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VARIA

Private Financing of Long-Term Care: Income, Savings and Reverse Mortgages

Carole Bonnet*, Sandrine Juin and Anne Laferrère*****

Abstract – To what extent would older Europeans be able to pay for their long-term care needs out of their income and assets if they had no access to informal care or public insurance? To answer this question, we build a microsimulation model and estimate the disability trajectories of those currently aged 65 or older in nine European countries using the *Survey of Health, Ageing and Retirement in Europe* (SHARE). We focus on the potential role of reverse mortgages in home equity release. According to the simulations, 57% of people 65 and over will experience disability. Conditional on need, care will be required for 4.4 years on average. Of those with no partner, 6% of dependent individuals could pay for their long-term care out of their income alone, 22% if they used all their savings except their home. The proportion would reach 49% if they took out reverse mortgages on their main residence. However, one-quarter would be able to finance less than 10% of their long-term care expenses.

JEL Classification: J140, D140, I130, C530
Keywords: long-term care, housing, reverse mortgage, microsimulation

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If care arrangements are kept constant, European Union public expenditures on long-term care (LTC) are predicted to increase from 1.6% of GDP in 2013 to 2.8% in 2060 (European Commission, 2015a). Sustaining LTC systems is a major challenge in a context of population ageing. The elderly will probably need to consider, at least to some extent, private financing arrangements for their LTC expenses. At first sight, an individual's ability to pay appears to be low without public LTC coverage. The cost of LTC is generally higher than the average pension. The situation is unlikely to improve given that the public pension replacement rate is projected to decrease by 12 percentage points between 2013 and 2060 (European Commission, 2015b). Moreover, even when public LTC insurance exists, out-of-pocket expenses may remain high (HCFEA, 2017; Muir, 2017) and represent a high proportion of individual incomes (Bérardier, 2012).[1]

In addition, the private LTC insurance market is generally small. Only 7% of LTC expenditures are financed by private LTC insurance in the US, and less than 2% in other OECD countries (Colombo *et al.*, 2011). This is partly explained by the unattractiveness of LTC insurance policies, poor financial knowledge among consumers, the long time horizon of the LTC risk, the low value put on consumption when dependent, and the existence of potential substitutes for private LTC insurance, such as family solidarity and social assistance (Brown & Finkelstein, 2009; Fontaine & Zerrar, 2013).

Another reason for the low demand for insurance is that individuals may plan to use their savings, and particularly their real estate, to finance the risk of LTC expenditures. Davidoff (2010; 2009) shows theoretically that home equity, if liquidated in the event of LTC needs, may substitute for LTC insurance. Using French data, Fontaine *et al.* (2014) find that the probability of purchasing LTC insurance is 4 to 7 percentage points lower for homeowners living in a home worth over 300,000 euros than for non-owners. Costa-Font & Rovira-Forns (2008) find that housing tenure reduces the probability of insurance demand in Catalonia (Spain). This suggests that homeownership may provide "self-insurance" for LTC (Laferrère, 2012), all the more since housing is the main part of elderly wealth.

This paper investigates the extent to which the European elderly are able to pay for their long-term care needs, on the basis of their income, financial assets and home equity. We focus on the potential role of reverse mortgages in financing the cost of LTC. Regularly considered in the US and UK cases, the issue of reverse mortgages is less frequently addressed in the Continental European context. Some recent papers focus on the interest elderly people may have in this way of extracting income from housing wealth (Costa-Font *et al.,* 2010; Dillingh *et al.*, 2017; Fornero *et al*., 2016), but empirical evidence on the possible implementation of such a product to finance LTC costs is still limited.

Our contribution is threefold. First, using the longitudinal dimension of *the Survey of Health, Ageing and Retirement in Europe* (SHARE), we estimate a disability transition model, taking into account the effect of income and education in nine European countries. Second, relying on a dynamic microsimulation approach, we simulate the disability trajectories of the cohort of individuals aged 65 and older in 2013, in order to assess their expected lifetime risk of needing LTC. Rather than studying population totals, we are interested in seeing what happens to these individuals in their remaining lifetime. To our knowledge, no other studies estimate both the individual lifetime risk of disability and the associated cost of LTC in several European countries, while taking into account the effect of socioeconomic status. Finally, focusing on individuals who have no partner when they are dependent, we study their ability to pay for their LTC needs, assuming no public coverage and no informal care. We assess the role of housing in LTC financing by simulating the lump-sum payments that could be extracted from reverse mortgages taken when becoming dependent. Since disability trajectories are simulated at the microeconomic level, we can study the dispersion across individuals in the ability to pay.

This article first presents a summary of the existing literature on LTC risk and financing, and describes reverse mortgage products. Then the data and methodology are described, followed by the results of the simulations of LTC risk and ability to pay, together with two alternative scenarios: the introduction of informal care and of public LTC coverage.

1. For France, Bérardier (2012) estimates that 25% of dependent people with severe needs have to pay out-of-pocket expenses that represent at least 40% of their individual resources.

Literature Review

LTC Risk and LTC Cost

While many studies have estimated the risk of nursing home utilization (see, for example, Friedberg *et al.*, 2014, for a summary), the literature on the lifetime risk of disability is relatively scarce. We summarize below the existing results from the last decade on this topic (see Kemper *et al.,* 2005 for some older references). Most models have used US data from the 1980s and the 1990s (Brown & Finkelstein, 2004, 2008; Crimmins *et al.,* 2009; Fong *et al.*, 2013; Kemper *et al.,* 2005) or UK data (Forder & Fernández, 2009; Rickayzen & Walsh, 2002) and make mortality and disability transitions depend only on age and sex. We note three exceptions: Duée & Rebillard (2006), Marbot & Roy (2015) and Atella *et al.* (2017). The two first studies use French data and include the effect of education and children in their model. The latter use European data (SHARE) and build a comprehensive microsimulation model that takes into account the effects of education, marital status and many health factors. According to this literature, the probability of needing long-term care ranges between 29% and 58% for men and between 51% and 79% for women. The LTC duration (if > 0) varies between 2.2 and 3.7 years for men and between 3.7 and 4.7 years for women. This variability is partially due to the different definitions of LTC needs. In this paper, we use recent European data from SHARE and take into account the impact of both income and education on mortality and LTC needs. As social inequalities in health remain high (Cambois *et al.*, 2016; Mackenbach, 2012), it is important to take them into account when studying the ability of individuals to finance their disability.

Assessing the cost of LTC is difficult, not least because it is shared between public systems (which differ across countries), elderly individuals and their families. In the US, the national median annual cost is $47,934 for homemaker services, $49,192 for home health aide, $18,200 for day-care facilities, $45,000 for assisted living facilities and $97,455 for a private room in a nursing home (Genworth Cost of Care Survey, 2017). Kemper *et al.* (2005), using microsimulation on US data, find that the average value of lifetime LTC expenditures is $47,000. They stress that 42% of people turning 65 in 2005 will have a zero cost, while 16% will incur expenses of over $100,000. Hussem *et al.* (2016) find on Dutch data that the aggregated LTC cost is $73,817.[2] It is higher for low-income households and single women. According to Forder & Fernández (2009), in the UK, the mean lifetime expected cost of LTC is $53,506 for females and $29,531 for males. Given that no comparable information on LTC cost is available for the nine countries studied in this paper, we build our own measure of LTC cost based on the restrictions individuals declare in basic activities of daily living and on labour costs in the different countries.

The role of Income and Assets in LTC Financing

The literature on LTC financing has mainly investigated the role of public coverage and of private long-term care insurance. To the best of our knowledge, very few papers have looked at the extent to which older people's own economic resources could be used to finance LTC. Hussem *et al.* (2016) stress that, if the Dutch had to pay for LTC up to a limit of 100% of their private income, they could cover between 47% and 64% of the costs. They do not assess the role of financial and housing wealth.

Unlocking home equity through reverse mortgages (RMs, see Box) may help to support old-age consumption. The literature first focused on the general economic situation of the elderly, and did not specifically address the issue of LTC needs. The effect of RMs seems to be mainly restricted to the oldest age-groups and is higher for single individuals than for couples (Hancook, 1998 on UK data; Sinai & Souleles, 2007; Venti & Wise, 1991 on US data). According to Venti & Wise (1991), reverse annuity mortgage payments would increase the income of low-income couples aged 85 and over by 35% and would double the income of low-income single homeowners. Ong (2008) finds a bigger effect in Australia (+71% on average for homeowners aged 65 and over). In Europe, if homeowners aged 65 and over converted 100% of their housing wealth at a 7% interest rate, it would decrease their risk of poverty by 23% in Spain, 18% in Belgium, 13% in Italy and 11% in France. The effect is less than 4% in Sweden, Austria and the Netherlands (Moscarola *et al.*, 2015).

2. *In this section, euros and pounds have been converted to US dollars.*

The issue of how RMs may finance LTC needs has emerged more recently in the literature. Masson (2015) suggests that a specific reverse mortgage product for dependent individuals may help finance LTC costs and support "*ageing in place*" in France (see also Stucki, 2005, for a discussion in the US context). Dependent individuals would provide a medical certificate and, since they have a shorter life expectancy, obtain a lower interest rate than non-dependent persons. In the UK, individuals can already borrow a higher amount if they have certain medical conditions or lifestyle factors affecting their health. RMs could be used to finance home care, which would reduce the burden of informal caregivers.[3] A limiting factor may be that, with current RM products, the borrower generally needs to repay the loan if she moves permanently to a nursing home.

Empirical descriptive studies confirm that home equity can significantly improve the ability of dependent individuals to pay for their LTC needs. Stucki (2006) stresses that US homeowners who have restrictions in basic activities of daily living have a median home equity of $75,000. An RM would provide a lump-sum payment of $30,000 to $49,000. However, home equity would generally cover less than two years of care. Mayhew *et al.* (2010) study whether households aged 65 and over in the UK are able to pay for LTC. They find that 400,000 out of 6.5 million can finance more than one year of LTC out of their income. The number increases to 3 million if savings are included and to 4.6 million if housing assets are added. A total of 4.2 million households could afford care for more than three years. However, these studies are cross-sectional and do not allow assessing the lifetime cost of LTC. They also do not take into account potential differences in the risk of disability according to socioeconomic status. If low-income and poorly educated individuals are more likely to face periods of LTC needs, it has important implications in terms of social inequalities and public policies. Indeed, homeownership and housing equity are negatively related to the risk of disability, LTC expenditures and institutionalization (Bockarjova *et al.*, 2014; Costa-Font, 2008; Rouwendal & Thomese, 2013). Thus, RM products may not be adequate for those with the highest needs.

3. See Lilly et al. *(2007) for a review on the consequences of informal care on the labour market. For the effect on caregiver's health, see, for instance, Coe & Van Houtven (2009).*

Box – **Description of Reverse Mortgage Products**

Reverse mortgages (RM, called "*lifetime mortgages*" in the UK) are credit operations used to unlock home equity. Contrary to home reversions (such as French "sales *en viager*"), RM do not imply any transfer of ownership. Homeowners (aged 62+ for the US Home Equity Conversion Mortgages, 55+ for the UK Aviva lifetime mortgages, 65+ in France) borrow against all or part of the value of their homes. The main difference with regular re-mortgaging is that the borrower does not need to make any repayments as long as she lives in the home. Contrary to traditional mortgages, interest is added to the loan balance, and the debt grows over time. When the (last) borrower dies, sells the house or permanently moves out, the RM is closed, and the loan is repaid. The heirs can reimburse the credit to the lender and keep the house. Alternatively, they can choose to sell it and, if the sale price is higher than the debt, keep the difference. The longevity risk and the risk on housing prices are transferred to the lender. The borrower's liability is limited to the value of the property at the end of the contract. If the loan value exceeds the sale price of the home, the lender is not allowed to seize other assets. RMs do not require medical or income tests and thus are accessible to poor-health and low-income individuals who must only have the financial resources to continue paying property taxes and insurance. While a private LTC insurance has to be purchased relatively early (before the disability occurs), RMs can be purchased at very old age, regardless of health status. Thus, RMs do not require anticipating the risk of LTC expenditures.

RM products have existed for many years in the US and the UK and have been gaining increasing attention in Europe. Overall, the RM market is small, even in the US, but it seems to be increasing. In the US, in 2010, 2 to 3% of eligible homeowners had an RM (Consumer Financial Protection Bureau, 2012). With a market share of more than 90%, the Home Equity Conversion Mortgage (HECM), insured by the Federal Housing Administration, dominates the US market (Shan, 2011). The number of new HECM loans increased from less than 7,000 in 2000 to more than 110,000 in 2009. After the subprime mortgage crisis, it decreased to about 55,000 in 2012. In Europe, the RM market represented 3.31 billion euros in 2007 – less than 0.1% of the ordinary mortgage market.

Data

This paper uses data from SHARE Waves 1 to 5.[4] SHARE is a longitudinal and multidisciplinary survey on health, income and wealth, and social and family networks. It provides information on individuals aged 50 and older (interviewed every two years) in 20 European countries, and on their partners. Information on limitations with instrumental and basic activities of daily living allows measuring the risk of needing LTC. Respondents are followed when they enter a nursing home.[5]

We focus on those aged 65 and over in Wave 5 (2013) in nine countries: Austria, Germany, Sweden, the Netherlands, Spain, Italy, France, Denmark and Belgium (23,769 observations). Hence, this work studies specific cohorts, born before 1948, which are not representative of future cohorts or of the general elderly population. Similarly, the countries studied are not representative of Europe as a whole (we selected the countries observed since the first wave; thus Eastern countries are not included). Table 1 provides some descriptive statistics on the sample.

Variables of Interest

Dependent persons in Wave 5 are identified using restrictions in basic activities of daily living (ADLs). The concept of "dependence" is hard to define, and various measures and administrative definitions are used to assess LTC needs and eligibility for public coverage. In this paper, we consider six ADLs (dressing, walking across a room, bathing or showering, eating, getting in/out of bed and using the toilet) and assume that those who report difficulties with at least two activities are in need of LTC.[6] This minimum of two ADLs is the eligibility threshold for public LTC coverage used in France, Italy and the Czech Republic[7] (Carrino & Orso, 2014). In the US, individuals must also need substantial assistance in performing at least two ADLs to trigger Medicaid and private long-term care insurance benefits (Brown & Finkelstein, 2007; Fong *et al.*, 2013). On average, 10% of those aged 65 and over were dependent in 2013 (Table 1). The proportion was higher in Southern Europe (14% in Spain and 12% in Italy) than in Northern Europe (4% in Sweden, 5% in the Netherlands and 6% in Denmark).

The annual household income is net of taxes and contributions, and includes earnings from (self-) employment, all types of pensions, disability insurances, regular life insurance payments, interests and dividends, real-estate income, and all public benefits, housing allowances and poverty relief programmes. As the objective of the paper is to assess the ability to pay for LTC needs assuming no public coverage, we exclude public LTC insurance payments.[8] We compute an adjusted household income by dividing the total income by the weighted number of household members (OECD modified scale).[9]

The survey also provides information on household financial assets net of financial liabilities and on net housing assets. The net home value H – home equity adjusted for percentage owned, less the value of mortgages – is the key variable used to simulate the equity that could be released through RMs.[10] We also take into account the ownership of other real estate (secondary homes, holiday homes, land or

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4. DOIs: https://doi.org/10.6103/SHARE.w1.260, https://doi.org/10.6103/SHARE.w2.260, https://doi.org/10.6103/SHARE.w3.100, https://doi.org/10.6103/SHARE.w4.111, https://doi.org/10.6103/SHARE.w5.100. See Börsch-Supan et al. *(2013) for methodological details. The SHARE data collection has been primarily funded by the European Commission through FP5 (QLK6-CT-2001-00360), FP6 (SHARE-I3: RII-CT-2006-062193, COMPARE: CIT5-CT-2005-028857, SHARELIFE: CIT4-CT-2006-028812) and FP7 (SHARE-PREP: N°211909, SHARE-LEAP: N°227822, SHARE M4: N°261982). Additional funding from the German Ministry of Education and Research, the Max Planck Society for the Advancement of Science, the US National Institute on Aging (U01_AG09740-13S2, P01_AG005842, P01_AG08291, P30_AG12815, R21_AG025169, Y1-AG-4553-01, IAG_BSR06-11, OGHA_04-064, HHSN271201300071C) and from various national funding sources is gratefully acknowledged (see www.share-project.org).*

5. When they die, an end-of-life interview is conducted with a relative, friend or neighbour. It should be stressed that, as with all surveys, there is some attrition when people change homes. This is also likely to be the case when the elderly enter a nursing home.

*6. The question is the following: "*Please tell me if you have any difficulty with these [activities] because of a physical, mental, emotional or memory problem. Again, exclude any difficulties you expect to last less than three months*".*

7. Other European systems use a mix of restrictions in ADLs and instrumental activities of daily living (Austria, Germany), or put higher priority on specific limitations such as washing and dressing (Belgium) or eating and using the toilet (Spain).

8. In the survey, only 271 individuals reported public LTC insurance payments.

9. This scale assigns a value of 1.0 to the household head, 0.5 to each additional adult member or child aged 14 and over, and 0.3 to each younger child. We use the adjusted household income for two reasons. First, it facilitates the comparison of living standards between households of different sizes. Second, in the simulations, we assume that income remains unchanged, even when the individual loses her spouse (we assume that the survivors' pensions roughly preserve her living standards). This assumption is easier to justify for adjusted household income than for household income.

*10. Homeowners are asked the following: "*In your opinion, how much would you receive if you sold your property today*?" We adjust this amount for the percentage owned by the respondent and her spouse (100% in most cases) and mortgages on the main residence. Around 10% of owners aged 65 and over have a mortgage, with an average value of 58,000 euros. Homeowners tend to overestimate the value of their homes. Venti & Wise (2001) focus on recent movers in the US and compare sales prices to the respondents' assessments of home value. They find an overestimation of 15 to 20% based on a comparison of means and of 6 to 7% based on medians. Benítez-Silva* et al. *(2015) find an overestimation bias of about 8%. In the Netherlands, the median homeowner overestimates housing prices by 13% (Van der Cruijsen* et al.*, 2014). It may lead to a slight overestimation of the ability of individuals to finance their LTC expenditures.*

forestry) that can be sold to finance long-term care needs.

Incomes and assets differ widely across the nine European countries (cf. Table 1). The average adjusted household annual income ranges between €10,000 in Spain and €38,000 in Belgium; the average value of net financial assets varies from €12,000 in Spain to €114,000 in Denmark, and the proportion of homeowners goes from 49% in Austria to 92% in Spain. Among homeowners, net home value is €241,000, on average. According to these descriptive statistics, reverse mortgages may help pay for long-term care in Spain and Italy, where income and financial wealth are low, but where homeownership rates are particularly high. In contrast, reverse mortgages will probably be less attractive in Sweden and the Netherlands, where incomes and assets are high, and homeownership is lower.

Methodology

Transition Model

Using all five waves of SHARE, we estimate three separate models using logistic regressions: one for mortality transitions between two survey waves (31,203 observations), one for the probability of becoming dependent (17,803 observations) and one for the probability of recovery (1,248 observations). Tables C1-1 and C1-2 in the Online complement C1 provides further details on observed transitions and on sample sizes (link to the Online complements at the end of the article). The explanatory variables are age dummies (with cut-offs at age 75 and 85), sex, quintiles of income, levels of education, and country dummies. In the mortality model, we also control for the disability status in the initial wave. Age dummies account for the nonlinear relationship between age, mortality and disability.[11]

Mortality Transitions

The analysis focuses on individuals whose disability status (dependent or not) is known in the initial wave and for whom life status is observed two years later. The probability of dying is 7.2 p.p. higher for dependent individuals than for non-dependent ones (see Table 2). Men and older individuals face a higher risk of death, while a higher income and a higher level of education are associated with a lower risk. The last variable in the table controls for the duration between the two interviews.

Comparisons of the estimated probabilities of death by country, sex and age with life tables from the Human Mortality Database show that SHARE underestimates mortality. This is linked both to the fact that individuals in institutions are not initially sampled in the survey in most countries, and to panel attrition. A correction factor by country, sex and age is computed to adjust SHARE estimated probabilities to life tables in the microsimulation model.[12]

Disability Transitions

The incidence of disability is estimated on non-dependent individuals in the initial wave (< 2 ADLs), who survive between the two waves and whose disability status is known in the final wave.[13] The probability of recovering from disability is estimated on those who are dependent (two or more ADLs) in the initial wave, are still alive two years later and whose number of ADL limitations is known.[14] As defined above, an individual becomes dependent if she reports at least two ADL limitations. To recover from disability, a person must report no difficulty in performing basic activities of daily living (total recovery). We make this choice for three reasons. First, since disability is not easily reversible, we do not want to overestimate recoveries. Indeed, Pérès *et al.* (2005) build a dynamic disablement process with 4 states: independence, mild disability (mobility problems), moderate disability, and severe disability (ADLs). They consider that direct transitions between two non-consecutive states do not occur. Cambois & Lièvre (2007) also stress that the probability of moving from ADL restrictions to independence is very low (around 2%). Most of the time, even when their health improves, former highly dependent individuals still have functional, IADL or mobility limitations. Thus, when a person reports one ADL, we assume that she is still dependent. Secondly, people may adapt to their problems, which may modify the way they answer to the questions. Due to hedonic adaptation, people with disability report approximately the same levels of happiness and life satisfaction than healthy individuals (Albrecht & Devlieger, 1999; Oswald & Powdthavee, 2008; Pagán-Rodríguez, 2010; Wu, 2001). Furthermore, dependent

11. Setting the thresholds to age 80 or 90 does not change the picture.
12. Details not shown, available from the authors upon request.
13. We do not simulate different levels of disability for technical reasons: since we have no information on the degree of difficulty in the different ADLs, it is difficult to build a reliable score. Simulating different levels of dependence would also reduce the subsample sizes in the transition models.
14. It should be kept in mind that this disability transition model may be biased due to attrition.

Table 1
Descriptive Statistics on the Sample

Mean or proportion (standard deviation) *Median*	Total	Austria	Germany	Sweden	Netherlands	Spain	Italy	France	Denmark	Belgium
Age	75.2 (7.4)	74.9 (7.3)	75.1 (6.9)	74.4 (7.3)	74.2 (7.4)	75.6 (7.6)	75.0 (7.4)	75.5 (7.7)	73.9 (7.3)	75.2 (7.5)
Female	0.572 (0.495)	0.577 (0.494)	0.562 (0.496)	0.553 (0.497)	0.544 (0.498)	0.579 (0.494)	0.573 (0.495)	0.590 (0.492)	0.540 (0.499)	0.572 (0.495)
Couple	0.639 (0.480)	0.568 (0.495)	0.676 (0.468)	0.683 (0.465)	0.660 (0.474)	0.605 (0.489)	0.643 (0.479)	0.595 (0.491)	0.682 (0.466)	0.655 (0.475)
At least one child	0.884 (0.321)	0.880 (0.325)	0.883 (0.322)	0.925 (0.264)	0.911 (0.285)	0.888 (0.315)	0.863 (0.344)	0.888 (0.316)	0.924 (0.265)	0.888 (0.316)
Level of education										
- Pre-primary/primary	0.369 (0.483)	0.179 (0.383)	0.025 (0.156)	0.323 (0.468)	0.173 (0.378)	0.741 (0.438)	0.601 (0.490)	0.454 (0.498)	0.195 (0.397)	0.261 (0.439)
- Secondary/post-secondary	0.459 (0.498)	0.582 (0.493)	0.713 (0.452)	0.418 (0.493)	0.607 (0.489)	0.194 (0.396)	0.353 (0.478)	0.350 (0.477)	0.474 (0.499)	0.470 (0.499)
- Tertiary	0.172 (0.377)	0.239 (0.426)	0.262 (0.440)	0.259 (0.438)	0.220 (0.415)	0.065 (0.247)	0.046 (0.210)	0.196 (0.397)	0.331 (0.471)	0.269 (0.443)
Disability status										
2+ ADLs (dependent)	0.101 (0.301)	0.090 (0.286)	0.098 (0.297)	0.043 (0.203)	0.051 (0.221)	0.137 (0.344)	0.119 (0.323)	0.082 (0.275)	0.060 (0.238)	0.118 (0.323)
Resources (in euros)										
Adjusted annual household income	19,996 (59,875) *15,082*	20,789 (14,101) *18,251*	20,860 (15,348) *17,430*	32,293 (18,962) *27,688*	25,009 (28,027) *20,118*	10,124 (8,062) *8,468*	12,249 (15,849) *10,323*	27,725 (128,814) *19,110*	25,083 (14,680) *21,106*	37,990 (49,669) *20,714*
Value of household net financial assets	44,548 (139,807) *9,000*	22,642 (54,332) *6,223*	35,471 (77,780) *11,500*	94,539 (138,870) *46,141*	109,887 (266,438) *24,000*	12,042 (25,811) *2,584*	14,090 (32,111) *2,881*	80,310 (236,479) *17,300*	113,627 (187,053) *40,225*	89,359 (145,582) *35,000*
Owners (main residence)	0.724 (0.447)	0.490 (0.500)	0.582 (0.493)	0.527 (0.499)	0.589 (0.492)	0.921 (0.270)	0.817 (0.387)	0.779 (0.415)	0.672 (0.470)	0.742 (0.438)
Net value of main residence (in euros) (if > 0)	241,220 (246,635) *200,000*	284,247 (234,070) *200,000*	224,262 (165,752) *195,000*	236,796 (220,864) *173,028*	242,856 (140,998) *215,000*	217,023 (452,308) *120,000*	231,813 (152,047) *200,000*	282,178 (191,418) *240,000*	212,944 (170,049) *160,901*	286,789 (129,309) *250,000*
Owners of other real estate or land	0.179 (0.383)	0.131 (0.338)	0.121 (0.327)	0.307 (0.461)	0.063 (0.243)	0.223 (0.416)	0.171 (0.377)	0.245 (0.430)	0.226 (0.418)	0.193 (0.395)
Value of other real estate/land (in euros) (if > 0)	237,511 (365,749) *150,000*	246,054 (297,720) *150,000*	302,679 (406,699) *140,000*	224,919 (258,169) *115,352*	216,820 (228,787) *150,000*	245,300 (672,413) *110,000*	201,016 (161,563) *150,000*	219,711 (159,876) *199,537*	203,710 (183,796) *134,084*	243,449 (211,429) *200,000*
Number of observations	23,769	2,417	2,624	2,907	2,206	3,717	2,700	2,435	1,986	2,777

Note: The statistics are weighted using calibrated individual weights. Individuals aged 65 and over.
Sources: SHARE data, wave 5.

individuals may adapt their home, which may, in turn, change their report of ADLs. For instance, Fänge & Iwarsson (2005) find that dependence in "bathing" decreases after adaptations in bathroom facilities. Thirdly, we assume that dependent individuals do not reduce their demand of LTC services when their disability status improves.

The probability of becoming dependent is higher for women and increases with age (Table 2). Low-income and poorly educated individuals face a higher risk of needing long-term care, which is related to their poorer health. For dependent individuals, the probability of recovery is mainly explained by age.

