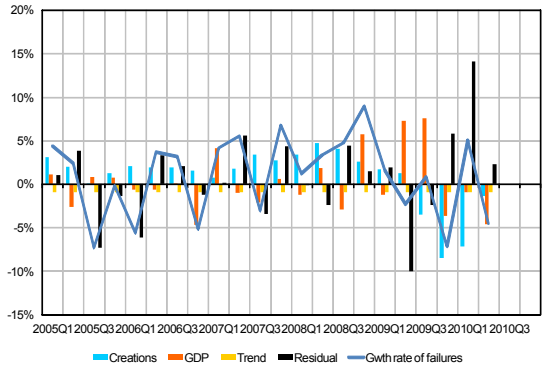
(5) Self-entrepreneurs are deemed to have terminated their economic activity when they voluntarily express a wish to wind down their business, or when they fail to generate revenue for 12 consecutive months. Therefore, the termination of self-entrepreneurial activity does not involve a business failure.

Chart 5: Annual and quarterly contributions of factors to changes in business failures

a) annual rates
Contributions to annual variations in failures



b) quarterly rates
Contributions to quarterly variations in failures



Source: INSEE, author's calculations.

3.1 In 2008, the large number of failures was mainly due to a demographic effect

Our estimate of the relative contribution of each factor suggests that the rise in business failures in 2008 (14% on an annual average basis) was mainly due to past changes in business demography. Indeed, the sole cause appears to be business creations, which trended up sharply in 2006-2007-probably as a result of the implementation of the Dutreil Acts in 2003 (see Charts 5).

The contribution of economic activity (GDP) appears to have been far smaller on an annual-average basis. In quarterly terms, however, the economic slump due to the crisis seems to have become the main factor in Q4 2008.

3.2 In 2009, adverse economic conditions seem to be the chief cause of the rise in failures

In 2009, adverse economic conditions appear to be the main cause of the rise in business failures (8% on an annual average). Past changes in business demography also played a role, but less so than in 2008 (see Charts 5).

For 2009 as a whole, actual failures were fewer in number that what the model indicated. The unexplained portion was particularly high in H1 2009, whereas one might have expected a steeper increase in failures for a given level of GDP and business creations, insofar as the model does not take into account the possible amplifying effects of the financial nature of the recession. This resilience of business firms is, no doubt, due to the measures to support corporate cash flow implemented as part of the recovery package.

3.3 H1 2010: more failures than expected, but potential structural effects due to introduction of self-entrepreneur status make it hard to draw firm conclusions

The number of business failures declined by 1% between H2 2009 and H1 2010, a modest dip by comparison with the expected effects of the economic recovery and past creations. Indeed, under the assumptions described above, our model pointed to an approximately 15% decline in failures in H1 2010. This percentage reflects the lagged effect of the decline in creations excluding self-entrepreneurs since end-2008. In our model, the impact of the decline on the dynamics of business failures would have peaked in H1 2010.

We can suggest two explanations for the disconnect between actual failures and the model's simulation in H1 2010:

(i) We cannot rule out a negative effect of the expiration of measures to support corporate cash flow. While the recovery package did save viable firms faced with a one-time cash flow problem, it doubtlessly allowed some unprofitable enterprises to survive one more year. This effect could explain a relative smoothing of business failures in 2009-2010.

(ii) A structural effect due to the introduction of the self-entrepreneur status may have driven up the aggregate failure rate of the new cohorts without signaling a deterioration in the structural financial position of firms. This might be the case if certain promoters of low-risk business plans, who might previously have implemented them in a standard incorporated enterprise, preferred to choose self-entrepreneurship. They would not have failed under either scenario, and their absence increases the nominal failure rate of conventional firms. A simulation performed to test a composition effect of this type would substantially improve the model's explanatory power for H1 2010 (see Box 3). This implies that the structural effect is an interesting explanatory option, although it is impossible to validate absent robust micro-econometric evidence. The economic upturn in the second half of the year may, however, result in a decline in business failures in full-year 2010.