Microsimulation Approach

The disability transition model allows for estimating individual probabilities of transitions as a function of age, sex, income, level of education, country and initial disability status. We then simulate disability transitions over a two-year period by comparing the estimated probabilities with a random variable that follows a continuous uniform distribution on [0,1]. The process

Table 2
Transition Probabilities between Two Waves

	Probability of dying	Becoming dependent (2+ ADLs)	Recovery (No ADL)
Age			
[65, 75]	-	-	-
[76, 85]	0.045*** (0.003)	0.053*** (0.004)	-0.121*** (0.024)
Over 85 years old	0.091*** (0.004)	0.105*** (0.006)	-0.201*** (0.034)
Female	-0.028*** (0.003)	0.013*** (0.004)	0.006 (0.024)
Dependent (2+ ADLs)	0.072*** (0.003)	-	-
Adjusted household income (country level)			
1st quintile	-	-	-
2nd quintile	-0.007* (0.004)	-0.008 (0.005)	0.045 (0.032)
3rd quintile	-0.008** (0.004)	-0.015*** (0.005)	0.012 (0.036)
4th quintile	-0.007* (0.004)	-0.023*** (0.005)	0.024 (0.036)
5th quintile	-0.012*** (0.004)	-0.028*** (0.006)	0.026 (0.040)
Level of education			
Pre-primary/primary	-	-	-
Secondary/post-secondary	-0.007** (0.003)	-0.018*** (0.004)	0.057* (0.030)
Tertiary	-0.011*** (0.004)	-0.030*** (0.007)	0.035 (0.044)
Country			
Austria	-	-	-
Germany	-0.003 (0.006)	0.012 (0.008)	-0.038 (0.054)
Sweden	-0.004 (0.005)	-0.044*** (0.009)	0.035 (0.055)
Netherlands	-0.004 (0.006)	-0.037*** (0.009)	-0.084 (0.069)
Spain	0.004 (0.005)	0.008 (0.007)	0.060 (0.042)
Italy	-0.004 (0.005)	0.002 (0.007)	0.021 (0.047)
France	-0.012** (0.005)	-0.022*** (0.007)	0.051 (0.045)
Denmark	0.009* (0.006)	-0.023*** (0.008)	-0.127* (0.070)
Belgium	-0.016*** (0.005)	-0.006 (0.006)	-0.076* (0.045)
Time between the two waves - 24 months	0.002*** (0.000)	0.000 (0.000)	0.007** (0.003)
Number of observations	31,203	17,803	1,248

Notes: Average marginal effects. Standard errors in parentheses. *: significant at the 10% level; **: 5% level; ***: 1% level. 1st column: individuals aged 65 and over and whose status (dependent or non-dependent) is known in the initial wave. 2nd column: individuals aged 65 and over and non-dependent (< 2 ADLs) in the initial wave. 3rd column: individuals aged 65 and over and dependent (2+ ADLs) in the initial wave.
Sources: SHARE, waves 1, 2, 4, 5 (and wave 3 for mortality transitions).

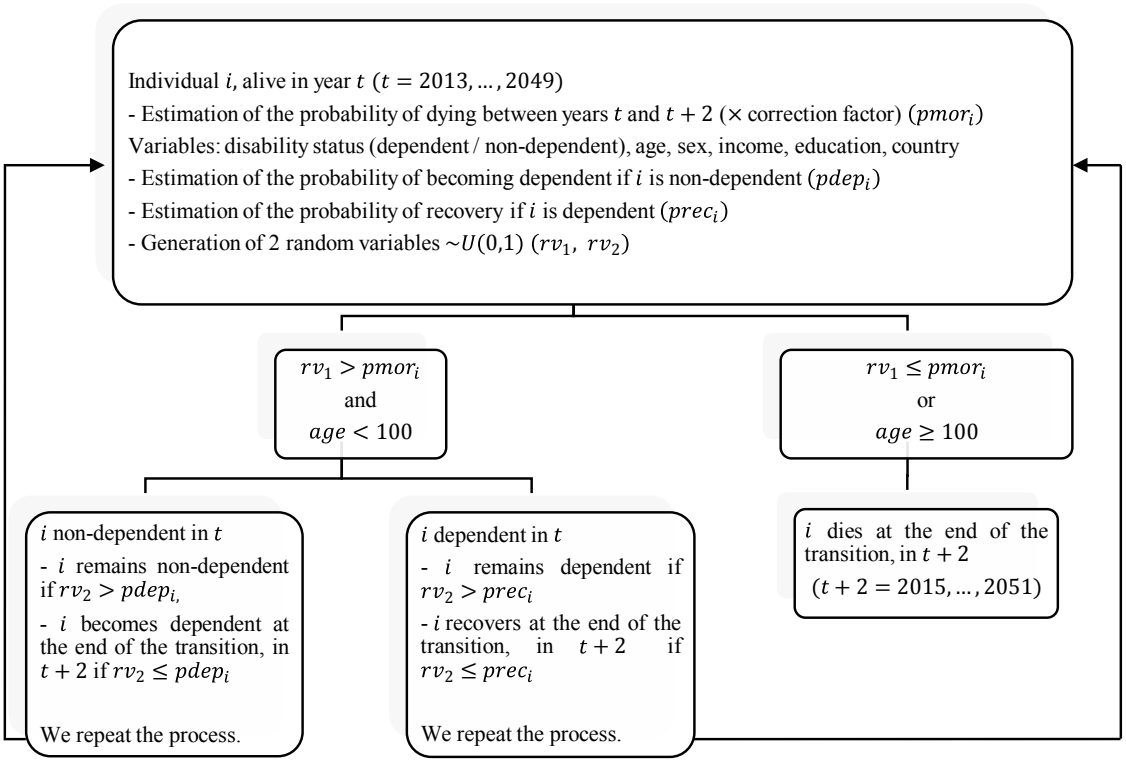
is repeated to simulate disability trajectories from 2013 until 2051. Centenarians are assumed to die with probability 1 so that all individuals aged 65 or more observed in 2013 are dead by 2051 (Diagram). The disability transition model assumes no change in disability rates and mortality trends during the simulation period. Since simulations rely on random numbers and may be affected by stochastic variability, the model is run ten times to obtain more stable and robust results. The results present the mean LTC risk and the mean ability to pay for LTC needs across these ten replications of simulations. The study of the distribution of ability to pay focuses on the tenth simulation (other simulations give very similar results).

LTC Cost

We compute the average cost of LTC at the country level. We focus on dependent individuals (two or more ADLs) in Wave 5 and calculate how many hours of care per week they need using a conversion table relating restrictions in basic/instrumental activities of daily living to home-help needs. The time of assistance needed for each activity of daily living is assumed to be the same in each country. It is a kind of "universal" need. Online complement C1 (Table C1-3) summarizes the assumptions, adapted from Pampalon *et al.* (1991), and provides a comparison with the assessment of needs used in Austrian and German long-term care systems (Carrino & Orso, 2014). We find that, on average, dependent individuals need 28.4 hours of care per week in the nine European countries studied. This is in line with the 31.5 hours of weekly care (from professional workers and relatives) reported by beneficiaries of public LTC coverage in France (Petite & Weber, 2006).[15] The need for care is then evaluated in monetary terms by applying the hourly labour cost in the "Accommodation and food services" sector (Nace Rev. 2 Section I) in each country (Eurostat data, 2012). We chose this sector because LTC uses mostly manual and low-skilled labour and little technology. The annual cost of LTC ranges between €20,383 in Spain and €42,096 in Denmark (Table 3). This cost is generally higher than the average

15. It is also in line with Muir (2017), who stresses that dependent persons require between 6 and 41 hours of care per week depending on their degree of disability.

Diagram
Description of the Microsimulation Process



annual income of individuals aged 65 and over in SHARE (cf. Table 1).[16]

We assume that there is no public LTC insurance and no informal care provided by relatives, friends or neighbours. In other words, dependent individuals have to bear the full cost of LTC. This is a kind of "what if" scenario, in a context of an uncertain evolution of care supply from children. The decline in fertility, the increase in the geographical distance between family members, the rising participation of women in the labour market, and the postponement of retirement age may modify informal care supply. Some simulations with public coverage and family care are presented in Online complement C5.

Simulation of Reverse Mortgages

People are assumed to take out a reverse mortgage as soon as they become dependent, i.e. at age 85 on average.[17] They can choose between different payment options, mixing lump-sum payments and annuities. Here, we simulate a single lump-sum payment, received at the origination of the RM contract. This is the most popular option (Consumer Financial Protection Bureau, 2012). We assume that the contract ends with the death of the borrower.

The maximum lump-sum amount L that dependent individuals can receive is determined by the general rule that the expected sale value of the house should not exceed the accumulated debt at the time of the borrower's death (equation (1)). The lump-sum payment increases with the net value of the main residence (the home equity) H and the expected growth rate of housing prices g, and decreases with the interest rate of the reverse mortgage m and the borrower's remaining life expectancy e. Indeed, older individuals will repay the loan sooner; hence, less interest will be accumulated, allowing a higher loan or, alternatively, a lower interest rate.

$$L = H \times \frac{(1+g)^e}{(1+m)^e},\ m > g \qquad (1)$$

We assume that the lenders do not adjust mortality to a dependent population, but rather determine e from the life tables of the Human Mortality Database (by age in each country). This assumption means that the amount lent will be lower than if the true life expectancy of dependent individuals were used. In our simulations, their life expectancy is on average 15% lower than that predicted by life tables for the general population. Moreover, the lender is not allowed to distinguish between male and female life expectancy because, since 2012, unisex pricing is compulsory (Court of Justice of the European Union, judgement of March 1, 2011).

We assume that people borrow on 100% of the home value and that the growth rate

16. We may overestimate the LTC cost because we have no information on the degree of restriction in activities of daily living and assume that all individuals need comprehensive care.

17. In fact, individuals may recover from disability (in particular at younger ages) and will probably use reverse mortgages only when they are sure that their health will continue to deteriorate. To simplify the analysis, we consider that individuals take a reverse mortgage during their first period of disability.

Table 3
Average LTC Needs and LTC Costs in Each Country

	Hourly labour cost in accommodation and food services (€)	Average annual cost of LTC
Austria	16.8	24,815
Germany	16.6	24,519
Sweden	25.3	37,369
Netherlands	18.2	26,882
Spain	13.8	20,383
Italy	18.0	26,587
France	23.0	33,972
Denmark	28.5	42,096
Belgium	21.3	31,461

Notes: Weighted statistics. Individuals aged 65+ and dependent (2+ ADLs) in wave 5.
Sources: SHARE, wave 5 and Eurostat data (2012).

of housing prices g is null. The reverse mortgage interest rate m is set at 8% and includes all fees (mortgage insurance premium, origination fees, closing costs and servicing fees). An 8% interest rate is consistent with rates observed in the UK, the US and on French markets, and with the values used in the previous literature (Bishop & Shan, 2008; Hancook, 1998; Moscarola *et al.*, 2015; Ong, 2008; Venti & Wise, 1991).[18] These high interest rates may be explained by the small size of the market and by the fact that the lender faces multiple risks: a longevity risk, an interest rate risk and a risk on housing prices. Online complement C4 tests the sensitivity of the results to changes in the interest rates and life tables used by the bank and to changes in the growth rate of housing prices.

To illustrate equation (1), consider a French owner of a €200,000 house who becomes dependent at age 85. Her expected life expectancy is 7.03 years, not taking into account the fact that she is dependent. If the lender fixes the RM annual interest rate at 8%, she will receive a capital of €116,429.

Measure of Ability to Pay for LTC Needs

To study the ability to pay for LTC needs, we assume that incomes and assets are used by decreasing order of liquidity. First, only the income minus food consumption, annual rents and other home-related expenditures (variable I) is used. Then, net financial assets F are depleted, and real estate RE other than the main residence is sold. When financial assets are used, interests and dividends from financial investments f are deducted from income. Similarly, the rental income r is deducted when real estate is used. Finally, the lump-sum reverse mortgage payment L is taken into account. The ability to pay for D years of disability is based on the comparison of income, assets and annual LTC costs C at the time when individuals become dependent (Table C1-4 in Online complement C1).

The analysis of the ability to pay for LTC focuses on dependent elderly people who have no partner/spouse when they become dependent. The reader should keep in mind that this subsample is not representative of the whole population of dependent people. We made this choice for three reasons. First, the assumption that there is no informal care is more credible for them. Second, taking an RM is easier for single individuals. They are more likely than couples to take out reverse mortgages. In the US, in the late 2000s, only 37% of the borrowers were couples (Consumer Financial Protection Bureau, 2012). The main reason is that people want to leave the home to their surviving spouse. RMs are also less advantageous for couples given that the bank considers the age of the youngest partner. Finally, including dependent individuals in a relationship would require some assumptions on the distribution of assets within the couple, which is not trivial.

A difficulty is that incomes and assets are known only in Wave 5. Their value when individuals become dependent depends on many factors, such as the evolution of inflation, pension indexation rules, interest rates, housing prices and life histories. We make simplifying assumptions. First, we assume that annual LTC costs do not vary during the simulation period (2013-2051). Second, the adjusted household income remains unchanged, even when the individual loses her spouse (the survivors' pensions roughly preserve her living standards). Finally, after the death of one's spouse, financial and housing assets do not change if the individual has no children, and are divided by two if there are children.[19]

Results

Long-Term Care Risk

According to our model, 57% of those aged 65 or older in 2013 will experience at least one period of LTC needs and, for them, the average number of years with disability is 4.4 (Table 4). The probability of needing LTC is higher for women (66%) than for men (46%), and women face longer periods of disability, 4.7 years on average compared to 3.8 for men. These results are consistent with previous findings. Socioeconomic status plays an important role. In the bottom income quintile, 64% of individuals are expected to become dependent, while the proportion is only 49% among the richest. Similarly, poorly educated individuals have a 65% risk of needing LTC as compared to 45% for those who have completed tertiary education. It suggests that social inequalities

18. In the UK (Aviva lifetime mortgages), the annual interest rate was 7.19% in September 2015. In the US, the expected interest rate of HECMs has decreased from 9.8% in 1990 to 4.9% in 2012, in line with the decline of the ten-year Treasury rate. The same trend is observed in France. The interest rate fixed by Crédit Foncier has decreased from 8% in 2007 to 4.8% more recently (Ogg, 2012).

19. We thus simplify inheritance laws and do not account for differences between European countries.

in health persist at very old ages. But, once dependent, the duration of LTC needs is less sensitive to the socioeconomic status. Finally, the probability and the duration of LTC needs are lower in Northern Europe (Sweden, the Netherlands, and Denmark) than in the South (Spain, Italy). On top of geographic health inequalities, it is also possible that fewer restrictions in ADLs are reported in the North than in the South of Europe because housing and the environment are better suited to the needs of people with disabilities.[20]

Ability to Pay for LTC

The LTC risk is significant – 57% of individuals will have to finance, on average, four years of LTC needs – and care is costly. According to our simulations, assuming that there is no public coverage for LTC and no informal care, dependent individuals will have to finance an average LTC cost of €114,779 (1st quartile: €53,174, median: €98,076, 3rd quartile: €147,115). Focusing on those who have no partner when they are dependent,[21] we study both the proportion of individuals who are able to pay for their LTC needs and the distribution of the ability to pay.

20. Institutional care is more common in Northern than in Southern Europe. Thus, if SHARE imperfectly follows individuals when they enter nursing homes, attrition leads to an underestimation of LTC risk in Northern Europe. However, since people in nursing homes are initially sampled in the three Northern Europe countries and not elsewhere, the bias is likely minimal.

21. The sample includes between 6,542 and 6,746 individuals (depending on the simulation) who had no partner/spouse in 2013 or who face long-term care needs after the death of their partner/spouse (see table C1-5 in Online Complement C1).

Table 4
Simulated LTC Risk and LTC Duration

	Probability of needing LTC	LTC duration if > 0 (years)
Total	0.571 (0.006)	4.378 (0.034)
Male	0.458 (0.010)	3.783 (0.076)
Female	0.656 (0.010)	4.689 (0.052)
Adjusted household income (country level)		
1st quintile	0.635 (0.012)	4.320 (0.071)
2nd quintile	0.617 (0.014)	4.356 (0.101)
3rd quintile	0.582 (0.007)	4.549 (0.124)
4th quintile	0.527 (0.012)	4.292 (0.135)
5th quintile	0.494 (0.014)	4.366 (0.058)
Level of education		
Pre-primary/primary	0.651 (0.008)	4.548 (0.091)
Secondary/post-secondary	0.552 (0.008)	4.270 (0.062)
Tertiary	0.452 (0.011)	4.203 (0.097)
Country		
Austria	0.560 (0.011)	4.240 (0.062)
Germany	0.592 (0.010)	4.262 (0.049)
Sweden	0.331 (0.008)	3.453 (0.068)
Netherlands	0.344 (0.010)	3.837 (0.096)
Spain	0.677 (0.015)	4.891 (0.132)
Italy	0.629 (0.014)	4.623 (0.138)
France	0.513 (0.018)	3.970 (0.105)
Denmark	0.416 (0.011)	4.216 (0.112)
Belgium	0.554 (0.013)	4.337 (0.094)
Number of observations: 23,769		

Notes: The figures correspond to the means of the (weighted) LTC risk and the (weighted) LTC duration across ten replications of simulations. Standard deviations of the means of the ten replications are reported in parentheses.
Individuals aged 65 and over in wave 5.
Sources: SHARE. We simulate trajectories of wave 5 individuals, using our transition model.

On average, only 6% of single dependent individuals can pay for their LTC needs out of their sole income. The proportion increases to 16% if they deplete their financial wealth, 22% if they sell their other real estate and to 49% if they take out reverse mortgages on their main residence (Table 5). Thus, half of the individuals cannot totally pay for LTC, even if they use all their income and assets. This highlights both the high cost of LTC and the need for additional forms of LTC coverage.

At the country level, the proportion of elderly who are able to pay for their LTC needs (with income, assets, and reverse mortgages) ranges from 38% in Austria and Denmark to 66% in Belgium. In most countries (Austria, Germany, Sweden, the Netherlands, Spain, Italy, Denmark), only 35 to 50% can finance their periods of disability. The proportion is higher in France (58%) and Belgium (66%) where income, financial and housing assets are, on average, higher.

While only 22% of individuals can pay for their LTC needs without using their home equity, this proportion more than doubles when reverse mortgage payments are taken into account. Indeed, the proportion of homeowners is high among older Europeans, and their average home value is generally higher than the average annual income and financial wealth. To give an example, dependent homeowners receive an average lump-sum payment of €141,191 when they take out reverse mortgages (Table C4-1 in Online complement C4). The potential role of reverse mortgages is particularly important in Spain and Italy, where a large proportion of individuals is cash-poor and house-rich (Figure I). In contrast, reverse mortgages seem less useful in Sweden, where individual income and assets are higher and homeownership is lower.

Thus, almost half of the individuals are able to finance their LTC expenses, if they use all their income and assets. To give a complete picture of the ability to pay for LTC needs, we also have to consider individuals who can finance only part of their LTC expenses. The proportion of LTC duration that individuals are able to finance is defined as the ratio between the number of years of LTC *(D)* they can pay for and their effective LTC duration. Without home equity, 52% of dependent individuals can only finance less than 10% of their LTC duration, while 22% can fully finance their periods of LTC needs (Figure II). When lump-sum reverse mortgage payments are added, these proportions become, respectively, 23% and 49%. Reverse mortgages increase the proportion of individuals who can pay for 50% or more of their LTC duration. But a significant proportion of dependent individuals can only pay for a small part of their LTC expenses, even if they take out reverse mortgages.

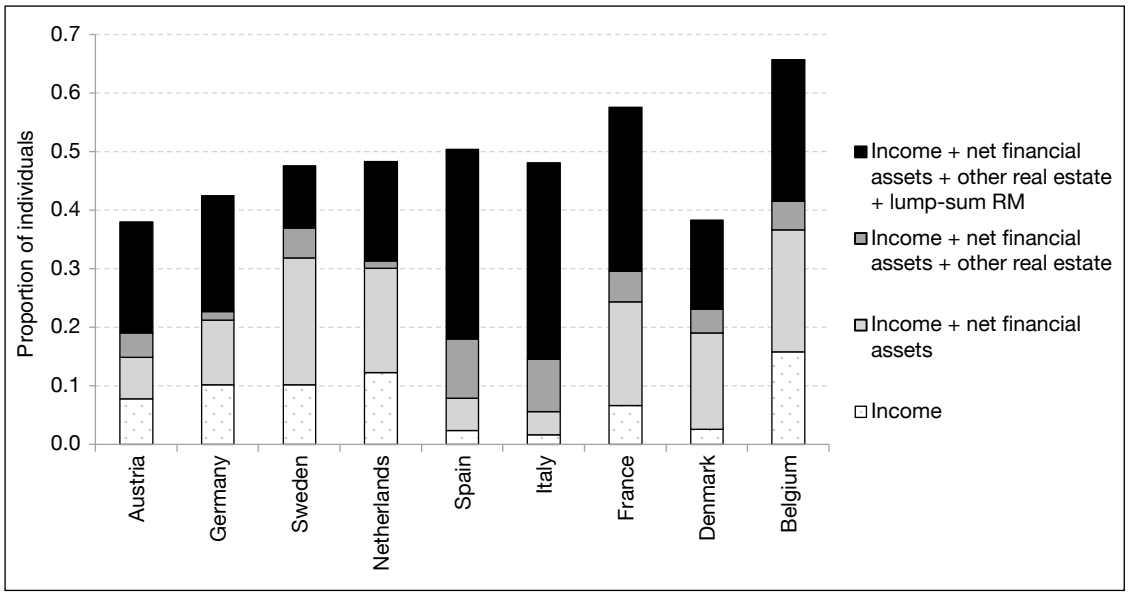
Table 5
Proportion of Dependent Individuals Who Are Able to Pay for Their LTC Needs

	Adjusted household income	+ Net financial assets	+ Other real estate	+ Lump-sum RM
Total	0.062 (0.003)	0.164 (0.006)	0.222 (0.004)	0.489 (0.005)
Country				
Austria	0.078 (0.005)	0.149 (0.011)	0.190 (0.013)	0.380 (0.013)
Germany	0.102 (0.007)	0.212 (0.009)	0.227 (0.009)	0.425 (0.012)
Sweden	0.102 (0.010)	0.319 (0.017)	0.370 (0.017)	0.476 (0.019)
Netherlands	0.123 (0.018)	0.301 (0.022)	0.313 (0.024)	0.483 (0.018)
Spain	0.024 (0.005)	0.079 (0.010)	0.180 (0.019)	0.504 (0.013)
Italy	0.017 (0.003)	0.056 (0.008)	0.146 (0.012)	0.481 (0.016)
France	0.066 (0.007)	0.244 (0.021)	0.296 (0.019)	0.576 (0.022)
Denmark	0.026 (0.006)	0.190 (0.019)	0.231 (0.019)	0.383 (0.018)
Belgium	0.158 (0.009)	0.366 (0.016)	0.415 (0.017)	0.657 (0.015)
Number of observations: between 6,542 and 6,746 depending on the simulation				

Notes: The figures correspond to the mean of the (weighted) ability to pay across ten replications of simulations. Standard deviations between the means of the ten replications are reported in parentheses.
Reading Note: In Austria, 7.8% of dependent individuals on average can pay for their LTC needs with their income. The proportion is 14.9% when net financial assets are added, 19% if real estate is taken into account and 38% if lump-sum reverse mortgages on the main residence are added.
Individuals aged 65 and over in wave 5 and who have no partner when they are dependent.
Sources: SHARE, authors' microsimulation.

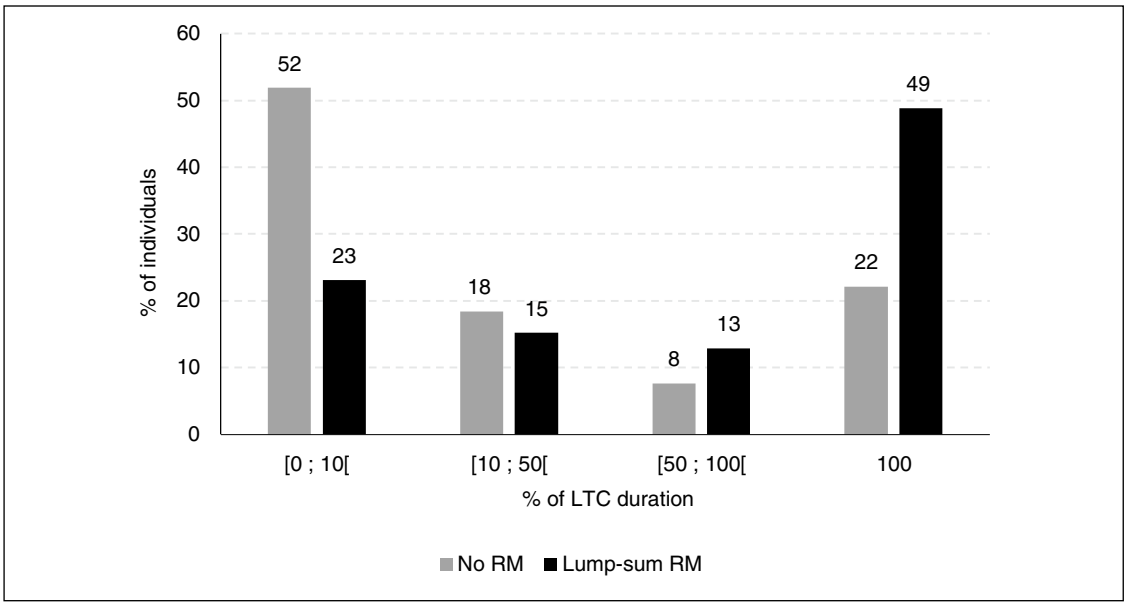
To give a more concrete example, in our simulated sample, the median dependent individual needs LTC for four years, which entails a median cost of €81,533. Her annual income is €6,400; her financial wealth is €2,500; and, if she takes out an RM, she will receive a lump-sum amount

Figure I
Proportion of Dependent Individuals Who Are Able to Pay for Their LTC Needs



Note: Individuals aged 65 and over in wave 5 and who have no partner when they are dependent.
Sources: SHARE data, authors' microsimulation.

Figure II
Proportion of LTC Needs that Dependent Individuals Are Able to Finance



Notes: The distribution corresponds to the tenth simulation. Weighted distributions. Individuals aged 65 and over in wave 5 and who have no partner when they are dependent (6,608 individuals).
Sources: SHARE data, authors' microsimulation. All countries.

of €57,006. This median dependent individual can cover 31% (15 months) of her LTC expenses with her income alone and 34% (16 months) if she depletes her financial wealth. With an RM, she can fully finance her LTC needs.

Distributions by country show that the ability to pay for LTC needs without reverse mortgages is particularly low in Spain, Italy and Austria, compared to other countries (Figure C2-1 in Online complement C2). In all countries, lump-sum payments from reverse mortgages shift the distribution to the right and improve the ability to finance periods of disability, but not in the same proportion everywhere. As outlined above, the effect of reverse mortgages is small in Sweden, Denmark and the Netherlands. By contrast, the impact is larger in Southern Europe. Austria, Germany, France and Belgium constitute an intermediate group.

Subgroup Analysis

Since poor individuals face a bigger risk of disability and have less housing wealth, socioeconomic inequalities may increase at older ages. Similarly, women are more often dependent than men and generally have lower income. What would be the consequences of the development of reverse mortgage products, in the absence of public LTC coverage, on the distribution of ability to pay according to gender and socio-economic status?[22]

The proportion of dependent individuals who could fully finance their LTC needs, using their income, financial assets and RMs, is higher among men (59%) than among women (46%) (Table 6). The ability to pay for LTC increases with the level of education. Only 43% of individuals who have completed primary education could pay for their LTC needs, as compared to 68% for those who have completed tertiary education. Similarly, the proportion of individuals who could cover their LTC needs ranges between 30% in the first income quintile and 88% in the fifth income quintile.

In Northern and continental Europe, reverse mortgage payments have only a small effect on payment ability for those in the top income quintile. These individuals have enough income and financial wealth. In contrast, in Southern Europe, only 30% of the richest individuals are able to finance their periods of disability out of their income and financial wealth. The proportion strongly increases when housing assets are taken into account (Figure C3-I in Online complement C3).

22. This question is highly policy-relevant if fiscal incentives are set up by governments to develop the demand for RMs.

Table 6
Proportion of Dependent Individuals Able to Pay for Their LTC Needs in Different Subgroups

	Adjusted household income	+ Net financial assets	+ Other real estate	+ Lump-sum RM
Total	0.062 (0.003)	0.164 (0.006)	0.222 (0.004)	0.489 (0.005)
Male	0.090 (0.009)	0.243 (0.021)	0.304 (0.020)	0.589 (0.028)
Female	0.055 (0.003)	0.144 (0.004)	0.201 (0.007)	0.463 (0.005)
Income				
1st quintile	0.000 (0.000)	0.046 (0.006)	0.069 (0.007)	0.298 (0.011)
2nd quintile	0.000 (0.000)	0.060 (0.010)	0.103 (0.010)	0.365 (0.022)
3rd quintile	0.000 (0.000)	0.101 (0.011)	0.166 (0.009)	0.475 (0.015)
4th quintile	0.009 (0.002)	0.212 (0.026)	0.307 (0.024)	0.658 (0.026)
5th quintile	0.445 (0.016)	0.606 (0.015)	0.699 (0.022)	0.877 (0.014)
Level of education				
Pre-primary/primary	0.015 (0.002)	0.077 (0.009)	0.135 (0.009)	0.428 (0.012)
Secondary/post-secondary	0.070 (0.005)	0.184 (0.007)	0.244 (0.009)	0.499 (0.008)
Tertiary	0.209 (0.013)	0.419 (0.021)	0.469 (0.018)	0.679 (0.026)
Number of observations: between 6,542 and 6,746 depending on the simulation				

Notes: The figures correspond to the mean of the (weighted) ability to pay across ten replications of simulations. Standard deviations of the means of the ten replications are reported in parentheses. Individuals aged 65 and over in wave 5 and who have no partner when they are dependent.
Sources: SHARE data; authors' microsimulation.

Reverse mortgage payments play an important role in the other income quintiles. The proportion of homeowners is high (cf. Table 1), even among low-income individuals. Among those 65 and older, the average proportion of homeowners is 61% in the bottom income quintile, 67% in the 2nd quintile, 71% in the 3rd quintile, 80% in the 4th quintile and 82% in the 5th quintile. However, even with reverse mortgages, the proportion of people who can entirely finance their periods of disability remains very low, in particular in the first two income quintiles.

Sensitivity Tests

As discussed above, dependent individuals have a shorter life expectancy. Using accurate life tables, banks may be willing to offer lower interest rates than for the general population. The offered lump sum would thus be higher. Online complement C4 presents tests of sensitivity of the results to changes in the interest rate and in life tables used to compute reverse mortgages. It also presents the simulated effect of changes in housing prices. The results are robust to changes in parameters, and the main conclusions remain unchanged.

The Role of Informal Care and Public LTC Coverage

We assumed that there was no informal care and no public coverage for LTC. Simulations taking these two elements into account can be found in Online Complement C5. To account for informal care, we simply assume that the LTC cost borne by dependent individuals is 25% or 50% lower when they had children in Wave 5. The proportion of dependent individuals with children who can pay for their LTC expenses increased from 49% to 57% (with a 25% lower LTC cost) and 68% (with a 50% lower LTC cost). To introduce public coverage, we mimic a simple income-tested system and assume that 80% of the LTC cost is publicly covered for individuals in the bottom income quintile, 60% for the 2nd quintile, 40% for the 3rd quintile, 10% for the 4th quintile and 5% for the 5th quintile. With public coverage, 67% of dependent individuals can totally finance their LTC expenses, as compared to 49% in the baseline scenario. Since we have assumed that co-payments increase with income, public LTC coverage reduces social inequalities. The ability to pay for 100% of expenses doubles in the first income quintile; it increases by three-quarters in the second quintile; and by one-third in the third quintile. As expected, there is almost no effect in the top two income quintiles.

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In a context of financial pressures on social protection systems, reverse mortgages would help to shift part of the burden of long-term care financing on older generations, without increasing future generations' contributions. However, our projections show that half of the population would not be able to finance all their LTC expenses, even if they used all their income and assets. One-quarter of dependent individuals would be able to finance less than 10% of their care expenses.

In the top income quintile, RM payments have almost no effect on the ability to meet LTC needs, except in Spain and in Italy. These individuals already have enough income and financial wealth to finance their periods of disability. By contrast, RMs play an important role in the other income quintiles (the house rich and relatively cash poor). However, the proportion of people who can pay for their periods of disability remains very small for low-income individuals.

All these results highlight the need for insurance coverage, public or private. The link between private and public financing of formal care and the provision of informal care should be underlined. By reducing the expected inheritance of children, RMs may weaken incentives to provide informal care (Bernheim *et al.,* 1985). On the other hand, parents may threaten the children to liquidate their home to receive more attention. Furthermore, public LTC benefits may crowd-out private RMs. Likewise, a means-tested public insurance programme may affect wealth accumulation. Comparing Mediterranean countries with Northern countries, the former have a particularly high proportion of homeowners and low public LTC expenditure. The elderly must rely on their assets and their children. Homeownership is lower in Northern countries, where LTC systems are generous. This suggests that individuals internalize the public policy context when making economic decisions. In this work, we do not take into account the interaction between individual savings decisions and the type of welfare state, and we cannot model reactions to policy changes, such as the introduction of RMs in European countries.

RMs may be perceived as "anti-family" in that the children may have to give up the family home (Assier-Andrieu & Gotman, 2009; Masson, 2015). Dillingh *et al.* (2013) show that having offspring decreases the probability of being interested in RMs in the Netherlands. However, the proportion of inherited homes is low and has been declining over time (Angelini *et al.,* 2013). In many countries, inheritance taxes already reduce real estate assets.

On the other hand, care preferences may also influence the demand for RMs. Many parents declare they do not want to be a burden to their children. RMs may allow dependent elderly to purchase formal home care and preserve their autonomy. Children could provide emotional support and help with domestic tasks, complementing professional care. Furthermore, children may prefer to receive a smaller share of the inheritance rather than provide care for their parents, sometimes at the expense of their health and career. A more thorough analysis of the relationship between inheritance taxation and child-parent obligations would have to be conducted to fully understand family decisions.

In practice, the RM market is very small. The most common explanation is that costs and fees are too high. This product also appears complicated and risky for both lenders and borrowers. The demand for RMs is likely to remain low in Europe, unless more attractive financial products are developed in relation to the tax system. □

Link to the Online complements:

https://www.insee.fr/en/statistiques/fichier/4173202/507-508_Bonnet-Juin-Laferrere_complement.pdf

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Comment
Is Self-Insurance for Long-Term Care Risk a Solution?

Jérôme Wittwer*

Abstract - The financial risk associated with long-term care (LTC) is partially insured in France and in all European countries. However, the level of coverage across all countries is significantly lower compared to health risk. Public coverage varies widely from country to country, although in most cases households are left to bear a significant proportion of the cost burden. Since LTC risk occurs at the end of life, the use by households of their financial and housing assets to finance their LTC expenses – in other words, self-insurance – may appear as one solution. Using data from the SHARE survey, the study by Carole Bonnet, Sandrine Juin and Anne Laferrère aims to address this question head-on and to assess the extent to which self-insurance could meet the financing needs of long-term care in Europe. This comment considers the approach taken by the authors before discussing the implications of their analysis.

JEL codes: J140, D140, I130, C530
Keywords: long-term care, housing, reverse mortgage, microsimulation

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The financial risk associated with long-term care (LTC) risk is partially covered in France and in all European countries. However, coverage across all countries is significantly lower compared to health risk. The level of public coverage varies widely across countries, but in most cases a significant proportion of the cost burden is left to households, particularly where the disability status requires institutionalisation. Furthermore, private insurance plays a marginal role in insuring against the risk. Because LTC risk occurs at the end of life, the use by households of their financial and housing assets to finance their LTC expenses – in other words, self-insurance – has been proposed as a possible solution (Bozio *et al*., 2016). In other words, the question arises as to the ability of self-insurance to insure against LTC risk. Using data from the SHARE survey, the study by Carole Bonnet, Sandrine Juin and Anne Laferrère aims to address this question head-on and to assess the extent to which self-insurance is able to meet the financing needs of long-term care in Europe. Before discussing the implications of the study, the approach taken by the authors is examined first.

Assessment of Needs: An Effective Approach

LTC risk is characterised by difficulty in performing basic activities of daily living. To compensate for these difficulties, dependent persons are cared for by relatives, known as informal caregivers, and/or by paid professional caregivers, whether care is provided at home or in an institution.

The position taken in the study involves estimating the financial risk associated with LTC risk by the number of hours required to care for a dependent individual, valued at the price of professional care. The assessment is carried out without taking into account public care and the informal care provided by relatives. The approach adopted is, in my view, highly effective. It has the advantage of allowing for a consideration of gross risk – i.e. the risk faced by individuals independently of resorting to informal caregivers. Of course, assessment is a delicate matter, and understanding the real needs of dependent individuals is no easy task. The authors' choice of standardisation is open to discussion. Scenario-based analyses drawing on other sources for the assessment of needs would have been worthwhile. More broadly, the measurement of needs would have merited further discussion since it determines all the calculations and results of the study.

In particular, the question of institutionalisation is not addressed. Yet the method of care delivery (at home, in an institutional setting or in assisted living facilities) directly determines the cost of care and the financial risk of long-term care. The measure of needs used in the study may not account for the cost of institutional care despite the high annual costs used for the simulations. In any event, the method of assessment of needs chosen by the authors, expressed in hours of care, does not cover the home care of certain dependent individuals, a case in point being dependent individuals suffering from dementia. In other words, severe needs requiring institutionalisation are not explicitly considered in the paper. The approach taken, based on the assessment of a standardised and absolute need, is however attractive insofar as it provides a means to move away from the real arrangements made by households, to focus instead on a financial risk that is independent of the care choices of families. In this way, it has the advantage of not having to take into account the costs of care associated with a costly decision. However, the exercise is not well suited to the case of institutionalisation, which may not be a matter of choice but necessity. Currently in France, institutional care is the type of care associated with the highest burden of cost for households – a burden that generally exceeds the income of persons in institutional care because of the costs associated with accommodation (Fizzala, 2016). In a way, the authors proceed on the assumption that home care costs and institutional care costs are equivalent. This would be worth further discussion.

Nevertheless, in any case, the approach adopted appears to be both effective and informative. Of course, the assessment of needs used by the authors is not independent of the hypotheses made to measure risk.

LTC Risk: A Highly Simplified Dynamic Process

Based on the data used, the authors are led to simplify the methodological approach and to make several significant simplifying assumptions. The first relates to the definition of a binary risk: requiring or not requiring long-term care. It would probably be more realistic to consider a more fine-grained process to reflect

the gradual development of the different stages of disability (Edjolo *et al*., 2016).

Similarly, the authors base the microsimulation on transition probabilities derived from logistic regressions using the different waves of SHARE. Here too, it would be better to base the simulations on estimations aimed directly at accounting for the dynamic of disability and taking better account of the competitive nature of long-term care and death risks.

It is clear that the data used do not allow for a direct implementation of this type of approach. However, it is possible to envisage importing epidemiological models with a view to applying them to the data used in the study. Doing so is, in fact, a highly delicate matter because of the fundamental difference between SHARE data and the data used in epidemiological research on long-term care, which are generally based on cohort data with long-term longitudinal follow-up. In other words, the authors can hardly be blamed for taking a pragmatic approach by adapting their method to the data used. This is all the more so since their aim is to account for the heterogeneity of risk with regard to the socio-economic characteristics of individuals, which is not always possible to do with the same degree of precision on cohort data, and even less so in a European perspective.

These methodological limitations, which are inherent to the data used, are not such as to fundamentally undermine the main findings of the study. Nevertheless, research of this kind would benefit from a more detailed modelling of the dynamics of long-term care, thereby allowing, by extension, for a more detailed needs assessment according to the stage of care reached.

Self-Insurance and LTC Risk Sharing

The study clearly highlights the fact that long-term care is a risk, in the sense that individuals will be affected to highly varying degrees whether the occurrence of the risk itself or the period of exposure to a disability status is considered. In other words, the variability of risk is sufficient to provide for risk sharing. While the message is not necessarily new, the translation of long-term care risk in terms of support needs and, ultimately, financial risk, as proposed by the authors, is particularly instructive. In other words, the study highlights the reality of the risk and the extent to which this reality applies to Europe as a whole, or at least to the countries included in the study.

Second, a key message of the paper is that the risk faced by a large proportion of the population is catastrophic in the sense that it exceeds the ability of the individuals in question to pay even when taking into account their financial and housing assets. From this point of view, LTC risk is no different from health risk. This is a key point of the paper. The financial risk associated with long-term care has sometimes been underestimated, either because it was assumed that it could be covered, at least in part, by relatives, or because it was thought that housing assets represented a sufficient source of financing to cover a significant portion of the risk.

First, the authors take the opposite view by considering financial risk independently of the informal care received, rightly assuming that informal care represents a resource that can sensibly be given a monetary value in the same way as professional care. The authors show that the second argument is only partly valid since just 49% of the European population studied and 58% of the French population cared for would be able to pay for their LTC needs by using all their assets. In other words, there is no escaping a form of sharing or socialisation of LTC risk if the aim is to provide sufficient coverage for the risk of being unable to perform the basic activities of daily living. This is, in my view, the main message of the paper. Once again, while it may not necessarily be a novel finding, the argument has great force, with the authors systematically considering the alternative of self-funded care by taking into account all the assets of dependent persons. The inability to pay for LTC needs is not limited to the poorest segment of the European population but to approximately half the population. A safety net reserved for the very poorest would then not be enough to provide sufficient coverage of LTC needs.

Of course, the finding may be tempered by considering that informal care is also a form of self-insurance that serves to reduce the cost of LTC as valued by the authors. The authors show, in this case, that 57% of the European population studied (68% in France) could pay for their LTC expenses. Of course, it should be kept in mind that the authors are approaching the matter from the standpoint of a radical scenario that leaves dependent persons with very limited means to live. In a less radical

scenario, the proportion of individuals who cannot pay for their LTC needs would be significantly greater even under the hypothesis that dependent persons rely on their ability to pay by resorting to informal care and by using their assets.

The results of European comparisons are more difficult to interpret. Variability across Europe does not appear to be a matter of risk alone, but also a matter of the cost of care and the importance of households' real estate assets. Therefore, the results relating to the proportion of households that would be able to pay for their LTC needs in different European countries are not immediately interpretable. In any event, the usual north-south gradient found in European comparisons, including on the LTC risk itself, does not apply. The reason is, first, that differences in the cost of care serve, in a sense, to offset household income differences and, second, that the proportion of homeowners able to draw on real estate is greater in southern countries. Of course, as noted by the authors at the end of the paper, the structure of housing assets cannot be considered as independent of the structure of social protection and, in particular, of the public policies aimed at dependent persons. The scenario studied by the authors, who do not consider any sources of financing other than those provided by the resources of the dependent person, seems somewhat artificial when examining the European comparisons. Undoubtedly, this does not detract from the value of the approach; but it suggests that more caution is needed in interpreting the comparisons presented in the paper.

Reverse Mortgages as a Medium for the Use of Real Estate

The question posed by the study is the ability of dependent individuals to self-insure when faced with the cost of LTC in the event of the occurrence of the risk. Here, the main contribution of the study consists in the systematic consideration of real estate as a source of financing for dependent persons. Doing so provides a very direct way of assessing the ability of households to pay for their LTC needs, showing, convincingly, that the resources of dependent persons who have no partner are barely sufficient to cover all such costs in half of all cases of persons with LTC needs.

To lend credibility to the scenario involving the use of real estate to pay for LTC needs, the authors consider the use of reverse mortgages to liquidate assets by making the funder assume the risk of long-term disability. The difficulty for such a market to expand significantly is well established, notably because of the very high interest rates prevailing in the market, which, by themselves, are enough to dissuade potential users. More fundamentally, we need to examine the role that paying for LTC through real estate can play in LTC financing systems as they currently stand in European countries and in France in particular.

In the case of France, public financing is concentrated on the poorest segment of the population even though the financing of LTC by the APA (*Allocation Personnalisée d'Autonomie*, or Personalised Autonomy Allowance) is universal in the sense that although the amount of assistance decreases with household income, all are eligible. It is important to recall that the APA is not recoverable from the estate and that the decision to exempt the APA from recovery from the estate at the time of death was adopted to avoid the low uptake found with the scheme that preceded the APA (the *Prestation Spécifique Dépendance*, or Specific Dependency Benefit). The aim was to avoid the risk of insufficient or unsuitable provision for dependent persons. In other words, the idea of drawing on the assets, and in particular the real estate, of dependent persons was set aside to protect such persons from inadequate provision.

From this point of view, the idea of using reverse mortgages may appear to be at odds with what we know about the behaviour of French families in relation to assets and property, since they are often very keen to protect the transfer of assets, sometimes beyond what is reasonable, i.e. potentially at the expense of the well-being of dependent persons.

Furthermore, and still in the case of France, for expenses not covered by the APA and exceeding the ability of the dependent person or of his or her household to pay, the mechanism of recovery on the estate, in particular for the ASH (*Aide Sociale à l'Hébergement*) a specific form of social assistance which funds the housing of persons in institutional care, is used by departments as a means of covering their expenses. In this case, real estate is implicitly mortgaged since it is used by the department at the time of inheritance up to the level of the expenses incurred by the department. In a way, French departments assume the role of mortgage issuers. However,

the mechanism involved is more complex than this since the department first turns to relatives of the dependent individual with a maintenance obligation before considering the individual's assets at the time of their death. This arrangement departs from an approach based on the deferred use of assets since there is currently no mechanism to regulate the contributions of those with a maintenance obligation based on the assets of the dependent person. A genuine mortgage-based approach should rectify this anomaly, the simplest option being to remove the principle of maintenance obligation to ensure that those with a maintenance obligation no longer perform the role of mortgage issuers, which is evidently a highly ineffective solution.

Admittedly, the case of France is specific and cannot be applied to all the European countries included in the study. Nevertheless, it raises questions about the role of reverse mortgages in how long-term care is financed in France and in Europe. The reverse mortgage market could be envisaged as an alternative mechanism to recovery on the estate that would be supervised and guaranteed by the state (in order to avoid prohibitive interest rates) and used to complete dedicated public financing or to finance existing services (such as the ASH in France).

Drawing on Assets is Not Necessarily Synonymous with Self-Insurance

It should be kept in mind that promoting a wider use of reverse mortgages is certainly not desirable without considering the risk that families may not resort sufficiently to such mortgages based on the needs of dependent persons. Without questioning the interest of the exercise proposed in the paper, it should not overshadow the drawbacks of using the assets of dependent persons to finance their care. First – and this is self-evident – such a method of financing implies opting out of risk-sharing. Yet, as the study clearly shows, long-term care constitutes a risk to which the population is exposed to highly varying degrees. Opting not to share the risk unquestionably leads to an *ex ante* loss of well-being. On the other hand, from the point of view of the transfer of assets, reverse mortgages are particularly unfair since it amounts to placing the burden of LTC risk on children whose parents cannot pay for their care. Given the correlation between the income of parents and the income of children (Gramain *et al.*, 2007), funding through reverse mortgages tends to reduce the assets of the poorest families to a greater extent than the assets of the wealthiest families.

The financial pressures on public spending and the difficulty of setting up an efficient long-term care insurance market are realities that may lead to considering the use of reverse mortgages, although it is important to remember that doing so is a last resort. However, this does not mean that household assets should not be used to finance long-term care. Other methods may be considered. In a recent study, Masson (2018) offered several scenarios aimed at basing deductions on household assets to better cover long-term care risk. The advantage of this kind of solution is that households are made to contribute independently of the occurrence of the risk, meaning that risk is shared, which, as noted above, is a condition for efficiency. It also ensures vertical fairness of financing by drawing on assets according to the amount of taxed property – in a logic of a vertical fairness.

As the authors of the article show, the private financing of long-term care risk – commonly known as self-insurance – cannot, in European countries, cover the risk for all persons in long-term care, far from it. From this point of view, the study is particularly informative and rich in content. It is also important to recall that the self-financing solution is in itself both inherently ineffective, in the sense that it implies opting out of risk-sharing, and unfair insofar as assets are made to contribute based on the ability of dependent individuals to pay for their care needs out of their income. □

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The Distributional Impact of Local Taxation on Households in France

Clément Carbonnier*

Abstract – The distributive profile of local taxation on households results from three main determinants: the tax base (the rental value of occupied or owned properties), the schedule (of exemptions and reductions) and the differences between local rates. The overall contribution of local household taxes to the progressivity of compulsory levies in France is measured and broken down into the three determinants based on the Insee survey on income and living conditions (*Statistiques sur les ressources et conditions de vie*, or SRCV) at household level and comprehensive databases at the local authority level. The tax base has a regressive effect, partially offset by the schedule. Local taxes and average income increase with the size of inter-municipalities: territorial heterogeneity is thus characterised by levels of local tax per capita that tend to increase with per capita income. However, this increase is less than proportional to that of income, generating a ratio of local taxes to income that decreases with the level of average income in the inter-municipal area.

JEL Classification: H71, H73, H23
Keywords: housing tax, property tax, redistribution

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During the 2017 French presidential campaign, the successful candidate made a commitment to exempting 80% of households from the housing tax, a local levy based on the rental value of occupied properties. The argument put forward by the campaign team was based on the regressive nature of the tax, which was seen as involving higher levies in poorer municipalities compared to affluent municipalities.[1]

The purpose of this paper is to measure the distributional impact of local taxes – specifically, housing tax and property tax – on households in France and to understand the determinants of their distributional impact. The distributional impact of a tax is measured by the distribution of the effort ratios for that tax – i.e. the amount paid relative to income – along the scale of living standards: the tax is progressive if the ratio increases with the standard of living and regressive if it decreases. Redistribution must be measured at the overall level of the tax and transfer system, the distributive profile of a tax being only its contribution to the general redistribution. It is not necessary for each individual tax to be redistributive, and indeed some may have other aims – such as the financial autonomy of local authorities and significant taxing powers at low economic cost – and their regressive aspect may be offset by other taxes or by the redistribution generated by the public spending they enable (Guillaud *et al.*, 2017).

The determinants of the distributional impact of a local tax can be of three kinds: the base, the schedule and the geographical variability of rates. In the case of France, the local taxation base governing levies on households is, in the case of housing tax, the rental value of the property occupied by households and, in the case of property tax, the rental value of the property they own. Local taxation on owned property is a common source of funding for local authorities internationally[2] and findings relating to the distributional impact of this type of base in France may apply more generally. While housing is typically considered to be a primary good, the consumption of which increases less quickly than income – which should lead to a regressive impact on the housing tax base – the impact of the property tax base is less clear cut since it is governed by two opposite effects: a home-ownership rate (the proportion of owner-occupiers) that increases with income, but owned property values that increase less quickly than income.

The second determinant is the schedule. Both taxes are essentially flat-rate taxes, but with exemptions and reductions based on income and household composition. Therefore, their schedules are constructed with the aim of achieving a progressive impact. The third determinant is the disparity in tax rates across the national territory and its correlation with the geographical distribution of household income. This question also extends beyond the borders of France and applies to all countries where local authorities enjoy fiscal autonomy: a correlation is typically found between local revenues and the funding needs of local authorities, meaning that the geography of local taxes has a distributional effect (Figure I). For example, Lewis (2001) and Zhao & Hou (2008) examined the case of consumption taxes in the United States, while Zhao (2009) complemented these studies by comparing the cases of China and the United States.

To measure the distributional impact of French local taxes and decompose their main determinants, this study draws on three databases. First, the survey on Households resources and living conditions (*Statistiques sur les ressources et conditions de vie,* SRCV*)* conducted by Insee at a household level is used to measure the overall distributive profile. For the sample of households, the impact of tax bases – the rental value of occupied properties and the proportion of owner-occupiers – can be determined, as can the impact of exemptions and reductions linked to family composition. However, because of the number of observations, the territorial division remains at a relatively aggregated level. The survey is used as a means of measuring the overall impact of the two taxes, these being slightly regressive, mainly on account of the low tax effort ratios of the top decile of the distribution of living standards. This is a consequence of the regressive impact of the tax bases, partially offset by the progressive impact of exemptions and reductions. For a given standard of living, the housing tax effort ratio increases with the size of the urban unit, while the property tax ratio

1. "Therefore, it is a regressive tax that generates further tax injustice. The housing tax also reinforces territorial inequalities. Taxpayers often pay far more if they live in a poor municipality than in an affluent municipality." *(En Marche, 2017). The exemption was enacted in stages by the Finance Act for 2018 No. 2017-1837 of 30 December 2017, with an initial reduction of 30% in 2018 followed by a 65% reduction in 2019 and, finally, a complete exemption from 2020 for households in the eight lowest deciles of the income distribution [https://www.impots.gouv.fr/portail/particulier/questions/suis-je-concerne-par-la-reforme-de-la-taxe-dhabitation].*

2. Similar taxes are levied in Germany, the United Kingdom, Sweden and Belgium.

is flat. For a given standard of living and size of urban unit, the effort ratios for both taxes are higher for households without children than for households with children.

To determine the impact of geographical disparities more specifically, two comprehensive databases at the local authority level are used. These two databases, produced by the General Directorate of Public Finance (in French, the *Direction Générale des Finances Publiques*, or DGFiP), aggregate data from household income tax returns on the one hand and data from local budgets on the other hand at the level of each local authority. The analysis is conducted at the level of "municipal blocks", i.e. the fiscal consolidation of municipalities and inter-municipalities. The evidence suggests that both public expenditure and local taxes per capita increase with the size of the municipal block. They also increase with average per capita income, but only because of the positive correlation between average income and the size of the municipal block. However, the growth in taxes per capita in line with income is relatively limited while the tax effort ratio follows a downward trend, underlining the slightly regressive contribution of local tax disparities.