Box 3: **How might the introduction of the self-entrepreneur status have influenced business failures?**

The introduction of the self-entrepreneur status was a major institutional shock. As self-entrepreneurs, by definition, cannot fail, the status has altered the relationship between total business creations and business failures. It may also have modified the relationship between creations excluding self-entrepreneurs and business failures, owing to a composition effect:

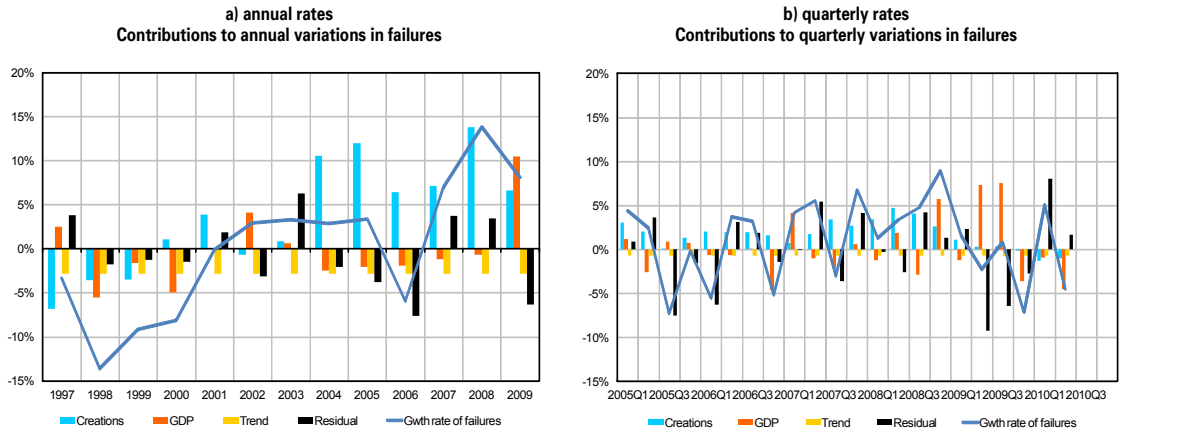
- First, studies have identified a non-null substitution effect between conventional business creations and self-entrepreneur creations.[a] The substitution mainly concerns micro business plans.
- Second, the failure rate may well be lower for micro business plans than for small and medium-sized plans (owing to lesser initial risk-taking), even though their termination rate is slightly higher (owing to discouragement, lack of demand, return to paid employment, or other causes). The microeconomic evidence on this point is slim, as INSEE does not publish cross-tabulated statistics on failure rates by business size and business age.[b]

To determine an upper bound for this possible composition effect on the link between creations excluding self-entrepreneurs and failures, we simulate the model as follows (see Charts 6):

- First, we calibrate the substitution effect as the gap between actual creations and creations simulated by our model (we had estimated the model for a period prior to the announcement of the introduction of the status[c]).
- Next, we assume that the termination of micro business plans whose initiators preferred self-entrepreneurship to conventional business-firm status would not, in any event, have generated business failures.[d] In this scenario, therefore, we shall use the level of creations that would have been observed-according to our model-absent the introduction of self-entrepreneur status.

This simulation substantially improves the model's explanatory power in H1 2010, as the contribution of the residual is far smaller than with the previous model simulation (Charts 5) for the period. We conclude that the inclusion of a composition effect is an interesting approach for explaining the high number of failures in H1 2010, but is hard to verify given the absence of robust microeconomic evidence.

Chart 6: Simulation results - Upper bound of composition effect due to introduction of self-entrepreneur status: contributions of factors to changes in business failures



Source: INSEE, author's calculations.

a. According to the official report on "Self-entrepreneurship: an assessment after a year of implementation" (Le régime de l'auto-entrepreneur, bilan après une année de mise en œuvre), about 11% of self-entrepreneur creations would actually have taken the form of conventional business creations if the self-entrepreneur status had not been introduced in 2009.

b. The 3- and 5-year survival rate for enterprises with zero employees is known to be slightly lower than that of enterprises with one or more employees. However, an older study by INSEE (*INSEE Première* no. 463, June 1996) showed that the smallest enterprises (zero employees) were far less represented in failures than in terminations. This may mean that the failure rate for enterprises with zero employees is lower despite a higher termination rate.

c. This method enables us to define a counterfactual scenario that takes into account the negative impact of the crisis on business creations. Nevertheless, the simulation based on the VECM model may overestimate the substitution effect measured under that scenario, for it does not take into account the negative impact of the crisis on business-creation dynamics. Note that the substitution effect measured with this method is close to the value published in the official report on self-entrepreneurship quoted in note "a" above (substitution rate of about 12.5% with our model versus 11% according to the report).

d. This is an "extreme" hypothesis. Some self-entrepreneurship plans would, of course, have ended in failure if they had been implemented via a conventional firm.

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