The remainder of the paper is structured as follows. Section one presents the theoretical arguments explaining the distributive profile of property tax and housing tax. The databases used are then presented in a second section. The third section uses household-level survey data to measure the overall distributive profile and determine the contribution of the base and of exemptions and reductions. Section four uses data at the local authority level to document the impact of geographical disparities. The last section concludes and discusses the implications of the results.

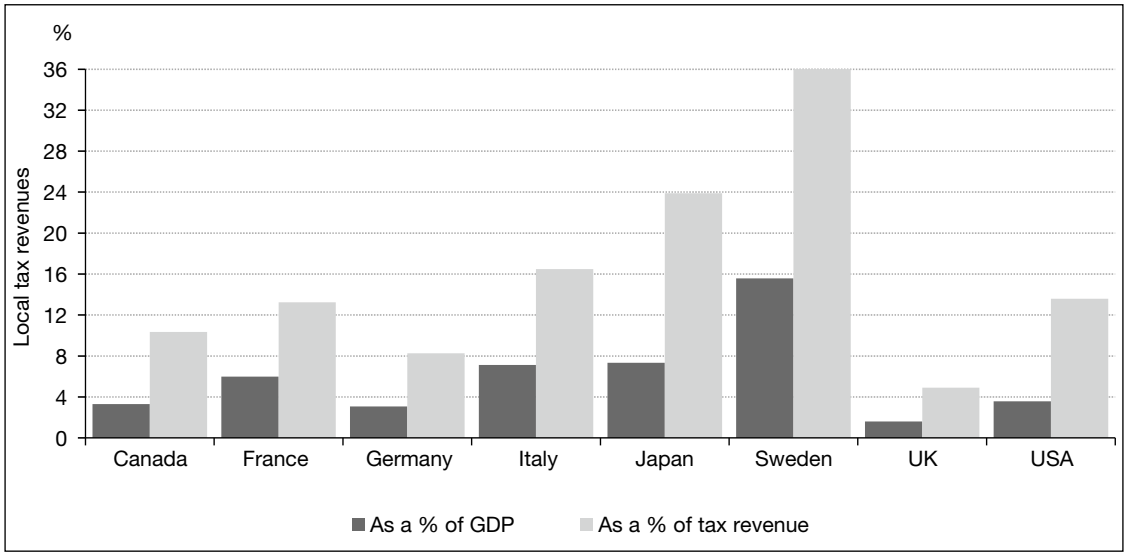
Theoretical Arguments on the Distributive Profiles of Local Taxes

The distributive profile of local taxes depends on three main determinants: 1) the tax base; 2) the schedule; 3) territorial disparities in the tax burden.

The Property and Housing Tax Base

When the base is not directly household income – as is the case in Switzerland – it can have a distributional impact depending on the correlation between the distribution of the base and the distribution of living standards. In France, as in many other countries, local household taxes are tied to property – in this case, to the rental value of properties, i.e. occupied properties in the case of housing tax and owned properties in the case of property tax.

Figure I
Local Levies in OECD countries, 2016



Coverage: Taxes levied to fund municipalities, inter-municipalities and counties (not *departments*, regions, provinces or states).
Sources: OECD, Revenue Statistics - Comparative tables.

The housing tax base increases with the taxpayers' standard of living, albeit at a lower rate than their income. Wealthier households live in more expensive properties, but the differences in rental values are smaller than the differences in income: the income elasticity of housing expenditure is positive but lower than the unit. Thus, the housing tax effort ratio – the housing expenditure-to-income ratio – decreases with the standard of living (Pirus, 2011 and Figure II-B), hence the regressive impact of the housing tax base.

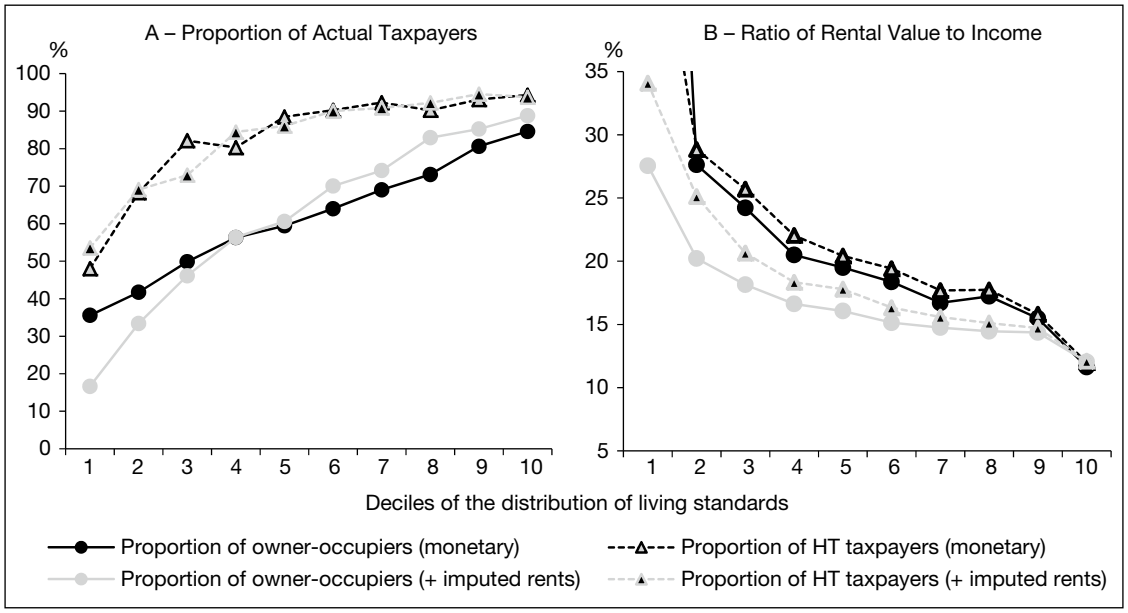
The case of property tax is markedly different since the base is the rental value of owned (rather than occupied) properties. In addition to the growth in property values in line with income, the growth in the proportion of households that own their property also needs to be considered (Figure II-A). However, the homeownership rate is not negligible even at the bottom of the distribution of living standards: one-third of households in the bottom decile and more than half from the fourth decile upwards own the property they occupy. In other words, there are two opposing effects: the decline in the value of owned property in proportion to income (among owner-occupiers, Figure II-B) and the increase in the proportion of owner-occupiers (homeownership rate).

In addition, property taxes apply not only to primary residences but also to secondary residences and rented properties. However, the effect remains limited since, for the nine lowest deciles of the distribution of living standards, 93% of the net value of owned properties was occupied by their owner in 2014 and made up more than two-thirds of the owner's assets (Garbinti *et al.*, 2016). The situation is different for the top decile, where ownership of rental property is more common but where property represents a far smaller proportion of total assets: one third for the top decile as a whole, one fifth for the top percentile and 12% for the top tenth of the top percentile. The wealthiest households mainly own movable property. Therefore, this paper does not examine the taxation of the estate as a whole (total assets), focusing instead on the primary residence.

Property and Housing Tax Schedules

The second determinant – the schedule – mainly consists of a single rate set at a local

Figure II
Parameters of Local Tax Bases According to Standard of Living



Note: In order to show all the graphs in the same scale and keep the curves visible, the values of the ratio (without imputed rents) for decile 1 are not represented in graph B for owner-occupiers and HT taxpayers; they are, respectively, 99% and 53%.
Coverage: Metropolitan France.
Sources: SRCV 2014.

level and exemptions and reductions set at the national level. In the case of housing tax, until the last reform exempting the least affluent households, a deduction was applied to the base based on the number of dependent children (10% of the average rental value in the municipality for each of the first two children and 15% for the following children). The elderly and the disabled were exempted from property tax and housing tax if the previous year's taxable income was below a given ceiling (€10,686 for a single person and €16,392 for a couple[3]). Other households could benefit from a housing tax ceiling equal to 3.44% of the previous year's taxable income if the latter was below a given ceiling (€25,130 for a single person and €36,872 for a couple plus €4,621 per dependent child). The effect of these schedules was to redistribute the income of middle- and high-income households towards low-income households and large families. In 2014, 82.7% of households were subject to housing tax and 56.9% to property tax. The latter figure is relatively close to the proportion of owner-occupiers since very few households are exempted: even in the lowest decile of the distribution of monetary living standards, the property tax exemption applies to just 5.8% of households (and just 2.0% of the lowest decile of the distribution of living standards including imputed rents), corresponding to 16.3% of owner-occupiers in this decile (12.2% including imputed rents).

Disparities in Local Tax Rates

The third determinant involves the possible territorial correlation between per capita income and the level of local taxes. The correlation may be due to a commitment to redistribution through grants to local authorities (mainly the General Operating Grant, known in French as the *dotation globale de fonctionnement*, or DGF) or to a correlation between local public expenditure and per capita income. Some inter-municipalities also operate on the basis of an equalisation between their municipalities through the Community Solidarity Grant (in French, the *dotation de solidarité communautaire*, or DSC), although local transfers remain limited relative to the equalising power of national grants (Frinault & Reigner, 2010; Reigner *et al.*, 2010).[4]

As for the possible correlation between local public spending and per capita income, the literature provides several explanations. The first goes back to Tiebout's (1956) seminal contribution on voting with the feet. Since then, research has shown that differences in preferences for local public goods can lead to economic segregation if marginal rates of substitution between public and private goods are ordered according to income (Westhoff, 1977; Gravel & Thoron, 2007). Segregation is exacerbated when endogenous variations in land prices are taken into account, without changing conditions (Rose-Ackerman, 1979; Calabrese *et al.*, 2006). Such segregation leads to a variation in local taxes directly dependent on per capita income and may be positive or negative depending on the sign of the correlation between income and the marginal rate of substitution between public and private goods: wealthier households may be more willing to pay for public goods than less wealthy households because they are able to acquire enough private goods and use local amenities; conversely, they may be less willing to pay because they prefer private substitutes to local public goods, viewed as being better suited to their individual preferences.

A direct link between local taxes and income may also arise from the need for large social budgets in municipalities with larger shares of poor households. Furthermore, the cause of segregation may be more related to socio-professional characteristics than to preferences in the territorial distribution of productive activities (Berry & Glaeser, 2005; Wheeler, 2005): if firms benefit from productivity gains related to sectoral agglomeration, geographical segregation may arise on the basis of the skill profiles of the labour force required by different industries. This can impact not only on average household income but also on local public spending since the latter represents both amenities for households and public factors for private production. This type of explanation is consistent with the main results of the geographical economy: two relationships exist in parallel, the first between agglomeration and productivity (and therefore per capita income), the second between agglomeration and local public investment needs, particularly to combat congestion (Ciccone, 2002; Martin *et al.*, 2011; Duranton & Puga, 2014).

3. These are the applicable ceilings for the 2014 housing tax; see https://www.impots.gouv.fr/portail/questions/theme/taxe-habitation/87

4. The empirical analysis focuses on municipal blocks (the fiscal consolidation of municipalities and inter-municipalities), thereby neutralising the DSCs: only government grants are considered.

The "zoo" effect (Oates, 1988) may also account for the correlation indirectly. The idea is that larger local authorities can offer their citizens the same public goods as smaller authorities and in greater quantities, but they can also offer new kinds of public goods (such as a zoo): the provision of public goods increases with size in the intensive and extensive margins. This was first observed by Schmandt & Stephens (1960) in the case of municipalities in Milwaukee County and, more recently, in France by Frère *et al.* (2011). In addition, the growth in local public expenditure per capita with population size – whether due to the zoo effect or congestion – can, in practice, be financed because of the decrease in the effects of local tax competition in line with the size of the regional authority (Carbonnier, 2013; Frère *et al*., 2014; Breuillé *et al*., 2018).

The different theoretical explanations presented in this section have different potential effects in terms of the distributive profile of local taxes. The empirical analyses in the remainder of the paper aim to document the correlation between local taxes and income with a view to testing the applicability of the different theoretical explanations to the case of France.

Data and Descriptive Statistics

To conduct the empirical analysis, two types of databases are used. The SRCV survey documents resources and transfers for a sample of households. Furthermore, databases at a local authority level ("Local authority accounting" and "Municipal income tax" – in French, *Impôt sur le revenu des communes*, or IrCom) are exhaustive and accurate from a geographical point of view, although the data are aggregated at a municipal level and conceal infra-municipal disparities. The focus of the analysis is the 2014 iteration, the most recent iteration common to all bases.

The SRCV survey provides information on local income and taxes paid by a sample of households, the characteristics of which are known in terms of family composition, homeownership and location (Box). The database also contains the rental value of the property, allowing for income and standard of living including imputed rents to be calculated.[5]

5. The equivalence scale used is the scale commonly used by Insee, the OECD-modified equivalence scale recommended by Eurostat: 1 for the first adult and 0.5 for any additional individuals if they are aged over 14 and 0.3 if they are aged under 14. http://www.insee.fr/en/methodes/default.asp?page=definitions/unit-consumption.htm

Box – **The SRCV Survey**

The SRCV survey is a face-to-face survey conducted every year by Insee among approximately 11,000 households. The survey collects information on material living conditions (income and transfers, dwelling size and associated expenditure) as well as the surveyed households' subjective perceptions of their standard of living. Most of the income and social transfer variables are matched with administrative sources.

A disposable income variable consisting of all declared income is thus constructed, including capital gains and allowances, from which direct taxes (including social contributions but excluding consumption taxes) are deducted. Based on this variable (referred to hereinafter as disposable monetary income), we calculate disposable income including imputed rent, which measures the benefit derived from a property below fair market value. Imputed rents are calculated on the basis of the rental value of occupied properties, estimated by Insee using hedonic regressions on an external source: the Housing survey[(a)]. For homeowners or households housed below fair market value (mainly social housing), the difference between housing costs and property rental value is added as income in kind. The costs taken into account for owner-occupiers include the interest on loans taken out to purchase the property but not the repayment of the principal. This is because such repayment increases the net wealth of the household, meaning that it is not a cost but a saving.

The principle of taking imputed rent into account has long been advocated in the literature, for both national accounts (Eisner, 1988) – which is now the case in most developed countries – and measuring income distributions (Yates, 1994). Homeownership is very strongly related to inequalities in living standards (Bonnet *et al.*, 2018; Carbonnier, 2015, 2017, 2018). The key idea is that a household's disposable income is the sum of its consumption and the increase in its net wealth. Thus, the consumption of services in one's own property is income in kind, from which financial costs must be subtracted. Similarly, the rental value of properties for households housed free of charge (or the difference with the rent for households benefiting from low-rent housing) must be added to income to properly measure the standard of living.

(a) http://www.insee.fr/en/methodes/default.asp?page=definitions/enquete-logement.htm

Income including imputed rent can be calculated using the SRCV survey but not with databases at the local authority level. As such, analyses based on data from local authorities only consider monetary income and analyses based on household data compare results for monetary income or including imputed rents. The two income measures (monetary or including imputed rent, respectively) are used to calculate the effort ratios for local taxes, which correspond to the payment of tax relative to income (monetary or including imputed rent, respectively).

Two important clarifications need to be made about the local tax measures used in the analysis at the household level. First, the amounts are derived from administrative data for housing tax but are reported by the households surveyed for property tax. Second, the amounts relate only to taxes paid in respect of the primary residence. Since primary residences account for the vast bulk of the housing stock, the weighted sums of taxes measured in the survey correspond to 89.4% of the amounts collected in housing tax and 88.6% of the amounts collected in property tax as measured in the national accounts.

Finally, the size of the urban unit[6] of residence is taken into account based on five categories: rural municipality (less than 2,000 inhabitants), small unit (2,000 - 19,999 inhabitants), medium unit (20,000 - 99,999 inhabitants), large unit (more than 100,000 inhabitants excluding Paris – the largest being Lyon with 1,620,331 inhabitants in 2014) and Paris (10,659,489 inhabitants in 2014).

Local Authority Data

Two administrative databases are used. The "Local Authority Accounting" database (in French, *Comptabilité des collectivités locales*) collates the local budgets filed by the DGFiP on a dedicated website.[7] For each level of local government, the aggregate values of the different categories of expenditure (personnel, investment, purchases, financial costs, etc.) and revenue (grants and different local taxes) as well as debt levels and flows are reported. The "Municipal Income Tax" (or IrCom) database is built by the DGFiP by aggregating tax return data at the municipal level. The database contains the number of tax households and households, as well as the breakdown of local populations by declared income segments. It also includes the sum of income declared by households in the municipality and their breakdown into wages, pensions, capital income and social transfers.

Since the revenue and expenditure of the two most decentralized levels are closely linked, the budgets of municipalities and inter-municipalities are consolidated; the territorial level examined here is precisely the resulting consolidation, termed "municipal block". The fifty municipalities (including Paris) that did not belong to any inter-municipality in 2014 are considered to be standalone municipal blocks. The two administrative databases are matched at the municipal block level. Local taxes are calculated in terms of per capita revenue but also in proportion to the total income of households across the municipal block. The ratio of local taxes to income is interpreted as a proxy for the local average tax effort ratio, although it differs from the effort ratios actually calculated in the analysis at the household level. For housing tax, variables at the municipal block level include taxes on second homes (potentially paid by households in other municipalities) and the proportion of tax reductions offset by the national budget (not paid by municipal block households). For these reasons, the housing tax data from these databases exceed the national accounts by 15.0%. For property tax, the difference with the national accounts is significantly smaller: the sum of the property taxes recorded in the base represents 97.9% of the total revenue.

Despite these weaknesses, the analysis at the municipal block level complements and explains the results at the household level. Although a portion of the measured taxes is paid by households residing outside the municipal block, the proportion relative to the total is very low. In addition, examining local tax levels in relation to the socio-demographic characteristics of municipal blocks – in terms of size, per capita income, local business tax base and grants – allows for the territorial effects that appear in the household analysis to be documented. They also provide empirical

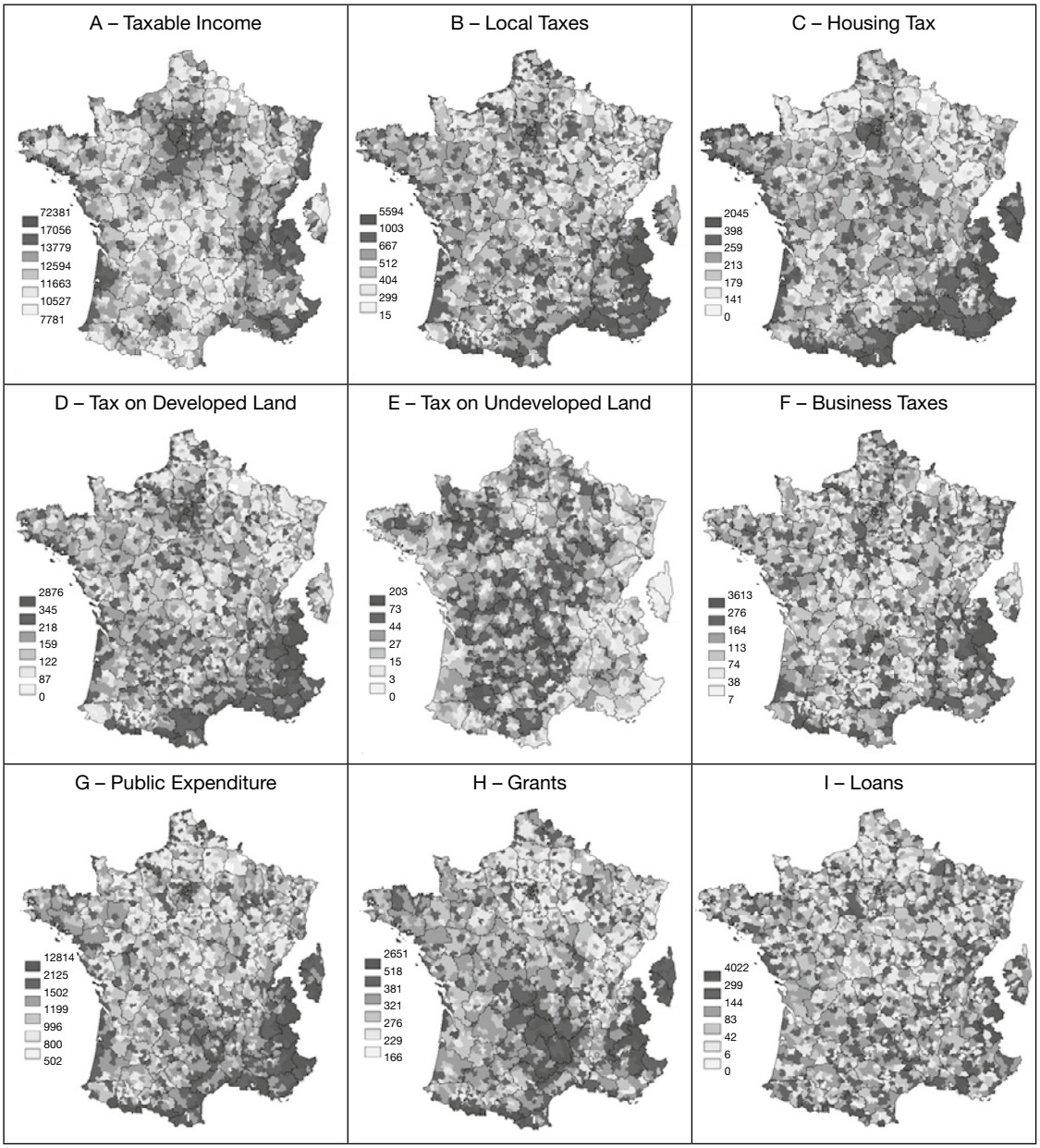
6. Urban units are determined by Insee according to the continuity of built-up land: properties situated less than 200 metres apart are considered to be part of the same urban unit. http://www.insee.fr/en/methodes/default.asp?page=definitions/unite-urbaine.htm

7. For the year 2014, four inter-municipalities are not included in the database because of changes in their composition: the CC (Community of Communes) of the Pays Rethelois, the CA (Conurbation Community) of Charleville-Mézières-Sedan, the CA of Colmar and the CC of Vinça-Canigou. These make up 0.4% of the population of France.

insight into the respective contributions of the theoretical determinants presented in the previous section.

Figure III shows the distribution of household income and the different characteristics of local governments at the municipal block level. The west of the Paris region, the Côte-d'Azur and the south Atlantic coast, as well as the German and Swiss borders, appear to be the most affluent regions. The major urban agglomerations also stand out (the rest of the Paris agglomeration, Caen, Rennes, Nantes, Bordeaux, Pau, Toulouse, Montpellier, Aix-en-Provence, Grenoble, Lyon, Clermont-Ferrand and Dijon). The two notable exceptions are Marseille and Douai-Lens. By contrast, rural areas are found to be less affluent than the rest of France.

Figure III
Maps of Local Authority Public Accounts in 2014



Notes: Values in euros per capita. Business taxes include corporate property tax (in French, *contribution foncière des entreprises*, or CFE), business value-added tax (*cotisation sur la valeur ajoutée des entreprises*, or CVAE) and the flat-rate tax on network companies (*imposition forfaitaire sur les entreprises de réseaux*, or IFER). These three taxes, along with property tax and housing tax, account for 98.3% of local taxes, the remainder being made up of a large number of very small taxes.
Coverage: Municipal blocks in metropolitan France.
Sources: DGFiP 2014.

The map of local taxes differs from the income map: the area of the Paris region with a high level of local taxes per capita is more concentrated towards the centre than the high-income area; the Alpine and Pyrenean regions levy high local taxes, as does the entire Mediterranean region – and not only the Côte-d'Azur. The distributions of property and housing tax are very similar to those of all local taxes, but differ significantly from the distribution of the tax on undeveloped land, which is highly concentrated in rural areas.

Despite very different profiles for grants, the tax and spending maps are largely similar. Grants are high in mountainous regions but do not offset the very high level of local public spending, and these regions levy large amounts of local taxes per capita.[8] However, the impact of grants is visible in large urban areas with poor households, such as Lille and Marseille. Both metropolitan areas have some of the highest levels of local public expenditure but relatively low local taxes.

There also appears to be a link between income distribution and urban density. Figure IV directly illustrates the existence of this link. The municipal blocks are arranged into 21 groups: Paris is isolated while the others are ordered according to the number of inhabitants and grouped to ensure each group has the same number of inhabitants.

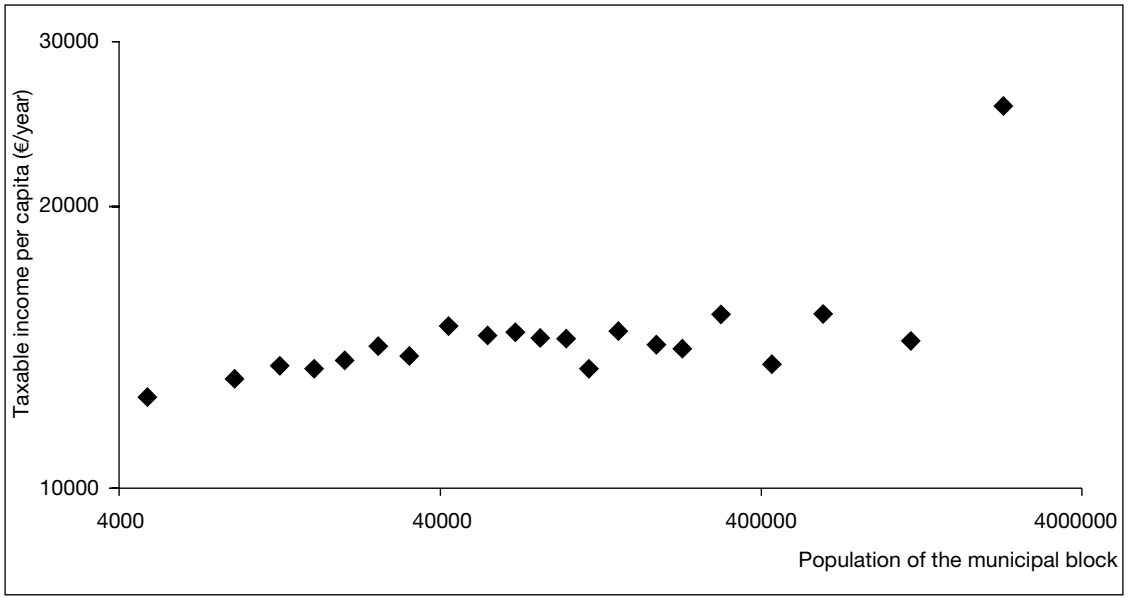
This figure only partially confirms the correlation. The relationship between municipal block size and per capita income is clearly stronger in the case of the smallest municipal blocks – i.e. up to 50,000 inhabitants – representing 40% of the population: the annual taxable income per capita increases from €12,500 to €15,000. The larger municipal blocks – representing 60% of the French population – show a per capita income of €15,000 (excluding Paris, which is both far more populous and much more affluent). However, although the largest agglomerations have the highest income levels, they are also where the greatest inequalities are found (Garnier & Kaldi, 2017).

Measuring the Distributive Profile of Local Taxes at the Household Level

In this section, the SRCV data are used to understand the distributive profile of local

8. *However, the perimeter of high local tax levels in the Massif Central is more concentrated around the Cantal* department *than the perimeter of high local public spending and grants.*

Figure IV
Correlation Between Municipal Block Population Size and Per Capita Income



Notes: The values are the averages for 21 groups of municipal blocks: Paris on the far right and 20 groups of the remaining municipal blocks ordered by size, ensuring that the total population is the same in each group.
Coverage: Municipal blocks in metropolitan France.
Sources: DGFiP 2014.

taxes and to break it down into its main determinants. The next section focuses more specifically on documenting the geographical determinant using the databases at the inter-municipal level.

Decomposition of the Distributive Profile of Local Taxes

The first step involves assessing the average effort ratio for property tax and housing tax for each standard-of-living decile (Figure V). In practice, the effort ratio is regressed on a set of decile indicator variables, with the top decile as a reference. This "gross" profile is represented by the "All households" curve in Figure V. For each tax, two specifications are implemented according to the measure (monetary or including imputed rent) of the standard of living.

Housing tax is found to be generally regressive: the parameters of each decile are positive and significant, meaning that the upper decile has a lower average effort ratio than the rest of the distribution of living standards. On the other hand, the effort ratio is relatively stable between the other nine deciles, very flat between the fifth and ninth deciles and higher for the three lowest deciles. The regressive profile is reduced but remains when imputed rents are taken into account.

To test the distributional effect of housing tax exemption, a similar regression is estimated solely on actual taxpayers (grey curve with black round dots). The regressive profile is clearly amplified, especially at the bottom of the distribution: the effort ratio for non-exempt households is very high and follows a downward trend from deciles one to four and stable from deciles four to nine before falling in the top decile. Here too the profile is robust to the measure of living standards. The increase in regressivity when taking into account actual taxpayers only reflects the progressive impact of housing tax exemptions. In what follows, further estimates are carried out by successively adding controls for household composition (cf. Figure V) and the size of the urban unit of residence. None of these additions substantially alter the profile of the curves, underlining the limited impact of these characteristics on the distributive profile of housing tax. Lastly, a final set of estimates is provided by adding a control for the rental value of the property relative to household income.[9] The effect is that the distributive profile is radically transformed for monetary living standards but not for living standards with imputed rents. In the case of monetary income, the profile becomes flat: the regressive nature of housing tax between actual taxpayers is entirely due to differences in effort ratios for housing.

To summarize the results, the distributive profile of housing tax relative to monetary living standards is slightly regressive due to the very regressive impact of the base – the rental value of the property – partially offset by the progressive impact of exemptions. However, the inclusion of imputed rents yields a different picture. The generally slightly regressive profile is maintained, as is the progressive impact of exemptions, but the latter appears to offset not the effect of the base but the residual distributive profile – possibly because of a link with local rate differences. One possible explanation is that most households – and even more so actual taxpayers – are homeowners: for them, the effort ratio for housing includes the rental value in both the numerator (housing value) and the denominator (imputed rent), which reduces the correlation with the housing tax effort ratio. On the other hand, the significant differences in rental values and homeownership rates between local areas – and, consequently, the significant disparities in living standards including imputed rents – can help to explain the residual regressive profile of housing tax linked to geography.

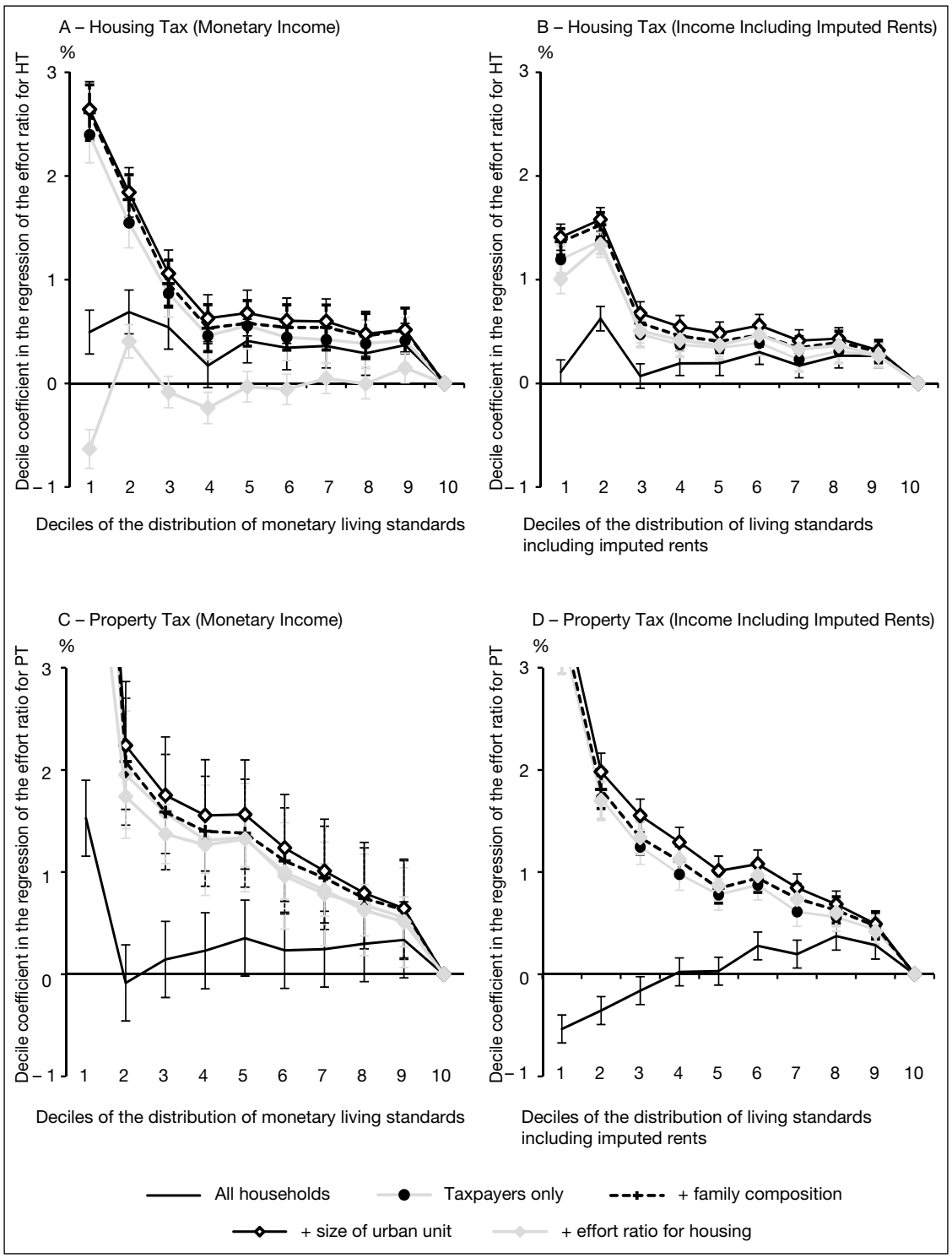
The case of property tax is different. The overall distributive profile is not independent of the measurement of living standards. The effort ratios of deciles two to nine of the distribution of monetary living standards are not significantly different from the effort ratio of the top decile because of large standard deviations, while the effort ratio is significantly higher for the bottom decile. By contrast, the effort ratio increases significantly along the distribution of living standards including imputed rents of deciles one to eight before decreasing significantly for the two highest deciles.

The results of the estimations on actual taxpayers[10] are indifferent to the inclusion of control and the measurement of living

9. Rental value is the value of rent for tenants at fair market value, imputed rent for owner-occupiers and the sum of the actual and imputed rents for tenants below fair market value.

10. This study only considers property tax on the primary residence, meaning that actual taxpayers are non-exempt owner-occupiers.

Figure V
Distributive Profile of Property Tax and Housing Tax



Notes: Coefficients of the regression of the effort ratio for local taxes on the indicator variables of the deciles of the distribution of living standards (decile 10 as a reference), the error bars indicate the 95% confidence intervals: black diamonds, all households without control; dark diamonds bordered with light shade, only taxpayers without controls; crosses and dotted lines, only taxpayers with controls for family composition; light diamonds bordered with dark shade, only taxpayers with controls for family composition and urban unit size; light grey diamonds, only taxpayers with controls for family composition, urban unit size and effort ratio for housing. To present all the results with the same scale, the coefficient values for decile 1 in graphs C and D are only represented for all households and without controls.
Coverage: Households in metropolitan France.
Sources: SRCV 2014.

standards, giving a strongly regressive profile.[11] Of course, this does not mean that property tax amounts decrease with the standard of living of homeowners, but that property tax increases at a slower rate than taxpayer income, leading to a decrease in the effort ratio in line with the standard of living of taxpayers.

The Impact of the Occupancy Status of the Property

The distributive profile of property tax is the result of the regressive profile between actual taxpayers and the proportion of actual taxpayers per decile. The proportion of actual taxpayers – which is very close to the proportion of owner-occupiers[12] – is linked to the difference between monetary living standards and including imputed rents. This explains the difference between the two distributive profiles of property tax and the fact that it is observed mainly at the bottom of the distributions: since monetary income is low at the bottom, potential imputed rents can represent a significant proportion of total income.

As shown in Figure II, the homeownership rate is low in the bottom decile of the distribution of living standards including imputed rents (one sixth) but is not negligible in the bottom decile of the distribution of monetary living standards (one third). This explains why the average cost rate for property tax is so high for the bottom decile of the distribution of monetary living standards and why it is low for the bottom decile of the distribution of living standards including imputed rents. The occupancy status of the property may also be important for the distributive profile of housing tax – even if the profiles with and without imputed rents are similar. To test this factor, Figure VI shows a direct comparison of housing tax effort ratios for tenants and owner-occupiers.

The differences between tenants and owners are limited and non-significant. The curve profiles in Figure VI are similar to those in Figure V regardless of the occupancy status of the property. In fact, a difference is found in the lower decile of the distribution of monetary living standards. Since it applies equally to all households and to actual taxpayers only, the difference is not due to a different exemption rate between tenants and owners, but probably to differences in the rental value of properties rented or owned by households in the lower decile. However, the general results presented above remain valid regardless of the occupancy status of the property.

Other Determinants of the Local Tax Effort Ratio

Adding control variables to the regressions presented above does not alter the distributive profiles of local taxes. For local taxes, this does not mean that these household characteristics have no impact on their effort ratios, but only that the impact is the same for households in different deciles. Figure VII presents the coefficients estimated for family composition and the size of the urban units in the regressions of the local tax effort ratio with all control variables. Therefore, the coefficients measure the impact of these determinants *ceteris paribus*, in particular at a given standard of living.

The results do not depend on whether exempt households or imputed rents are included, indicating that neither the proportion of households exempt from housing tax nor the proportion of owner-occupiers significantly influences the effort ratio differences according to family composition and the size of the urban unit. By contrast, the results for property and housing tax differ significantly. The effort ratio for housing tax increases significantly and continuously with the size of the urban unit, unlike property tax.

The profiles according to family composition are similar: for both singles and couples, effort ratios are higher for families without children than for those with children. This can be partly explained by an age composition effect: older households living in larger properties no longer have dependent children. However, the cases of singles and couples are not identical. First, with the same number of children, singles have a higher effort ratio for housing tax but a lower ratio for property tax compared to couples. Moreover, while no differences are found between couples with one or two children and those with more than three children with regard to property tax, large families appear to benefit from a lower effort ratio for housing tax. This is because base reductions

11. To compare the distributive profiles and provide a clear view of the variations between deciles two to ten, the y-axis is the same for all the graphs, ranging from -1% to 3%: the coefficients of the effort ratio for property tax for actual taxpayers are not represented for the bottom decile since they exceed 3%; they stand at 3.5% when including imputed rents and at 7% otherwise.

12. Exemptions exist, but only for very poor households and the disabled.

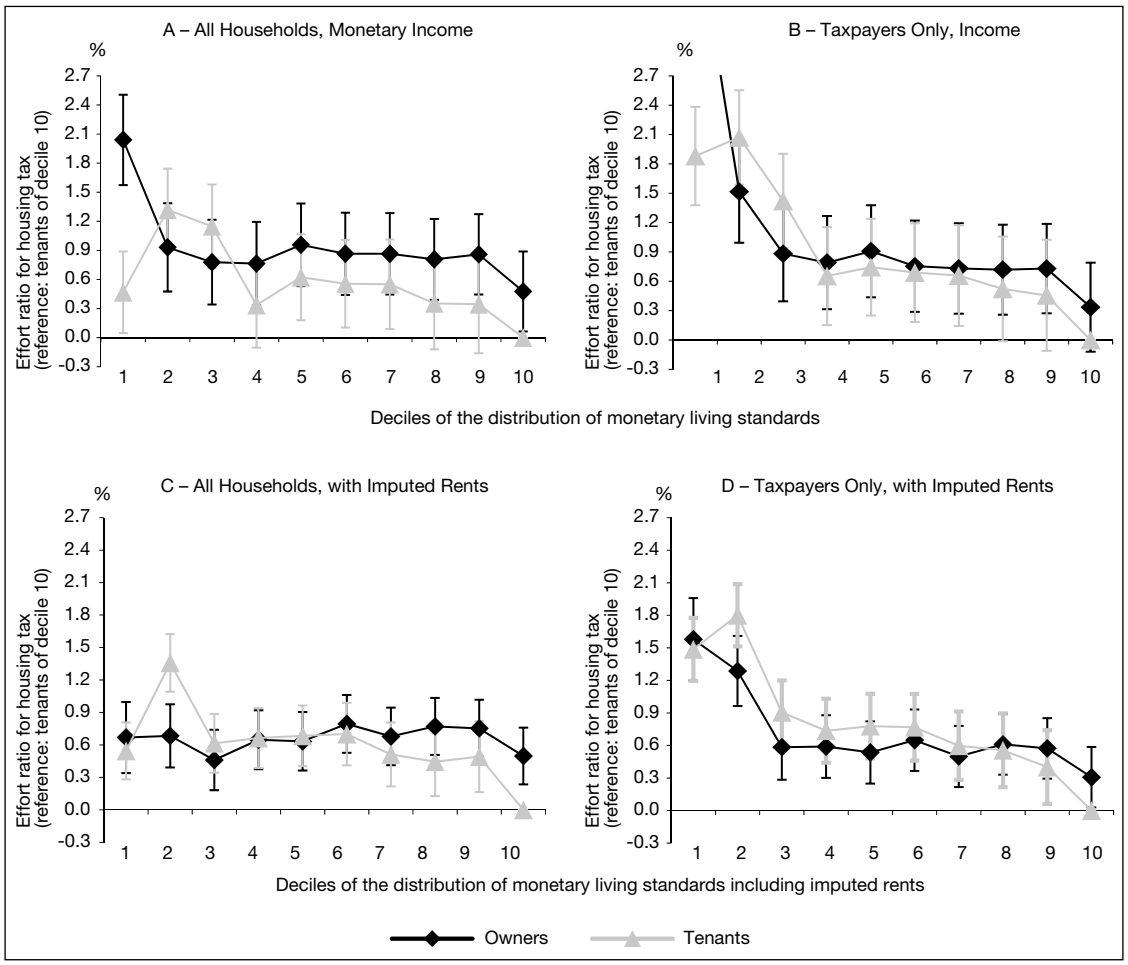
per dependent child exist for housing tax but not for property tax.

Rate Disparities and the Distributive Profile of Local Taxes

The analysis conducted so far at the household level does not point to a distributional impact of rate disparities between different areas according to the degree of urbanisation. However, the increase in the effort ratio in line with the size of the urban unit of residence is significant in the case of housing tax (but not in the case of property tax). Figure IV shows a positive correlation between municipal block size and per capita income. Several theoretical explanations have been proposed pointing to a territorial correlation between local taxes and per capita income, including preferences for public goods that vary with income and a double correlation between, on the one hand, municipal block size and per capita income and, on the other, between municipal block size and local public spending (due to the zoo effect or to fight congestion). The commitment to equalisation through grants to local authorities can also have an influence.

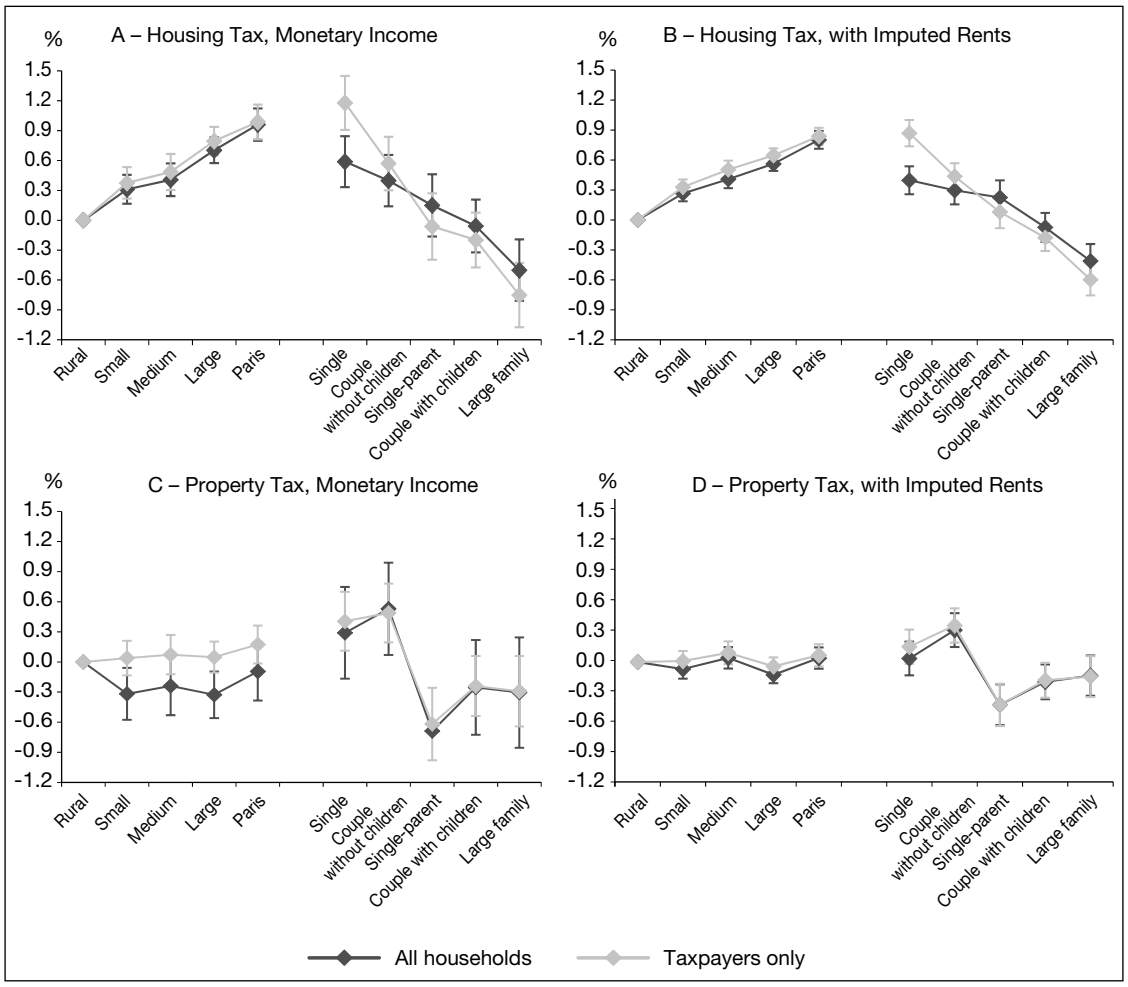
To test these theoretical hypotheses, databases will now be used at the municipal block level to compare average income with local authority budgets. The data on local taxes differ slightly from those used previously in that they relate to all actual revenue and not only to revenue levied on primary residences. However, it was

Figure VI
Distributive Profile of Housing Tax According to the Occupancy Status of the Property



Notes: Coefficients of the regression of the effort ratio for housing tax on the cross-tabulation of the indicator variables of the deciles of the distribution of living standards with the indicator variables of property occupancy status (decile 10 of tenants as reference), the error bars indicate the 95% confidence intervals. In order to show all the graphs in the same scale and to keep the curves of graph B visible, the effort ratio is not represented for decile 1 (4.3%).
Coverage: Households in metropolitan France.
Sources: SRCV 2014.

Figure VII
Determinants of the Effort Ratio for Property Tax and Housing Tax



Notes: Coefficients of the regression of the effort ratio for local taxes on the cross-tabulation of the urban unit size and family composition indicator variables, with control, for the income decile, of the deciles of the distribution of living standards, the error bars indicate the 95% confidence intervals.
Coverage: Households in metropolitan France.
Sources: SRCV 2014.

shown above that local taxes related to the primary residence account for the vast bulk of actual revenue, meaning that the vast bulk of local authority revenue levied on households is actually paid by local residents.

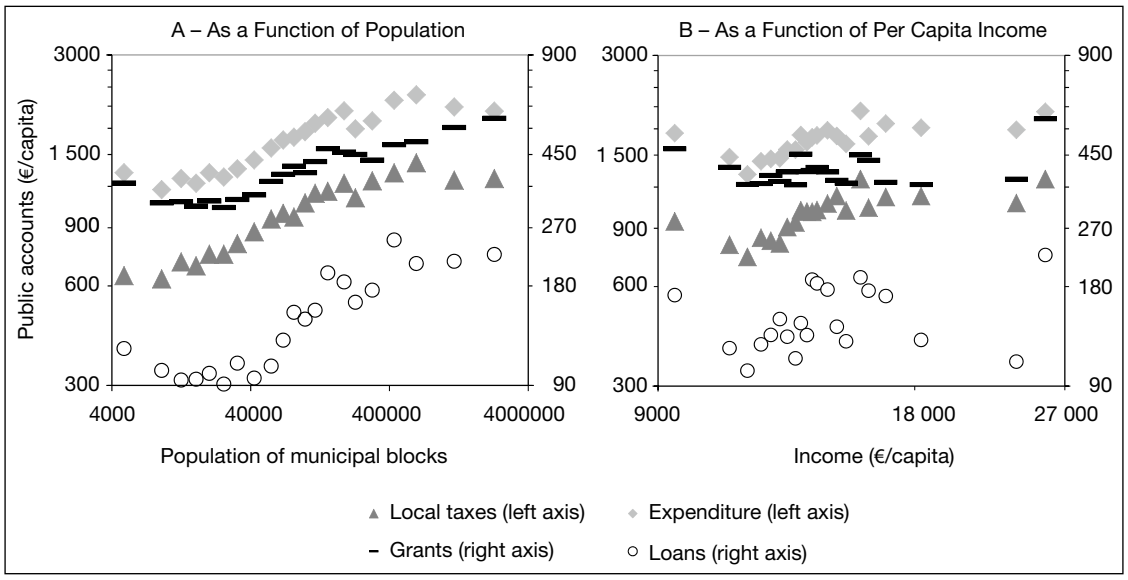
Composition of Municipal Block Budgets

First, four components of the budgets of municipal blocks are examined, including expenditure on the one hand and three types of resources on the other: local taxes, grants and loans. Figure VIII shows average values according to population quantiles (Figure VIII-A) and per capita income (Figure VIII-B).

The four components increase with municipal block population size, excluding the two extremities, i.e. the quantile of the smallest municipal blocks on the one hand and Paris on the other. The relationship with per capita income is less clear-cut. There is no trend for either loans or grants. However, the middle of the income distribution (excluding the first three and last five quantiles) shows an increasing trend. The top of the distribution is constant. The bottom shows an opposite trend: the poorest municipal blocks have higher levels of expenditure, local taxes and grants than the wealthiest municipal blocks.

Regressions are used to test the significance of the trends and measure the interaction of

Figure VIII
Accounts of Municipal Blocks in 2014



Notes: Per capita value of the components of municipal block accounts by quantile (20 quantiles plus Paris) of population and per capita income.
Coverage: Municipal blocks (consolidation of municipalities and inter-municipalities) in metropolitan France.
Sources: DGFiP 2014.

the two explanatory variables (Table 1). The separate regressions for per capita income and population confirm the results of Figure VII: all the explained variables increase with municipal block population size and per capita income. The average range is a 10% increase in local expenditure when the population doubles and a 3% increase when average income increases by 10%. For local taxes, we find an increase of 11% when the population doubles and a 6% increase when the average per capita income increases by 10%.

However, the link with income is influenced by the correlation with population: the income coefficient is cancelled out (expenditure) or even becomes negative (grants and loans) when population is controlled for. The income coefficient is halved, but remains significantly positive in the case of local taxes. By contrast, the population coefficients are virtually unchanged when controlling for per capita income. Moreover, the proportions of variance (R^2) explained by the regressions are significantly higher when regressing on population than on income, and almost identical when regressing on population only or on both variables.

These broad trends conceal significant disparities. The French Court of Auditors (Cour des comptes, 2016) specifically analysed these disparities in terms of expenditure and grants, showing that they are the result of history and the compensation of past resources. Table 2 shows the results of similar regressions for the breakdown of public expenditure into financial charges, investments, purchases and personnel costs (civil servants and contractors). The same relationships are found as for all expenditure items: the coefficients are significantly positive for the separate regressions, but when regressing on income and population at the same time only the population coefficient remains positive (and of constant value). The income coefficient for the decline in investments remains positive when controlling for population, but is divided by five and significant only at the 10% threshold; it is cancelled for purchases and personnel costs, and becomes negative for financial charges.

The evidence suggests that the components of the budget of municipal blocks are directly linked to the size of municipal blocks and that the link with per capita income is only an indirect effect of the correlation between the population of the municipal blocks and per capita income.

Composition of the Local Taxes Financing the Municipal Blocks

Local taxes can be broken down into taxes on developed and undeveloped land, housing tax and local business taxes (Figure IX and Table 3).

Table 1
Budget of Municipal Blocks According to Population and Income in 2014

	Public spending			Grants		
	On income	On population	On income and population	On income	On population	On income and population
Income	0.321*** (0.028)		0.018 (0.023)	0.072*** (0.025)		-0.210*** (0.020)
Population		0.134*** (0.003)	0.134*** (0.003)		0.114*** (0.003)	0.125*** (0.003)
R^2	0.055	0.444	0.444	0.004	0.429	0.457
Observations	2191	2191	2191	2191	2191	2191
	Loans			Local taxes		
	On income	On population	On income and population	On income	On population	On income and population
Income	0.409*** (0.088)		-0.252*** (0.085)	0.608*** (0.032)		0.310*** (0.028)
Population		0.261*** (0.012)	0.274*** (0.012)		0.147*** (0.004)	0.131*** (0.004)
R^2	0.010	0.196	0.200	0.142	0.378	0.411
Observations	2073	2073	2073	2073	2073	2073

***: significant coefficient at the 1% threshold.
Notes: OLS regressions at the municipal block level; all variables are in logarithmic form as the logarithm of per capita value except population, expressed as the logarithm of municipal block population.
Coverage: Municipal blocks (consolidation of municipalities and inter-municipalities) in metropolitan France.
Sources: DGFiP 2014.

Table 2
Public Spending of Municipal Blocks According to Population and Income in 2014

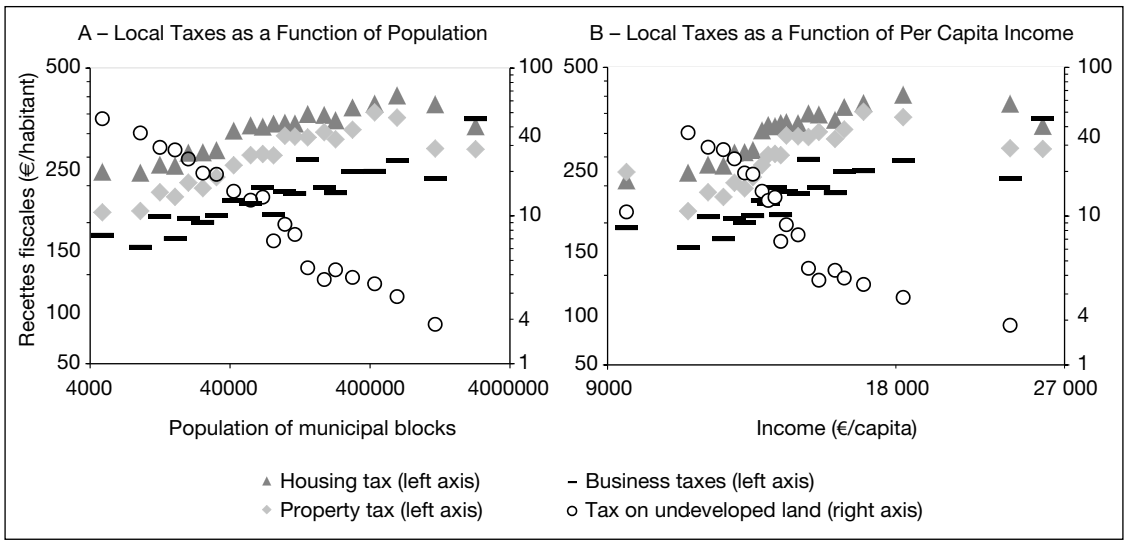
	Financial charges			Investment		
	On income	On population	On income and population	On income	On population	On income and population
Income	0.178*** (0.051)		-0.162*** (0.050)	0.334*** (0.035)		0.065* (0.033)
Population		0.142*** (0.007)	0.150*** (0.007)		0.122*** (0.005)	0.119*** (0.005)
R^2	0.006	0.163	0.167	0.039	0.240	0.242
Observations	2191	2191	2191	2191	2191	2191
	Purchases			Personnel costs		
	On income	On population	On income and population	On income	On population	On income and population
Income	0.175*** (0.029)		-0.024 (0.028)	0.387*** (0.038)		- 0.038 (0.030)
Population		0.087*** (0.004)	0.088*** (0.004)		0.186*** (0.004)	0.188*** (0.004)
R^2	0.017	0.187	0.187	0.045	0.475	0.476
Observations	2191	2191	2191	2191	2191	2191

***: significant coefficient at the 1% threshold, *: at the 10% threshold.
Notes: OLS regressions at the municipal block level; all variables are in logarithmic form as the logarithm of per capita value except population, expressed as the logarithm of municipal block population.
Coverage: Municipal blocks (consolidation of municipalities and inter-municipalities) in metropolitan France.
Sources: DGFiP 2014.

Three of the four local taxes increase with both population and income. The last tax – the tax on undeveloped land – has a strongly decreasing profile: the proportion of undeveloped land decreases sharply with municipal block size since undeveloped land is largely agricultural land. From this point of view, Figure IX-B shows that the poorest municipalities are not

rural: indeed, the lower quantile of income distribution is characterised by a particularly low level of tax on undeveloped land, meaning that these are municipalities with little under-developed land. The lower quantile appears to be out of step with the alignment of the other quantiles for the other taxes too. The quantile is made up of municipal blocks with much lower income levels compared to the other blocks and has particularly high levels of property and business taxes but particularly low levels of housing tax.

Figure IX
Taxes Financing Municipal Blocks According to Population and Income in 2014



Notes: Per capita tax revenue of municipal blocks by quantile (20 quantiles plus Paris) of population and per capita income.
Coverage: Municipal blocks (consolidation of municipalities and inter-municipalities) in metropolitan France.
Sources: DGFiP 2014.

Table 3
Taxes Financing Municipal Blocks According to Population and Income in 2014

	Housing tax			Tax on developed land		
	On income	On population	On income and population	On income	On population	On income and population
Income	0.804*** (0.028)		0.607*** (0.027)	0.518*** (0.036)		0.208*** (0.033)
Population		0.117*** (0.004)	0.087*** (0.004)		0.147*** (0.005)	0.137*** (0.005)
R^2	0.274	0.265	0.403	0.086	0.319	0.332
Observations	2191	2191	2191	2190	2190	2190
	Local business taxes			Tax on undeveloped land		
	On income	On population	On income and population	On income	On population	On income and population
Income	0.914*** (0.050)		0.547*** (0.047)	-2.241*** (0.106)		-0.950*** (0.077)
Population		0.189*** (0.007)	0.162*** (0.007)		-0.617*** (0.011)	-0.570*** (0.011)
R^2	0.135	0.264	0.307	0.170	0.589	0.616
Observations	2191	2191	2191	2186	2186	2186

***: significant coefficient at the 1% threshold.
Notes: OLS regressions at the municipal block level; all variables are in logarithmic form as the logarithm of per capita value except population, expressed as the logarithm of municipal block population.
Coverage: Municipal blocks (consolidation of municipalities and inter-municipalities) in metropolitan France.
Sources: DGFiP 2014.

As for the rest of the income distribution, business taxes do not deviate from the upward trend, while the curves are non-monotonic for property and housing tax: the two upper quantiles decline. On average, the log-linear regressions indicate that housing tax per capita increases by 8% when the population doubles or per capita income increases by 10% (when regressed separately); the same coefficients fall to 6% when both variables are regressed together. The corresponding values for property tax are an increase of 11% when the population doubles and of 5% when income increases by 10% (when regressed separately), with the same values falling to 10% and 2% respectively when both variables are regressed together.

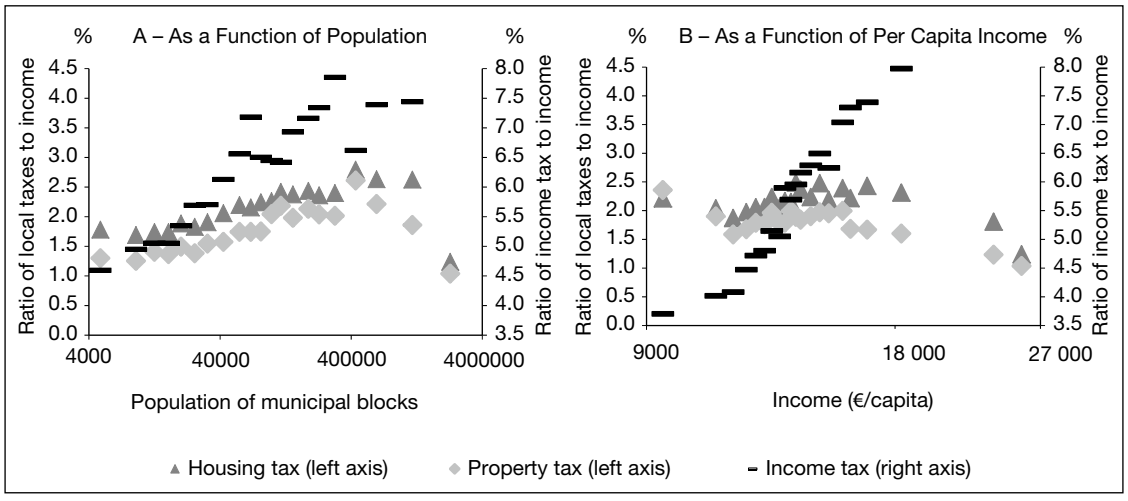
Impact of Territorial Disparities on the Distributive Profile of Local Taxes

The distributive profile of local taxes concerns the effort ratio and not the per capita amount. To test it, we measure the variations in the ratio of local taxes to per capita income according to the population and per capita income of municipal blocks (Figure X and Table 4).

Except for the upper quantile – Paris – the effort ratio for housing tax increases with the population size of municipal blocks. A similar profile is found for property tax, with the difference that the decrease at the top of the population distribution begins earlier. On the other hand, the effort ratio for both taxes is non-monotonic relative to the per capita income of municipal blocks. The lower part initially follows a downward trend, followed by an upward trend in the median part, before a further decrease at the top of the distribution of per capita income. This gives a generally regressive average relationship confirmed in Table 4. The coefficients of per capita income are negative for both effort ratios, whether or not the population of the municipal blocks is controlled for. The correlation with the population is significantly positive in the case of the effort ratio for housing tax (with and without controlling for income) but zero in the case of the effort ratio for property tax (with and without controlling for income).

However, regressivity remains low, with a 0.03 percentage point decrease in the effort ratio for housing tax when per capita income increases by 10% (0.21 points when income doubles) and 0.08 points for property tax (0.56 points). By adjusting for the differences in the population of the municipal blocks, the result is identical for property tax, unlike the result for housing tax: the decrease in the effort ratio with a 10% increase in per capita income rises to 0.07 percentage points (0.48 points when income doubles).

Figure X
Effort Ratios of Municipal Blocks According to Population and Income in 2014



Notes: Ratio of local taxes to income of municipal blocks by quantile (20 quantiles plus Paris) of population and per capita income.
Coverage: Municipal blocks (consolidation of municipalities and inter-municipalities) in metropolitan France.
Sources: DGFiP 2014.

Table 4
Effort Ratios of Municipal Blocks According to Population and Income in 2014

	Housing tax on income			Property tax on income		
	On income	On population	On income and population	On income	On population	On income and population
Income	-0.305*** (0.063)		-0.691*** (0.062)	-0.807*** (0.069)		-0.967*** (0.077)
Population		0.136*** (0.009)	0.170*** (0.009)		-0.000 (0.000)	0.000*** (0.000)
R^2	0.011	0.098	0.147	0.060	0.001	0.068
Observations	2191	2191	2191	2191	2191	2191

***: significant coefficient at the 1% threshold.
Notes: OLS regressions at the municipal block level; per capita income and population are in logarithmic form; property tax and housing tax are expressed as municipal block revenue relative to per capita income.
Coverage: Municipal blocks (consolidation of municipalities and inter-municipalities) in metropolitan France.
Sources: DGFiP 2014.

* *
*

This study showed that, prior to the recent reform introducing housing tax exemptions for the bottom eight deciles of the distribution of monetary living standards, housing tax was slightly regressive. This is the result of the highly regressive impact of the base, the generally regressive impact of the disparity in rates across the national territory and the progressive impact of reductions and exemptions. In this sense, the post-reform breakdown should be similar, unlike the very significant increase in exemptions. It should result – before potential adjustment for local rates – in a generally progressive profile: zero for the bottom eight deciles and positive for the top two deciles. However, the profile remains regressive within the two upper deciles. Taking imputed rents into account in the measurement of household income makes little difference to the overall profile and breakdown: the base remains regressive while the reductions and exemptions remain progressive, but the resulting regressivity is only maintained at the top of the distribution of living standards. The breakdown of the property tax profile is similar, with a highly regressive base among owner-occupiers offset by the growth in the rate of actual taxpayers along the distribution of living standards (since wealthier households are more likely to be owners). The result is a flat profile up to the eighth decile of the distribution of monetary living standards (the profile is progressive according to the distribution of income with imputed rents) and regressive at the top of the distribution (for both distributions).

To refine the analysis of the impact of local differences in tax rates between households, a larger sample than the SRCV survey sample would be needed: while the survey allows households to be located at the municipal level, the number of observations at this level is not always sufficient to allow analysis at the local level. On the other hand, the use of data aggregated at the municipal block level (budget consolidation of municipalities and inter-municipalities) provides an understanding of the impact of rate disparities – i.e. progressive on average but non-monotonic. The ratio of amounts collected to income decreases with per capita income at both ends of the distribution but increases in the middle of the distribution. When controlling for municipal block population size, the regressive impact increases, especially in the case of housing tax. Although beyond the scope of this paper, an important question involves determining which approach (with or without controlling for the size of municipal blocks) provides the best indicator of the distributional impact of local taxes. To answer this question, a detailed analysis is required to understand the reason for the increase in the local tax burden with the size of local authorities, which initially suggests that households derive specific benefits in return for paying such taxes.

The explanation based on spatial segregation due to a correlation between household income and household preferences for local public goods – in other words, voting with one's feet – is contradicted by the fact that the growth in per capita taxes as a function of income disappears completely when controlling for municipal block population. However, several competing explanations remain plausible. For

example, it is conceivable that households in the more populous municipal blocks – which are on average wealthier – pay higher local taxes because their local governments provide them with a wide range of public goods (the zoo effect). In this case, the true regressive impact must be measured by controlling for the size of the municipal blocks, in which case it is twice as high as without controlling. The correlation with population may have another cause: the governments of the most populous local authorities are subject to less pressure from local tax competition, the link between size and tax competition having been highlighted by studies on the impact of the creation of inter-municipalities on local rates (see Carbonnier, 2013; Frère *et al.*, 2014; Breuillé *et al.*, 2018). The correct measurement of the distributional impact then depends on the use of these additional public resources, useful public goods – according to the literature initiated by Zodrow & Mieszkowski (1986) showing the sub-optimal provision of public goods due to tax competition – or, on the contrary, on the waste of public funds from the perspective of the government as a fiscal Leviathan (Brennan & Buchanan, 1977).

A third possible explanation is that households in the more populous municipal blocks – which are on average wealthier – pay higher taxes because of additional public spending to fight congestion. However, the distribution of the consequences of agglomeration – in terms of the productivity of economic activities and congestion costs – can be ambiguous. Combes *et al.* (2012) show that most of the productivity gains enabled by agglomeration are passed on to property prices. This indicates that the additional public expenditure allowing agglomeration and the associated productivity gains ultimately benefit owners in large metropolitan areas. This raises the question of the interaction of income and wealth inequalities and refers us back to the recent debate around the idea that the increase in asset values in proportion to income, noted by Piketty & Zucman (2014) and Piketty (2014), is largely driven by the significant increase in property values. □

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Housing Allowances Alone Cannot Prevent Rent Arrears

Véronique Flambard*

Abstract – This article examines the extent to which housing allowances ensure continued access to affordable housing in France. According to data from the 2013 Housing Survey (*enquête Logement*, Insee), the most recent national housing survey available, one in four recipients of housing allowances experienced financial difficulties during a 24-month period (compared to one in ten non-recipients). The safety net role of housing allowances is studied through their effect in the event of job loss. The analysis is based on two points of discontinuity in terms of income: the eligibility threshold and the ceiling for the maximum rate of allowance. Probit regression results show that recipients of housing allowances are not significantly better protected. Housing allowances also fail to correct inherent disadvantages across households. In fact, the risk of difficulties in paying rent appears to be linked to a combination of factors: low income, unexpected events, certain family composition and places of residence increases the risk.

JEL Classification: H31, I38, R21
Keywords: housing allowances, housing affordability, rent arrears, poverty, housing prices

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Housing allowances are now one of the most widely used housing instrument in OECD countries (Kemp, 2007). They are mainly designed to promote adequate and affordable housing, often with the aim to internalize externalities from poor housing (fire risk, violence, social exclusion and social instability). These policies have also been used to lift low-income households out of poverty or to redistribute income (Grigsby & Bourassa, 2003). Recently the issue of declining affordability has been high on the research agenda (Chen, 2010; Ben-Shahar, 2015; Lens, 2017; Dewilde, 2017; Wetzstein, 2017). A gap seems to exist between discourses of housing affordability and effective affordability. The challenge is therefore to identify the sources of unaffordability. This research seeks to contribute to this literature by reviewing potential shortfalls in the design of housing allowances and their implementation. Its aim is also to analyze and test whether housing allowances cushion households against negative income shocks.

The analysis is focused on the French case, a country where housing allowances (*allocations logement*, or AL) are the main policy instrument (accounting for more than three-quarters of the housing assistance budget to the consumers with a cost of 18 billion euros in 2017). Approximately six and a half million households receive housing allowances. In addition, in France the right to housing is inscribed in the Constitution of 1946. This entitlement was reinforced with the Act of March 5th, 2007, as "an enforceable right to housing" (*droit au logement opposable*). The strategic priority given to the program 109 in the French finance law is to help "low-income households to gain access to housing and to maintain it". With this strong priority given to affordability, it is interesting to use it as a case study. Its interest goes beyond the French case for an international audience, because many characteristics of the French housing allowance system exist in other countries as well. Therefore, identified causes of unaffordability and weaknesses in the French case are likely to be relevant for other countries as well. This paper also contributes more generally to the research agenda on the optimal design and implementation of housing allowances.

The rest of the paper is organized as follows. In the next section, housing allowance impacts are critically analyzed by drawing on the existing literature. Then, probit regressions are used to assess the role of socio-economic factors in housing-related financial difficulties and the role of housing allowances as a safety net. Finally, we conclude with some policy implications.

Analytical Framework

Defining Affordability

Hancock (1993) argues that "any rent will be affordable which leaves the consumer with a socially acceptable standard of both housing and non-housing consumption after the rent is paid". In practice, this is difficult to guarantee as there is no coordination on how much overall benefits a welfare recipient receives (housing assistance is typically calculated without any reference to other possible assistance for transportation or school meals, for example).

Other indicators have been suggested to define affordability (recently Lux, 2007). However, there are also difficult to implement. In this context, it is not surprising that policymakers rely most of the time on easy to use ratios. It is considered that housing expenditures exceeding 30% of the household budget can endanger housing stability (Heylen & Haffner, 2013). However, there is no clear threshold for unbearable housing burden because a high rent-to-income ratio may be acceptable on a high income but unbearable on a low income. Australian researchers use the 30% threshold only for the households in the lowest 40% income (Rowley *et al*., 2015).

Our main objective is to assess whether households can afford to pay their rent. Therefore, we will report (gross and net) rent-to-income ratio and the probability of difficulties paying the rent for the analysis.

OECD Countries Background Information

Direct rental assistance lowers the effective cost of a household's housing burden. It aims at increasing the willingness and ability of households to enjoy better housing. Many countries have entitlement housing allowances. In the USA on the contrary, vouchers are not an entitlement. Housing policies can be included in social policies. In France or in the United Kingdom however they are treated

as specific housing assistance for low-income households (Kemp & Kofner, 2010).

In 2015, public spending on housing allowances was the highest in the United Kingdom with 1.4% of GDP, followed by France (0.8% of GDP).[1] In countries such as Denmark, Germany, the Netherlands, New Zealand or Sweden the proportion was close to 0.5%. It was lower (between 0.1 and 0.3%) in other OECD countries such as Australia, Austria, Bulgaria, Croatia, Czech Republic, Ireland, Japan and the United States. The proportion of households receiving housing assistance in OECD countries is the highest in France at 25% and the lowest in Germany at 2%, see Haffner (2009). However, the lowest tenth-percentile-income-households receive lower allowances in France than in OECD countries (Salvi del Pero *et al*., 2016). The French housing allowance program has probably been stretched to its limit. The French Court of Auditors (Cour des comptes, 2015) warned about rising costs due to the increasing number of eligible households (from approximately one and a half million households in 1970 to six and a half million today), due to people living apart (children moving out, people divorcing) and to unemployment (which tripled since the 1970s). This research seeks to understand the existing weaknesses of housing allowances and the causes of unaffordability.

Expected Effects of Housing Allowances

Housing Consumption

The fact that housing subsidies are used rather than simple redistribution measures suggests that governments believe that housing is a merit good. Musgrave (1957) defines a merit good as a good or service, such as education or health, that is regarded by society as deserving public finance. One way to ensure decent housing is to set minimum standards for eligible subsidized dwellings. In this case, households are constrained to consume minimum amounts of some housing attributes (size, bathroom, kitchen, safety norms, heating system, etc.). Some households who do not have access to decent housing without the housing subsidy will be able to do so with the allowance, but they are forced to increase their consumption. Hence, the rent-to-income ratio is not necessarily reduced. For the other households, there is not necessarily an impact on quality. Grislain-Letrémy & Trevien (2014) conclude that housing subsidies had almost no effect on housing quality and none on the number of rental dwellings available in France. To understand why, it is useful to go back to the economic effects of housing allowances. The budget constraint becomes non-linear with housing allowances. In fact, below a minimum housing expense, the household is not eligible to housing benefits, leaving the budget constraint unchanged. Above that minimum, which gives access to a "decent dwelling", the subsidy acts as a price reduction if the rent is inferior to the rent ceiling and as a supplement of income otherwise. If housing consumption is quite irresponsive to price and income changes, the rent to income ratio is reduced. The impact depends, in fact, mainly on the price and income elasticity of demand. For most households, the price elasticity of demand is low, around 0.5 (Chauvin & Muellbauer, 2018, for France and for other countries Arrazola *et al*., 2015). Therefore, even with subsidized housing, households will not increase their housing consumption proportionally with the net decrease in relative price. The second effect, the income effect, is also small in general. Fallis (1990) has estimated the marginal propensity to consume housing out of one dollar of unearned income to be equal to 0.17. Cornuel & Calcoen (2005) found that for households able to access decent housing without the allowance, the effect is equal to 0.15. They did not provide estimates for the less well-off for which housing consumption must increase in order to access decent housing.

Society can consider it a moral hazard issue and an inefficient outcome if households consume more than the "fair" quantity or quality of housing. Despite low elasticity, this concern is acute, if the allowance scheme totally shields households from any variation in the level of the rent of the dwellings they occupy. When this is the case, households have no incentive to limit their housing consumption. This is rather limited in France because housing expenditure is capped in the allowance schedule and rent ceilings are low (see below). In fact, 87% of the households in the private housing sector and 52% in the social housing sector (Cour des comptes, 2015) pay more in rent than the imposed cap. For the households who are not on income-support or whose rent

1. *https://www.oecd.org/els/family/PH3-1-Public-spending-on-housing-allowances.pdf*

exceeds the rent ceiling, the housing allowance does not act anymore as price subsidy (percent-of-rent payment) but rather as a welfare payment which depends on income, family composition and housing zone (1, 2 or 3). Households then face trade-offs between paying food or children's activities on the one hand and housing on the other hand. Some may then face financial difficulties if they do not allocate enough for housing expenditure.

Rent Levels

Landlords can demand direct payment of housing allowances (in case of unpaid rent, for example) to prevent rent arrears. This is increasingly the case in France. It is then possible that housing allowances are captured, at least partially, by landlords, through inflated market prices. The estimates for France range between 70% and 100%. Fack (2006) provided evidence that one euro of housing allowance caused an increase of 78 cents of rent. Grislain-Letremy & Trevien (2014) showed that for housing of similar characteristics in zones 2 and 3, one euro of housing allowance is fully captured by landlord. Inflationary effects have been observed in different places (Kangasharju, 2010; Gibbons, 2006; Susin, 2002). Thus, recipients benefit only partially from their housing subsidies, as part of it is being captured by landlords through higher rents. The effect seems to be particularly high in France as it is characterized by low supply elasticity (see also Laferrère & Le Blanc, 2004). Indeed, according to Caldera-Sánchez & Johansson (2011), the price elasticity of supply is close to 0.36 in France, much lower than in the USA at 2.01. It reflects the difficulty to find available land to build housing in France as well as constraints in the housing market. The incidence of housing allowances on price can be reinforced in France by the fact that landlords can request direct payment of the housing allowances and by the large number of people eligible to housing assistance relative to other countries. As a result, in the French Finance Law of 2016, housing allowance generosity has been reduced. The objectives are to reduce public expenses and to curb the inflationary effects of housing benefits.[2] The French government has communicated on this reform by inviting landlords to reduce rents. The United Kingdom introduced a similar reform in 2011-2012. Reduced housing allowances mainly benefited renters, albeit to different extents and with the exception of people living in the suburbs of London and in the East Midlands (Brewer *et al*., 2014).

Experienced Financial Difficulties

Below a certain income threshold, households are unable to save. They are also likely to be constrained in their credit ability. The recipients of housing allowances are typically more likely to fall in this category because housing allowances are awarded on the basis of income.[3]

They are thus more vulnerable to income or expenditure volatility. Furthermore, the design of the housing allowance scheme itself amplifies the effect of unexpected difficulties for households at risk: low-income households are near the maximum allowance and that maximum cannot be increased if income falls. These households are thus less protected against loss of income than wealthier ones. In addition, in France, there is a shortage of low-rent accommodation and moving costs are high, limiting adjustment when conditions change. Finally, the income used for the calculation is the disposable income earned two years ago (*infra*). If the household has lost its employment income the housing allowance is not immediately revised and therefore does not act immediately as a safety net. On the contrary, if the household experiences an increase in income the housing allowance will need to be reimbursed later on when the corrections are made. To sum up, it is not necessarily the case that housing allowances automatically reduce housing-related financial difficulties (because of the trade-offs with non-housing goods, shortage of low-rent accommodation, minimum housing standards and rent increases). Secondly, risk factors are more common for low-income households (typically the recipients) than for other households. Thirdly, the design of the housing allowance scheme itself amplifies the effect of unexpected difficulties for households at risk. These factors illustrate the difficulties involved in using only housing allowances to achieve the goal of housing sustainability and a guaranteed right to housing.

These shortcomings have been pointed out by various researchers. Berger *et al*. (2008) show

2. The Finance Law of 2018, posterior to the period studied, goes in the same direction, reducing the rents and subsequent allowances in the social housing sector.

3. In France, most of the recipients (75%) belong to the three lowest income deciles. The majority of them (60% for the households without children) are below the poverty line.

that, in the USA, single-mothers tend to suffer a little bit more difficulty paying rent or utilities when they receive housing allowances than when they do not. They hypothesize that it is caused by an increase in housing consumption (because households desire more or better dwellings or because they are forced to reach a minimum standard to be eligible to housing assistance). Haffner & Boumeester (2014) provide evidence that despite housing assistance in practice almost 37% of tenants are overburdened by housing costs in the Netherlands. They even find that 6% of "tenants, who based on the norms, have sufficient income, do not overconsume, live in a rent-controlled dwelling owned by a social landlord, and receive a housing allowance, still cannot afford their housing costs." (Haffner & Boumeester, 2014, p. 135). Stone *et al*. (2015), conclude that in Australia some households need additional housing assistance in order to remain housed despite rental assistance. Life events and periods of transition are more frequent and have more consequences on housing for low-income households than for more wealthy ones.

Descriptive Approach to Unaffordability

The French System of Housing Allowances

To understand the determinants of affordability (or lack thereof), we must first clarify who is eligible and how the allowances are calculated in France. A household may be eligible for one of two main allowances: housing allowances and personalized housing allowances (*aide personnalisée au logement*, or APL). The latter is for subsidized or rent-controlled housing units. These allowances are received by all eligible households who apply and qualify (it is an entitlement).[4]

Housing allowances are means-tested by reference to households' net adjusted income (adjusted in the sense that taxes and other welfare benefits are deducted from the taxable income). The adjusted taxable income of year t is used for the calculation of the allowance for July of year t+1 to June of year t+2. Allowances can be retrospectively adjusted for changes in circumstances (income, family composition or place of residence). Any revision of household composition and rent is carried out once a year.

Housing allowances are progressive so that households have to cover a larger proportion of their housing expenditure as their income increases (from 8.5% to nearly the full rent). The cost of living is taken into account in the calculation based on two criteria: the number of persons in the family and the location of the dwelling.[5] The household can qualify for the housing allowances only if the dwelling is considered decent, conditioned by size and quality.

Based on the criteria described above, the housing subsidy is calculated as follows:

$$\begin{aligned} subsidy &= 0.915 * (Min\left\{R; \overline{R}\right\} + C) \\ &\quad -T * (I - I_0) \text{ if } I \geq I_0 \\ subsidy &= 0.915 * (Min\left\{R; \overline{R}\right\} + C) \text{ if } I < I_0 \end{aligned} \quad (1)$$

where I is the adjusted income, R is the rent (excluding utilities and other charges) and $\overline{R}$ is the ceiling set by the government on housing expenditure (its value depends on family size and geographical location). C is a lump sum fixed by the government to account for rental charges (monthly payments charged by landlords for maintenance, garbage disposal and security services). This lump sum depends on family size. T is a parameter set by the authorities which depends on family size and rent, and increases with income, I. This means that the allowance decreases as income rises.[6] The participation of the households may also vary if their situation changes (family type, location) and is not by construction limited to 30% percent of their income. Therefore, compared to other systems such as the American one, the French system does not guarantee affordability in terms of a rent-to-income ratio.

In the French scheme, the resource condition is tested by comparing I and I_0, which corresponds approximately to the guaranteed minimum income (*revenu de solidarité active*, or RSA) minus family benefits and a base rent

4. Homeowners are also eligible to housing allowances. However, they are not included in the analysis. The objective of the article is to study the impacts of housing allowances on difficulty paying the rent *(for renters).*

5. Three zones are considered in the calculation of housing allowances. The Paris metropolitan area, a sub-region of the larger Ile-de-France (IDF) forms zone 1. The remaining towns in IDF and cities of more than 100,000 inhabitants form zone 2. All towns not included in zone 1 and 2 are in zone 3.

6. This mechanism is not applied in all countries; for instance in the United States, housing vouchers cover expenses beyond 30% of income (adjusted for family size and up to a fair market rent). In practice, those receiving this form of assistance have a net housing expense of 30% of their income. Therefore they are protected from changes in both the rent and the household's own income (Carlson et al.*, 2011). This is not the case in France.*

set by the government. For income below I_0 the allowance is set at its flat rate maximum which covers 91.5% of the rent R and a lump sum amount for other housing expenses C. The allowance decreases as income increases (Diagram). The calculation of the housing allowance is complex because parameters depend on the spatial-socio-economic characteristics of the household. All households contribute to the rent (with a minimum of 34.53 euros or 8.5% of R) which increases in line with income growth and decreases in line with family size. This contribution limits moral hazard issues. However, a one euro increase in rent is nearly completely offset by the allowance increase of 0.915 cents close to I_0 if the rent R is below the maximum eligible rent $\bar{R}$. Incentives are high for landlords to increase rent (Laferrère & Le Blanc, 2002; Fack, 2005) up to the rent ceiling in this case. Only 13% of renters pay less that the maximum rent in the private sector.

Data

Conducted by the French Institute of Statistics (Insee), the Housing Survey (*enquête Logement*) provides a representative sample of all dwellings. In 2013,[7] 27,137 dwellings (households) and 65,034 individuals have been surveyed between June 2013 and June 2014. The survey provides information on dwellings and their features, household characteristics, occupancy status, housing costs (rent level or mortgage payments) and housing allowances among others. There are also retrospective questions about the dwelling or household (past 12 months, last 24 months, last 4 years). We use a self-declared variable about financial difficulties experienced by the household over the last 24 months to pay rent or housing service charges. As control variables, we use information about family type, income level, group age of the most educated person in the household, location of the dwelling, amount of housing allowance received, remaining housing expense and the nationality of the reference person among others.

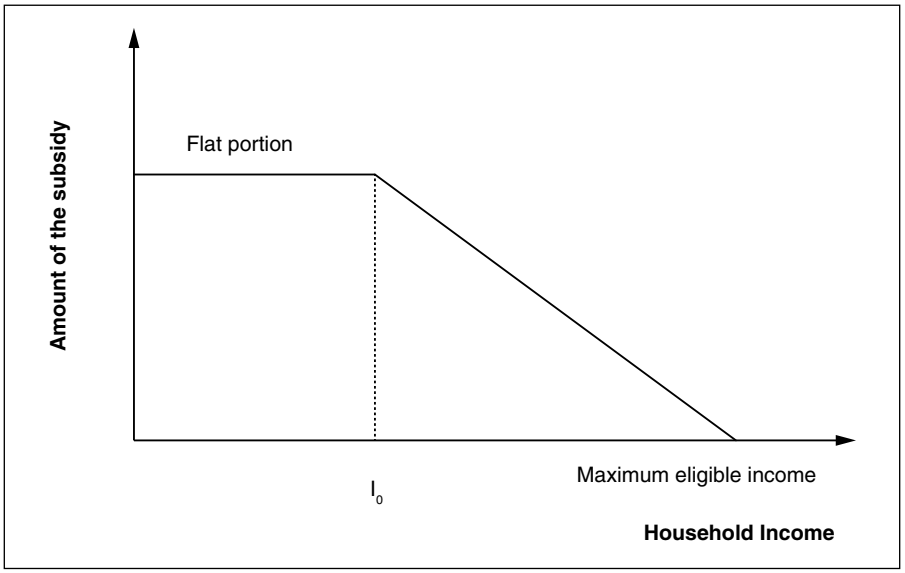
Profile of the Recipients and Indicator of Affordability

Approximately, one out of five households in France benefits from housing allowances. In 2013, 95% of them are tenants, half of them living in dwellings managed by the public sector. Single-parent families and households from the first two income quartiles are overrepresented among housing allowance recipients.

We focus here on tenants who earn less than the median income. The rent is considered unaffordable if it takes up more than 30% of the household's income (measured as the total

7. *It is the most recent survey available at the time this research was carried out.*

Diagram
Housing Allowance as a Function of Household Income



amount of labor income, capital income and welfare benefits). Table 1 shows measures of the rent-to-income ratio, or gross and net housing burden and the share of households reporting difficulties paying rent; note that for nearly three percent of the renters, the ratio exceeds 100 % showing a critical situation (these observations are excluded from the statistics presented in Tables 1 and 2).

Recipients of housing allowances spend just 18% of their income on rent with the housing allowances (vs 49% without assistance). Table 1 shows that APL recipients who get the maximum assistance benefit from a lower net housing burden at 18% than AL recipients at 23% (the APL is for subsidized or rent-controlled housing units). Households who benefit from APL enjoy lower rents but typically have lower incomes than households renting in the private sector. When adding the other housing expenditures (water, electricity, heating, service charges in collective buildings and local housing taxes) to the rent, the net total housing burden is much higher, at 38% for all recipients (cf. Table 1). Households are impacted by this lack of affordability as evidenced by the fact that one out of four dealt with financial difficulties over the last two years preceding the survey.

The average hides large differences across them, depending on the household composition, income level and place of residence. Households of the three lowest income deciles face a net housing total burden of 48% (Table 2). However, their probability of financial difficulties does not differ much from the average of all recipients at 24%.

Two categories of households, single parent families on the one hand and those living in the metropolitan area of Paris on the other hand report financial difficulties more often than the others (36 and 37% respectively, cf. Table 2). And, before the deduction of housing allowances, some groups of recipients spend much more than 30% of their income on rent. The housing burden is considerably reduced by housing allowances and does not exceed 30% on average for the categories of households described in Table 2. Households for which housing allowances play a larger role in reducing housing expenditures are single-parent families, single persons, low-income households, tenants in the private housing sector. This illustrates the goal of redistribution towards low-income families. However, even those receiving the highest amount of assistance (category 10 in Table 2, for whom the housing burden is zero once the allowances are taken into account) remain at high risk, with a third of them having difficulties paying their rent or charges during the two years preceding the survey.

The Insee Housing Survey allows quantifying the consequences of financial difficulties. A proportion of 3% of tenants-recipients are at risk of being forced to move because of financial difficulties or judicial decision of eviction, and 6% have directly been impacted following late payments (e.g. suffered from cold because electricity has been cut, lost the discretionary use of the allowance with payments being made directly to the landlord, or had their housing allowances suspended or their renting guarantee compromised). Lack of access to affordable housing can also lead to

Table 1
Housing Burden and Financial Difficulties of Renters

(In %)

	Housing burden (rent)	Net Housing burden (rent)	Net Housing burden (rent and utilities)	Net Housing burden (rent, utilities, taxes)	Difficulties paying over last 24 months
Recipients of HA	58.5	22.5	39.6	40.4	23.4
Recipients of personalized housing allowance (APL)	48.3	17.7	36.1	37.2	26.0
All recipients	49.5	18.2	36.5	37.6	25.7
Non-recipients	23.7	23.7	31.5	33.0	11.5
All renters	34.3	21.5	33.6	34.9	17.4

Note: Housing burden is the ratio of the gross housing cost divided by the income of the household. Net housing burden is the ratio of the gross housing cost minus housing allowances divided by the income of the household. The income is the total annual income (based on the variable mrtota2, which includes all types of perceived incomes, including from financial investments or welfare benefits). Observations with net burden in excess of 100% were dropped for the calculation (they represent 311 observations or 2.90% of the renters who were clearly in a situation of unaffordable rent at the time of the survey).
Sources: Insee, *enquête Logement* 2013.

Table 2
Housing Burden and Financial Difficulties by Family Types and Income Level of Housing Allowance Recipients[a]

(In %)

	Gross Housing Burden (rent)	Net Housing burden (rent)	Net total Housing burden (rent, utilities, taxes)	Difficulties paying over last 24 months
1. Single persons	56.1	23.0	43.4	19.5
Single parent				
2. 1-2 children	51.8	14.3	36.1	36.0
3. 3+ children	62.9	10.6	37.8	37.6
Couple				
4. Without children	38.7	17.8	32.1	25.4
5. 1-2 children	39.1	14.0	31.2	28.8
6. 3+ children	35.1	11.8	26.7	28.6
7. Other in a dwelling	46.2	20.9	39.2	21.6
8. Three lowest income deciles	68.3	21.7	48.02	23.9
9. Five lowest income deciles	58.3	20.1	42.7	24.7
10. NHB=0 and 5-lowest deciles	64.3	0	31.9	33.7
11. Zone 1 bis (Paris)	54.6	26.0	45.6	28.5
12. Zone 1	48.6	18.1	39.5	37.0
13. Zone 2	52.6	19.1	38.7	25.0
14. Zone 3	45.9	16.2	34.9	23.8
15. Renting in the private sector	55.53	24.58	40.78	23.10
2+8+15+(11 or 12)	75.30	30.46	49.37	32.28
All renters-recipients	49.5	18.2	37.6	17.37
As a benchmark: whole population	17.9	12.8	25.9	17.2

[a] Including the recipients of the APL.
Note: For these sub-categories, observations with net burden in excess of 100% were dropped for the calculation of average housing burden.
Coverage: Households with an income below the median.
Sources: Insee, *enquête Logement* 2013.

homelessness, which the Housing Survey cannot measure (the survey covers only housed people). Foundation Abbé Pierre (2017) estimates that in 2017 in France, 4 million people are homeless or without any regular dwelling and that 12.1 million are suffering either from very high housing burden, fuel poverty, eviction risk or overcrowding.

Statistical Analysis of the Impact of Housing Allowances

To assess the effect of the allowance, one would ideally wish to compare households receiving it to households not receiving it but otherwise identical. This is not possible in the French context, since housing allowances are an entitlement (cf. *supra*). Instead, we will use two discontinuities of the housing allowance scheme (cf. Diagram). Firstly, we will compare recipients with the maximum level of assistance (close to I_0 on the Diagram) to those who receive slightly less (in the ninth highest decile of allowance). Secondly, another regression is conducted on households who barely qualify (and are in the three lowest deciles of allowance, close to the maximum eligible income on the Diagram) compared to those who do not qualify. This strategy is based on the assumption that small differences might matter a lot for low-income people.

We especially analyse whether housing allowances make it easier for households to deal with job loss close to these discontinuity points. Job loss represents a quarter of the adverse events faced by households in 2013 (and unemployment in France has tripled since the creation of housing allowances).

The dependent variable is a binary variable that is equal to 1 if the household reported having encountered financial difficulties in the two

years preceding the survey. Independent variables are: net total housing expense, household characteristics and whether the recipient receives maximum assistance "MaxHA" or barely qualifies "JustHA", location of the dwelling and a variable controlling for job loss. An interaction term for being a recipient and having lost one's job ("Loss-Max" or "Loss-Just") measures the impact of housing allowances in the change of probability to experience financial difficulties after job loss (the variables are detailed in Appendix).

Results

The estimation results (probit model) are reported in Table 3. First, the regression is run on the subset of recipients whose income is close to the discontinuity point I_0, then on that of recipients close to the income level to be eligible to the housing allowance.

The probability of financial difficulties appears higher for those who perceive a low amount of housing allowance than for their counterparts who are not eligible (coefficient "JustHA" is positive and significant at a 0.5% threshold). Near the other discontinuity point, households who perceive the maximum rate of housing allowance are not better off or worse off than those who perceive a high rate of assistance (coefficient "MaxHA" is positive and significant only at the 8% threshold). This finding is consistent with the fact that the amount of housing allowances falls as income rises.

People who lost their jobs recently (coefficient of "JobLoss" in Table 3) are also more vulnerable. The net total housing burden ("NBurden") increases the probability of financial difficulties for households with a high rate of housing allowance (by definition, those on low income) but has no significant effect for those with a low rate of housing allowance (the coefficient is significant only at a threshold of 8%). The probability of financial difficulties is higher for single families with 1 or 2 children ("Fam_sf12") – who by definition, can rely only on a single earner – and for foreigners ("Foreign"). Financial difficulties are relatively lower for people over 65 years old ("Age_>64"). A possible explanation is that their income is more stable.

The interaction effect[8] between job loss and the status vis-à-vis housing allowances ("Loss-Max" or "Loss-Just") is not statistically significant in the regressions at all levels of the probability of financial difficulties. In fact, the effect depends on all the covariates of the model, as shown by Ai & Norton (2003). Therefore receiving (different levels of) housing allowance does not change significantly the probability to face financial difficulties in the event of job loss near the two discontinuity points. In the first regression, the allowance cannot increase any further for those on "MaxHA" (other welfare benefits can adjust but clearly not by enough to prevent higher housing unaffordability risk). The coefficient "Loss-Max" is not significant, which means that those at "MaxHA" are not significantly better or less protected than those close to but not exactly at the maximum. In the second case, households who receive a low amount of housing allowances should be protected by the increase in allowance following income loss. But in practice, the coefficient "Loss-Just" is not significant. The implementation of the housing allowance certainly plays a role here. The protection might be inadequate because the income used to calculate the benefit is the income earned in the two years preceding the calculation. Even though the amount of housing allowance is adjusted to account for changes in income, the estimation result suggests that it fails to reduce the probability of financial difficulties, at least close to these two discontinuity points.

Additional effects are worth noting in the second regression for those close to the maximum eligible income. The risk of financial difficulties is lower for those who do not live in Paris or the surroundings (out of zone 1), showing the incapacity of the housing allowance to counterbalance the higher prices in the Paris region despite more generous benefits. This result is consistent with Wetzstein's (2017) observation that there is a lack of affordable dwellings in cities.

Tables 2 and 3 give evidence of the Schwabe law as also observed by Haffner & Boumeester (2014): the lower the income, the higher the housing burden. This empirical law can be extended by saying the lower the income, the higher the unaffordability risk for those on low rate of allowance (coefficient "JustHA"). Housing allowances fail either to counterbalance inherent financial disadvantage or to bring people to the same risk level for these

8. *Computed using Stata macro "inteff".*

Table 3
Determinants of Difficulties Paying Rent or Charges Over the Last Two Years

	Max HA vs High level of HA	Low level of HA vs no HA
JobLoss	0.56** (0.14)	0.53** (0.09)
MaxHA	0.25 (0.14)	
Loss-Max	-0.22 (0.20)	
JustHA		0.22** (0.08)
Loss-Just		0.09 (0.16)
NBurden/10,000	0.63* (0.31)	0.21 (0.12)
Age_<30	0.24 (0.15)	-0.00 (0.11)
Age_3039	Ref.	Ref.
Age_4049	-0.13 (0.12)	-0.04 (0.10)
Age_5064	0.07 (0.16)	-0.09 (0.10)
Age_>64	-0.58* (0.26)	-0.51** (0.12)
Income_Support	0.05 (0.10)	0.24 (0.13)
Ed_0	Ref.	Ref.
Ed_1	0.09 (0.19)	-0.04 (0.13)
Ed_2	0.13 (0.12)	-0.08 (0.08)
Ed_3	-0.04 (0.16)	-0.18 (0.10)
Ed_4	-0.27 (0.24)	-0.33 (0.13)
Ed_5	-0.44* (0.21)	-0.17 (0.12)
Fam_couple	Ref.	Ref.
Fam_single	0.35 (0.26)	0.03 (0.09)
Fam_sf12	0.49* (0.24)	0.34** (0.12)
Fam_sf3	0.59* (0.27)	-0.12 (0.29)
Fam_child12	0.29 (0.25)	-0.11 (0.10)
Fam_child3	0.23 (0.25)	-0.03 (0.15)
Fam_other	0.29 (0.30)	-0.07 (0.14)
French	Ref.	Ref.
Foreign	0.35** (0.12)	0.26** (0.09)
Became French	-0.01 (0.17)	-0.01 (0.11)
Social H	0.04 (0.12)	0.11 (0.07)
Private Sector	Ref.	Ref.
Zone_1	Ref.	Ref.
zone_21	0.01 (0.12)	-0.17* (0.07)
zone_22	-0.07 (0.38)	-0.30 (0.23)
zone_23	omitted[(a)]	-0.25 (0.43)
Zone_31	-0.20 (0.18)	-0.36** (0.11)
zone_32	0.17 (0.18)	-0.34** (0.11)
zone_33	-0.22 (0.19)	-0.26* (0.11)
Arrival_1	-0.52** (0.17)	-0.15 (0.10)
Arrival_2	-0.23 (0.14)	0.10 (0.09)
Arrival_3	0.25 (0.15)	0.13 (0.09)
Arrival_4	0.04** (0.16)	0.29** (0.11)
Arrival_5	Ref.	Ref.
Intercept	-1.29** (0.33)	-1.02** (0.18)
Interaction term	JobLoss × MaxHA	JobLoss × JustHA
Coefficient (min, max)	(-0.09; -0.00)	(0.00; 0.06)
Std Error (min, max)	(0.01; 0.08)	(0.03; 0.06)
Z (min, max)	(-1.42; -0.32)	(0.00; 1.36)
Number of observations	1,503	4,398
Log Likelihood	-666,039	-1,887,439
Pseudo R^2	0.0819	0.0852

[(a)] Failure predicted, observations dropped
Note: *** p<0.001, ** p<0.01, * p<0.05. Robust standard errors are in parenthesis. See in Appendix the definition of the variables.
Reading Note: For a continuous variable (such as the net housing burden) a positive coefficient can be interpreted as an increase in the probability of difficulties in paying rent when the value of the regressor, holding all other covariates constant, increases. A positive coefficient for a categorical variable signals that the probability of financial difficulties for this particular category is higher than for the reference category; for example, the positive coefficient for "Fam_sf3" shows single families with three children are more at risk than the reference category which is a couple with no children.

households (near "JustHA"). Unforeseen events (job loss here) increase the probability of financial difficulties for all households who earn less than the median income (in the two regressions, the coefficient "JobLoss" is positive and significant).

The median income level per consumption unit,[9] housing allowances and net housing burden are presented in Table 4 for the four groups of households studied in the regressions (respectively for those near "JustHA"; not eligible; with a high coverage rate and with the maximum coverage rate). The median monthly housing allowances (column 2) are lower for households who perceive the maximum HA rate than for those who perceive a high rate of HA. The latter pay higher monthly rents than the former.[10]

The last column of Table 4 shows that the probability of encountering financial difficulties is much higher for the recipients who perceive high level of housing allowances than for those who perceive just few (0.33 compared to 0.21).

Robustness checks

To check for the robustness of these results, the impacts of the housing allowances on difficulties paying rent were estimated using propensity-score matching.[11] This technique, first introduced by Roseubaum & Rubin (1983), will allow estimating the effect of receiving housing allowances accounting for the households' characteristics. The difference in financial difficulties between the two groups (recipients and non-recipient households) depends both on the characteristics that determine eligibility and on the benefits of the policy per se. The treatment effect is estimated by matching each observation which benefits from the policy with another one comparable on all observed covariates but which does not benefit from it. The average treatment effect (ATE) is calculated by taking the average of the difference between the observed and potential outcomes for each observation. The average treatment effect on the treated (ATT) is the same indicator calculated on the group of recipients. We estimated treatment effects for all households who earn less than the median income. The measures (ATE and ATT) are not significantly different from zero. We also ran the estimation, on the one hand on households who experienced a job loss, and on the other hand on the sub-sample of households from the three-lowest income deciles. The conclusions are unchanged. The average treatment effect and average treatment on the treated (ATE and ATT) on financial difficulties are still not significantly different from zero.

In summary, risk factors of housing unaffordability are low-income ("JustHA"), high housing burden for low-income families ("NBurden"), living in cities with low housing allowance rate (zone 1 relative to zone 3, for households in the second regression) and being less senior in the dwelling (relative to "Arrival_5"). The likelihood of difficulties paying rent is also increased if the reference person is of working age (relative to "Age_>64") or a foreigner ("Foreign"), or if the household is a single-parent family ("Fam_sf12", "Fam_sf3"). Unemployed low-income households are not

9. We also calculated the mean. The mean and median are in fact not very different for this sample. We have chosen to report median, that are known to be less sensitive to extreme values.
10. The monthly median rent is 364 euros for high HA and 307 euros for "MaxHA". The proportion of people living in subsidized dwellings (with typically lower rents) is higher for "MaxHA" than for "HighHA".
11. Stata command "teffects psmatch".

Table 4
Median of the Monthly Financial Variables by Level of Housing Allowance Rate

Housing Allowance	Net Monthly Housing Burden	Monthly Housing Allowance (in euros)	Overall Monthly Income per Consumption Unit (in euros)	Probability of difficulty paying rent
Maximum rate	0	322	520	0.34
High rate	147	377	610	0.33
Low rate	273	100	1,010	0.21
Not eligible[(a)]	420	0	1,260	0.16

[(a)] For households who earn less than the median income.
Note: The number of consumption units is calculated with the Oecd-modified equivalence scale used for EU statistics.
Sources: Insee, *enquête Logement* 2013; author's computation.

better protected than employed ones (interaction effects "Loss-Max" and "Loss-Just" are not significant). Therefore, the housing allowances do not cushion low-income households from financial difficulties in the event of job loss. All in all, housing allowances improve housing affordability (cf. Table 2) but not to the extent that housing allowance recipients are better protected against financial difficulties (as shown by the results of probit regression and propensity score matching results).

Policy Implications

From a public policy perspective, the issue of (in)affordable housing can be analysed in three ways: poverty, consumption and protection from adverse events.

If the issue is analysed as a poverty issue (an income that is too low) then redistributive policies are the most direct response to the problem. Even though housing allowance policies have increasingly been given the role of redistributive instruments (Griggs & Kemp, 2012), they are probably not cost effective for this purpose. In France, housing allowances are not even included in social policies, so that income from different sources is treated differently in the calculation of overall benefits (resulting for instance in a less favorable treatment for the working poor, those receiving a mix of labor and social welfare benefits). Indeed, French economists have recently called for a better coordination of social policies to improve the effectiveness of government support (Bozio *et al*., 2015).

The response would be different if the issue was a consumption issue (with income large enough to cover basic needs). If consumption of other goods and services is above the socially accepted standard level at the expense of rent payment, a solution can be to pay directly the housing allowances to landlords. Households then lose the discretion of trade-offs between different essential goods and services. If alternatively the minimum quantity of housing which is considered as desirable by the society (the "decent" dwelling) is unsustainable for low income households then the norm of decency or the assistance level should be revised.

Note that it is also possible to question the calibration of the housing scheme parameters rather than the housing policy design. Rent ceilings or lump sum charges paid to households can be too low relative to actual costs especially in collective buildings. Indeed, in France at least, under indexation is a measure that has been used to lower public expenditure. It is clear that two contradictory objectives (affordability and reduction in public spending) cannot be reached simultaneously. Unaffordability can also be caused by housing overconsumption (the dwelling is under occupied or equipped with a higher than average level). If it is an individual choice, then it is not a policy issue. However, if the household is forced to rent such a dwelling by lack of affordable and adequate dwelling then it is a market failure. With low supply elasticity, housing allowances are not likely to solve that last issue alone. Subsidizing supply (if it does not crowd out private investment) would be a better response. The literature has blamed the reduced affordability also on the inflationary effect of housing allowances on rent (a price effect, rather than just a consumption effect). In the French case, it is particularly acute with a large share of the population who benefits from housing allowances, the possibility for landlords to claim direct payment of housing allowances and a low elasticity of supply. Reform is therefore needed here. A larger elasticity of supply should be promoted by reducing the structural constraints of the real estate market (on land and construction). Compared to the other European countries, a larger proportion of the population is covered by this assistance and this might be worth reassessing. Social policies are complementary. As shown by Griggs & Kemp (2012), housing allowances are very generous in England but because other benefits are not, residual incomes of recipients are low compared to other European countries. Revising housing allowances certainly means reconsidering new grounds for different social policies. For instance, redistributive policies could offset the decrease in housing allowances. Reducing the number of beneficiaries could then reduce the existing inflationary effect on rent.

Finally, housing unaffordability can be triggered by an adverse event. The potential role of housing allowances as a *shock* absorber following job loss was raised. Employment insurance should make up for part of the loss of income but not all households are eligible (if they had to quit their jobs or did not contribute enough to the employment insurance before, for example). Therefore, it raises the question of how ear-marked policies should deal with

events like that. Temporary emergency grants could be used. But the question of when and how to adjust the housing allowances remains an important one and is far from being obvious. One could argue that housing allowances should be calculated on a smoothed average of the past income levels to avoid high dependence on income at one moment in time. It would then act as a permanent source of income and households would be able to rely on a relatively constant amount. Any adjustment in housing consumption (size, quality, location, etc.) is costly because moving is costly. Housing therefore requires a long-term commitment. But the regression results and the discussion above also raise another aspect of the problem. When income drops, housing expenditure might become unaffordable, implying financial difficulties and adverse consequences. If society values access to housing and its stability, then effective policies should provide mechanisms to make up (at least partially) for the lost labor income. This result can be achieved through adjusting housing allowances quickly (and not retrospectively with an important time lag), negative income tax or a coordination of different social policies. It is up to future research to analyze how the design of the housing allowance schemes (or a coordination with other policies) should be revised to improve its effectiveness with respect to the housing right.

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We have examined in this article whether housing allowances ensure continued affordability. Their role as safety net was investigated by their impact in the case of job loss: do housing allowances reduce the probability to experience financial difficulties? To answer this question, an interaction term is introduced in the probit regression between (the level of) housing allowances and job loss to assess the role of housing allowances in preventing difficulties in paying rent. This interaction term is not significant when other household characteristics are controlled for. Housing allowances therefore do not help to reduce financial difficulties for those experiencing job loss. Ferey (2018) shows that housing subsidies also do not encourage people to return to work, due to the substitutability of unemployment benefits and means-tested benefits. Finally, they introduce significant disparities between households with similar incomes. Thus, the households with the lowest tax rates, with equal income, are those that do not receive housing allowances or the RSA.

In fact, it is a daunting challenge for housing allowances alone to ensure the right to stable and decent housing. Long-term affordability requires redistributive (or well-integrated social) policies to address the poverty issue. Flexible social policies or temporary emergency subsidies should be able to respond to sudden income volatility when insurance or savings are not enough. Availability of low-rent housing also requires a healthy housing market where supply meets housing demand. Housing allowances, here again, cannot solve this issue alone, especially with their adverse inflationary effect.

In the French case, several caveats have been identified. Housing allowances have a large coverage relative to other OECD countries. The lowest ten percentile income households therefore enjoy a relative lower level of protection. The large coverage combined with housing market constraints has fueled rent increases. Housing allowances have been increasingly costly. To limit this cost, rent ceilings, lump sum payments for charges and other parameters have not been fully indexed on inflation eroding affordability. The econometric results also show that horizontal and vertical equity are not re-established by housing allowances. A solution could be to revise the parameters (and lump sum charges) for single parent families, households on the lowest incomes and those in the Paris metropolitan area. However, it is difficult to say if indeed it is housing allowances or if it is the other social policies (including the redistribution itself) which are not well tailored in the first two cases. The question of how to respond to income volatility is not clear. Job loss increases the probability to face financial difficulties. There is a trade-off between offering a stable benefit favorable to long-term housing commitment and a flexible one, which adjusts to the household's need. In France, housing allowances are not part of social policies. This is therefore a challenge for quick and efficient coordination of social policies when the household situation changes. In this context, it is not surprising to find that low-income households are not well protected against income fluctuation.

In France, there is a "right to housing": every household must have access to and remain

in a decent dwelling. In practice, this is however difficult to achieve, particularly in a context of tight public budgets, high unemployment and a shortage of affordable housing. Housing allowances alone cannot solve the problem, and it certainly calls for a more comprehensive approach to address the affordability issue. If this article has contributed towards this research agenda, important outstanding questions remain. Specifically, it is very difficult to disentangle the different causes mentioned along the paper. It would require calculating a poverty line corrected for the spatial-socio-economic characteristics of the households, information on the consumption of other goods and services of households, estimating whether over-consumption was imposed on the households by market failures, etc., which is beyond the scope of this research. □

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APPENDIX

Control Variables for the Econometric Analysis

Variable name	Description
JobLoss	Job loss over the last four years
MaxHA	HA brings net housing burden to 0
Loss-Max	Interaction term (job loss and HA bring net housing burden to 0)
JustHA	Just recipient of HA
Loss-Just	Interaction term (job loss and just recipient of HA)
NBurden	Net Housing burden (rent, utilities and housing taxes)
Age	Age of the most educated person of the household by age groups
Income_Support	Minimum guaranteed income support (“Revenu Solidarité Active”)
Ed_0	No diploma or former primary school certificate (reference)
Ed_1	Middle school certificate (“BEPC” or “BE”)
Ed_2	Vocational high school certificate (“CAP” or “BEP”)
Ed_3	High school graduate (“Baccalauréat”)
Ed_4	Two years of postsecondary education
Ed_5	More than two years of postsecondary education
Fam_couple	Couple without children
Fam_single	Single person
Fam_sf12	Single family with 1 or 2 children
Fam_sf3	Single family with 3 or more children
Fam_child12	Couple with 1 or 2 children
Fam_child3	Couple with 3 children or more
Fam_other	Other family type
Foreign	Does not have the French nationality
Became French	Acquired the French nationality
Social H	Household living in subsidized dwelling (social sector)
zone_21	Zone 2 in urban unit of [100,000; 1,999,999[inhabitants
zone_22	Zone 2 in urban unit of [10,000; 99,999[inhabitants
zone_23	Zone 2 in urban unit of less than 10,000 inhabitants
zone_32	Zone 3 in urban unit of [10,000; 99,999[inhabitants
zone_33	Zone 3 in urban unit of less than 10,000 inhabitants
Arrival	A dummy taking into account the arrival date in the housing unit
Arrival_1	Less than one year in the dwelling
Arrival_2	1 to 4 years in the dwelling
Arrival_3	4 to 8 years in the dwelling
Arrival_4	8 to 12 years in the dwelling
Arrival_5	More than 12 years in dwelling (reference)
Formal Education	Category variable for the formal education levels
Family type	Category variable for each family type: single person, single family, couple with children, other (family) type
zone	Category variable for housing price levels. 3 zones are interacted with population
zone 1	Paris agglomeration, in the Ile-de-France region (IDF)
zone 2	Other in IDF and cities of more than 100,000 inhabitants
zone 3	Cities not in zone 1 and 2

The Perception of Job Insecurity in France: Between Individual Determinants and Managerial Practices

Stéphanie Moullet* and Zinaïda Salibekyan**

Abstract – Since the crisis, to what extent is the perception of the risk of job loss affected by the nature of the work environment, the employer's human resources management policy and its economic situation – or what employees know or perceive about it? Understanding what determines the perception of job insecurity is still rarely the subject of research by labour economists, even though this perception has proven effects, particularly on labour market behaviour and employee health. The analysis is conducted for France, using linked employee-employer data from the *REPONSE* 2011 survey. A multilevel model with a random constant is estimated after transforming the reported risk of job loss variable into a continuous "pseudo" variable of perceived insecurity. We show that managerial practices based on communication, promoting discussions between employees and management, as well as employee profit-sharing schemes or incentive practices, appear to reduce the perception of job insecurity.

Codes JEL / JEL Classification: J81, J28, O15
Keywords: perceived job insecurity among employees, managerial practices, workplace, linear probability model, multi-level approach

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Since the mid-1970s, France has seen an overall increase in employment insecurity, understood as frequently alternating between being in employment and being unemployed. This increase reflects the flexibility of the labour market and the development of particular forms of employment (Cahuc & Postel-Vinay, 2002). The 2008 economic crisis further increased the risk of job loss and the overall uncertainty of employees about the future of their employment; the unemployment rate is indeed a major determinant of the perception of job insecurity. Erlinghagen (2008) shows that, for a set of European countries, the long-term unemployment rate reinforces this perception, regardless of the situation of employees on the labour market.

The first contribution dealing with the perception of job insecurity, by Greenhalgh & Rosenblatt (1984), defines it as "the perceived powerlessness to maintain desired continuity in a threatened job situation". Therefore, employees may feel threatened even when their employment contract, for example a permanent contract, is deemed stable. Thus, in France, the perception of growing job insecurity, which was already widespread before the crisis, has since increased significantly among private sector employees on permanent contracts: 16% feared losing their jobs in 2005 and 24% in 2013 (Algava, 2015). Though permanent contrats constitute the "normal"[1] form of the employment relationship, more than a third of them are terminated within one year for the period 2007-2011 (Paraire, 2015). More generally, although the perception of insecurity and the rigorousness of employment protection play an important role in France (Deloffre & Rioux, 2005), they appear to be unrelated once the characteristics of employees and those of their jobs have been controlled – they may even be negatively linked (Postel-Vinay & Saint-Martin, 2004). In the French context of mass unemployment, employees are both highly protected and very anxious (Maurin, 2009). Their perception of risk, given the scale of the potential loss, would feed their fear. The fear of job loss (of social downgrading, for Maurin) is a psychological and social notion that is separate from the reality of unemployment itself. In other words, even when the risk of job loss is objectively low for some, they still lose hope to find one in a society where finding a job is difficult. This means that the risk stems from the scale of the loss rather than its probability. In addition, the perceived risk may be more or less significant, from very high to zero, via an intermediate situation where the risk cannot be assessed as high or low; in other words, it is unknown or uncertain.[2]

To date, few studies in labour economics have focused on the subjective aspect of job insecurity. As with any variable related to perceptions, its determinants are multidimensional and relate to other disciplinary fields, such as psychology (Fernandez-Ballesteros, 2002). Ultimately, very little is known about the determinants of employees' perception of their job insecurity, even though the perception of a risk of job loss has consequences on behaviour that are as important as those of the job loss itself. It is therefore very important to understand what influences the formation of this perception (Postel-Vinay & Saint-Martin, 2004). As early as 2005, the French *Conseil de l'emploi, des revenus et de la cohésion sociale* recommended that the perception of employment insecurity be the subject of numerous studies, stressing that "the perception of risk has consequences on the well-being and behaviour of personnel that make it as interesting as the actual risk" (*Conseil de l'emploi, des revenus et de la cohésion sociale*, 2005, p. 129). We know that employees' perception of job insecurity affect their professional performance and family life (Bohle *et al.*, 2001; Böckerman, 2004; Sverke *et al.*, 2002) and that it conditions voluntary mobility on the labour market. Therefore, examining the perception of insecurity makes particular sense from a public policy perspective. Various studies have also highlighted the implications of this perception in terms of general well-being, through its effects on the physical and mental health of individuals (Burgal *et al.*, 2009; Ferrie *et al.*, 2005; Näswall & De Witte, 2003). For example, for European countries in the mid-2000s, Burchell (2009) shows that the increase in job insecurity is associated with an increase in anxiety and depression symptoms and a decrease in sleep quality. In France in 2013, half of employees whose health is impaired fear losing their jobs, compared to 20% of those in good health (Algava, 2015). Recently established by Caroli & Godard (2016), the strictly causal effect of the perception of job insecurity on health (once the potentially endogenous nature of that perception of insecurity has been addressed) mainly concerns stress.

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1. According to Article L1221-2 of the French Labour Code, permanent employment contracts constitute the normal and general form of employment relationships.

2. Uncertainty is defined as the inability of employees to predict the consequences of choices and decisions (Miliken, 1987). Such inability stems from a lack of information.

In addition to the role of the labour market context and employees' own attributes, the perception of job insecurity can also be mitigated or reinforced by organisational factors, such as the type of work environment, the level of insecurity experienced by other employees in the same establishment, the social climate in the same establishment, its human resource management policy, the economic situation in the workplace and what employees know or perceive about it. Thus, the individual determinants of perceived job insecurity are nested in the organisational contexts of the different employing establishments. Taking this specific context into account at the establishment level, makes it possible to take a further step forward in understanding perceived insecurity, by taking into account individual and contextual determinants of the perception of insecurity. These determinants which are partly unobserved influence what happens on the labour market (see, for example, Abowd *et al.*, 1999), as well as job satisfaction (Haile, 2015) and even the perception of happiness (Ferrer-i-Carbonell & Frijters, 2004). Self-assessed job insecurity by employees can only be properly analysed by simultaneously taking into account contextual factors at the macro level (the unemployment rate, for example), the individual resources of those stakeholders (education level, for example) at micro level (Erlinghagen, 2008; Esser & Olsen, 2012) and the employer establishment at meso level. To our knowledge, the links between the determinants associated with the workplace and the insecurity perceived by employees have not been empirically investigated for France, with the exception of Amossé *et al.* (2016). This is a comparative study on perceived job insecurity in France and Great Britain. They show that by controlling the characteristics of individuals and establishments, there has been no significant change in the insecurity experienced since the onset of the crisis.[3]

In this article, we examine perceived job insecurity by investigating their individual determinants together with, in particular, those associated with the employer establishment. Therefore, our objective is to characterise the context in which employees express their fears and to measure its effect by using a set of variables, including variables characterising managerial policies, to evaluate the specific role of each on employees' perceptions. To do this, we use data from the national linked employee-employer 2011 *REPONSE* survey (Dares), which allows conducting a joint analysis of employers' human resources management practices and the situation of employees. The purpose of the survey is also to provide a graduated measurement of the perceived risk of job loss, by taking into account an intensity of perceived insecurity. This is done by distinguishing between insecurity and security and an intermediate situation in which the risk of job loss is unknown. The empirical analysis focuses specifically on employees with more than 15 months of seniority in establishments with 11 or more employees in the private non-agricultural sector.

The rest of the article is organised as follows: The first section reviews previous literature on perceived job insecurity and so-called objective insecurity; the second section presents the data and variables used for the analysis. Then, the third section describes the methodological approach. The last section analyses and discusses the results.

Objective vs Perceived Job Insecurity

The subjective dimension of job insecurity that is of interest has been the subject of much work. The literature supports the idea that insecurity cannot correspond to an objective state insofar as it results from what individuals perceive and experience: an economic situation can be considered to correspond to a state of insecurity or not, depending on both the perception of different individuals and their own ability to cope with insecurity. This is related to their individual experience and their past practices, where the subjective or psychological component – the perception of anxiety or safety – is predominant. Thus, in its subjective dimension, job insecurity is highly dependent on the individual and can be felt differently by two different employees, even though their objective employment situation is identical. According to Van Vuuren (1990), job insecurity also includes a dimension relating to uncertainty about the future. Not knowing whether the job currently held will be sustainable is a key component of perceived insecurity.

For Anderson & Pontusson (2007), subjective job insecurity is a cognitive aspect, namely employees' perceived risk of losing their jobs in the near future. This article adopts precisely this definition, which is based on the employees'

3. The data used are from the REPONSE *and WERS 2004/2005 and 2010/2011 surveys.*

own assessment of the risk of job loss in the coming year. Gallie *et al.* (2016) distinguish between the concern of losing one's job (job tenure insecurity) and the concern of losing certain job characteristics that are important to the employee (job status insecurity). Chung & van Oorschot (2011) also address employment insecurity as a combination of the job insecurity perceived by the employee (individuals believe they will lose their job in the coming year) and labour market insecurity, namely the risk of not finding a job quickly.

In respect of the so-called objective employment insecurity, the literature also contains multiple definitions. Labour market insecurity is determined on the basis of possible job loss rather than employment prospects (Dixon *et al.*, 2013). Some studies define security and "implicitly" its opposite, as multidimensional (Wilthagen & Tros, 2004): job security corresponds to the possibility of retaining a given job with a given employer. Less restrictive, employment security and employability security mean the possibility of holding a job and, therefore, not being in search of a job. Income security, which is broader still, corresponds to the fact of having an income throughout one's life, especially in the absence of employment. Lastly, combination security refers to the possibility of reconciling paid and unpaid work throughout life.

Most of the work on subjective job insecurity has been conducted on the basis of individual data for Western European countries (see for example, Rugulies *et al.*, 2006), Canada (McDonough, 2000) and Taiwan (Cheng *et al.*, 2005). Numerous studies show that this perceived insecurity depends only in part on the objective risk of exposure to risk. Generally, those studies focus on the insecurity generated by globalisation, changes to technology and skills and the increased duality of the labour market (Chung & van Oorschot, 2011; Clark & Postel-Vinay, 2009; Erlinghagen, 2008; Näswell & De Witte, 2003). For example, in a context of atypical employment growth, temporary employment contracts are more associated with greater perceived insecurity than permanent contracts (Chung & van Oorschot, 2011, among others). However, the relationship between seniority and subjective insecurity is not clearly established. By allowing the accumulation of firm-specific human capital (Becker, 1964) and the development over time of mutual trust between employees and employers (Rosen, 1985), seniority can be expected to protect employees from the risk of dismissal. In the context of the dual system of the French labour market, protected employees with high lengths of seniority are opposed to a precarious labour force, largely excluded from on-the-job training and more at risk of forced mobility (Le Barbanchon & Malherbert, 2013). In this context, it is also possible to think that many employees consider such mobility as "normal", with job losses appearing less as risks than as transitions to be managed.

In addition, other studies highlight gender differences in relation to perceived insecurity, which is higher among women, in addition to their labour market situation, which is generally more precarious (Green, 2009). The perception of insecurity is also related to the age of employees (Erlinghagen, 2008; Green, 2009), as well as their level of education, a proxy for individual levels of human capital (Green, 2009; Postel-Vinay & Turon, 2007). Lastly, previous experiences of unemployment increase perceived job insecurity, insofar as such interruptions make it more difficult to return to work (Erlinghagen, 2008; Esser & Olsen, 2012). The increased use of short-time working arrangements since the 2008 crisis (Calavrezo & Lodin, 2012) enables establishments to reduce their labour force (employees working less than the legal working time) to avoid layoffs. This arrangement undoubtedly has the effect of increasing uncertainty about the future among employees and, for some of them, their perception of insecurity. In contrast, on-the-job training, as a potential support for upwards mobility, reduces the perception of job insecurity (Goux & Maurin, 1997). Access to training for employees can enable them to increase their level of skills, to be more informed about the skills to be acquired and, therefore, to feel better equipped to deal with hazards. For the employer, training and the skills development that it enables can be a tool for employee retention, as those skills are valued on its internal labour market. Forth *et al.* (2016) show that there is a positive link between being part of the internal labour market of an establishment and benefiting from formal training.[4] Therefore, it can be expected that participation in on-the-job training increases the perception of job security among employees and reduces the perception of uncertainty, as it can be considered by employees as a sign that they belong to the internal market of the establishment.

4. Only participation in formal training is available in the REPONSE *survey.*

In addition, managerial practices aimed at improving employee performance, such as incentives or regular one-on-one meetings with supervisors, can have an effect on the perception of job insecurity (Gallie *et al.*, 2016[5]). Though these types of practices can increase the risk of job loss in the event of underperformance, they can also reduce perceived insecurity. In fact, by seeking to increase productivity, they require higher investments in employees' skills and thereby encourage employers to retain their jobs (*id.*).

The empirical studies presented here have primarily highlighted the determinants of the perception of job insecurity at individual level, whether in terms of the attributes of the employees or of the jobs they hold. They also reflect the difficulty of defining and understanding the perception of insecurity, which, while the opposite of the perception of security, is partly a feeling of uncertainty. Our contribution here is to link establishment-level policies, human resource management practices and the perception of job insecurity with a measure that distinguishes between perceived insecurity and uncertainty.

The Perception of Job Insecurity among Employees: First Descriptive Overview

In the *REPONSE* survey (Box 1), employees are specifically asked to evaluate the chances of losing their job over the next 12 months; possible responses range from "none" to "very high", including a "do not know" option (Table 1). In 2011, almost 13% of employees consider these risks to be high (8.6%) or very high (4.1%), while over 67% consider them to be low (37.5%) or non-existent (29.9%). Almost 20% respond that

5. Gallie et al. *(2016) examine the links between the subjective insecurity of employees – their risk of job loss – and the organisational contexts based on the 2012 British Skills and Employment Survey. This is because, individually, these data do not make it possible to take into account the heterogeneity of establishments.*

Box 1 – **The REPONSE Survey**

The data used to analyse the individual perception of job insecurity are taken from the 2011 survey on *Relations Professionnelles et Négociations d'Entreprises*, *REPONSE* (Professional Relations and Business Negotiations) conducted by Dares (the Directorate for statistics and studies of the French ministry of Labor). Since 1993, every six years, DARES uses this survey to question social relations stakeholders within establishment. Thus, for the third time, the 2011 survey provides a snapshot of social relations in the workplace in France.

The aim of the survey is to understand the dynamics of employment relations within establishments between management, employee representative institutions and employees. This objective justifies the multiplicity of stakeholders surveyed. The establishments surveyed are randomly sampled through a face-to-face interview with a management representative. These establishments belong to the private and semi-public sectors (excluding administration and agriculture), are representative in terms of size and business sector and have at least 11 employees. Employees are surveyed by post, if they have at least 15 months' of seniority within the establishment; they represent 87% of employees in the non-agricultural commercial sector in establishments with 11 employees or more. The 15-months threshold leads to over-representation of employees on permanent contracts whose objective job insecurity, and probably their perceived insecurity, is less than for other employees – with this minimum length of tenure, more than 90% are on permanent contracts.

Thus, the survey makes it possible to cross-reference the views of the stakeholders by surveying, on the one hand, a management representative (Management component – more than around 4,000 interviews) and, on the other, an employee representative (where there is one – almost 2,400 interviews) and, in addition, a sample of employees (over 18,000 surveyed). Insofar as the determinants of job insecurity are variables related to both employee and establishment levels (this level rather than company level allows more analysis of organisational practices, see Askenazy & Grenet, 2009), here we use linked data from the Employee and Management components.

After removing non-responses relating to the perception of job insecurity and observations with missing information for the individual variables, a sample of 10,033 individual observations (employees) from 3506 establishments is left.

We note that employees not answering the question relating to the RJL have individual characteristics that are closer to those who report insecurity than other employees, with the exception of their length of tenure within the establishment, which is higher (the proportion with less than 5 years is 20%, in comparison with 28% and 32% for employees who report security and insecurity, respectively).

In addition, to take into account local economic contexts on the individual in relation to the individual perception of job insecurity, departmental unemployment rates for 2011 (Insee) are attributed to individual observations.

that do not know: this uncertainty about the duration of employment or the situation can be considered a major aspect of the perception of job insecurity, or even a perception of powerlessness (Dekker & Schaufeli, 1995). In this first descriptive approach, the degree of perceived insecurity is determined based on three options that can be given: high, unknown and low.

The level of insecurity perceived varies in accordance with employee characteristics. In particular, the descriptive statistics reveal, unsurprisingly, that the perception of insecurity is most widespread, firstly, among employees who have experienced unemployment during the previous three years and, secondly, among those on fixed-term employment contracts (Table 2).

Table 1
Perception of Job Insecurity: "Do you think there is a risk of losing your job over the next 12 months?"

(In %)

Very high	4.1	High risk of job loss (RJL) (or insecurity)	12.7
High	8.6		
Do not know	19.9	Unknown RJL	19.9
Low	37.5	Low RJL (or security)	67.4
None	29.9		

Reading Note: In 2011, 37.5% of employees report a low RJL over the next 12 months.
Coverage: Private sector establishments with more than 11 employees, with at least 15 months of seniority. Weighted data.
Sources: Dares, *REPONSE* 2011.

Table 2
Perceived Job Insecurity and Employee Characteristics

(In %)

	Low RJL Security	Unknown RJL	High RJL Insecurity
Employment contract type			
Permanent	67.8[(a)]	19.6	12.6
Interim	73.0	20.6	6.4
Temporary	59.8[(a)]	23.4	16.8
Seniority in the establishment			
Less than 5 years	68.7	18.0	13.3
Between 5 and 10 years	69.5	19.5	11.0
More than 10 years	65.8	21.2	13.0
Short-time working in the last 3 years	54.7	23.6	21.7
Absence of unemployment	69.1	19.1	11.8
Employer-funded training in the last 3 years	73.4	15.5	11.1
Absence of training	62.3	23.6	14.1
Men	67.5	19.3	13.2
Women	67.2	20.5	13.3
Age bracket in 2011			
Aged 16-29	74.2	15.0	10.8
Aged 30-49	66.0	20.7	13.3
Aged 50 or over	60.4	30.0	9.6
Level of education			
Unqualified	49.2	39.9	10.8
BEPC[(a)]	61.2	23.3	15.5
CAP-BEC[(b)]	65.8	21.5	12.7
2 years of higher education	74.5	12.6	12.9
3/4 years of higher education	76.9	9.1	14.0
5 or more years of higher education	79.9	7.2	12.9
Total	67.4	19.9	12.7

(a) French middle school diploma
(b) French vocational qualifications and Baccalaureate
Reading Note: In 2011, among employees on permanent contracts, 67.8% report a feeling of job security (or consider their RJL to be low), whereas this is the case for only 59.8% of employees on temporary contracts.
Coverage: Private sector establishments with more than 11 employees, with at least 15 months of seniority. Weighted data.
Sources: Dares, *REPONSE* 2011.

At the other end of the scale, the perception of security is highest among the most highly educated employees and that perception increases steadily with the level of the qualification; the proportion of those who say they do not know whether the risk is high or low varies in the opposite way. Accepting the premise that this risk is unknown when individuals do not have sufficient information and/or are unable to distinguish between relevant and irrelevant information (Giffort *et al.*, 1979), then the highest qualified personnel are more capable than the others of assessing their employment situation. In contrast, a higher-than-average proportion of the least qualified employees declare not to "know" their RJL. The differences in perception for other employee characteristics are less directly interpretable, given the correlation between various characteristics. However, it is interesting to note that the levels of RJL reported by men and women are quite similar.

The perception of insecurity among employees also varies in accordance with the economic situation and human resource management of the employing establishment (Table 3). Thus, employees in establishments whose business volume has declined or who have adjusted their workforce downwards over the past three years report a perception of job insecurity more often

Table 3
Perceived Job Insecurity and Organisational and Managerial Context of the Establishment

(In %)

	Low RJL Security	Unknown RJL	High RJL nsecurity
Changes to workforce numbers in the last 3 years			
Increase	73.0	18.7	8.3
No change	67.0	21.2	11.8
Reduction	59.8	19.9	20.5
Business volume in the last 3 years			
Increase	74.0	17.3	8.7
Stable	66.7	21.9	11.4
Decrease	57.8	21.5	20.7
Skills reference system			
Introduction or amendment in the last 3 years	70.7	17.1	12.2
Unchanged	65.6	21.4	13.0
Removal of positions in the last 3 years	63.6	17.6	18.3
No removals	68.5	20.6	10.9
Dissemination of information on employment development prospects to all employees			
Regularly	69.0	18.6	12.4
Occasionally	64.7	22.0	13.3
Never	66.0	21.5	12.5
Regular interview between employees and their supervisors			
For all employees	69.8	18.0	12.2
No interview or only for certain employees	62.7	23.7	13.6
Social climate within the establishment			
Calm	68.3	20.4	11.3
Stressed	61.1	16.8	22.1
Frequency of strikes lasting less than 2 days (in the last 3 years)			
More than 5	39.8	44.5	15.7
3 to 5	39.4	43.2	17.4
1 to 2	35.9	44.7	19.4
None	33.4	42.6	24.0
Management reaction in case of difficulty			
Absence of difficulty	43.9	26.4	29.7
No particular initiative	28.4	51.3	20.3
Unilateral decisions	29.5	46.6	23.9
Consultation of employees and employee representatives to find common solutions	39.1	41.2	19.7

Reading Note: In 2011, among employees in establishments where the number of employees has increased, 73% report a feeling of job security.
Coverage: Private sector establishments with more than 11 employees, with at least 15 months of seniority. Weighted data.
Sources: Dares, *REPONSE* 2011.

and, logically, a perception of security less often. The perception of insecurity also appears to vary in accordance with social climate: a tense social climate is associated with a higher proportion of employees expressing a higher perception of insecurity or uncertainty. In contrast, high levels of conflict – measured by the frequency of short-term strikes (less than two days in length) during the previous three years – appear associated with lower proportions of employees reporting high RJL. One possible explanation would be that the level of conflict manifests a context in which employees have the ability to mobilise themselves versus a context high in insecurity or discouragement. Another explanation would be that, knowing that conflict and the scale of negotiations go together in the establishments (Béroud *et al*., 2008), the presence of employee representatives to negotiate and their ability to do so would contribute to a certain feeling of security for employees. There are also some differences associated with changes in work organisation: for example, the prevalence of perceived security is lower when there have been job cuts in the recent past. In contrast, it is higher among employees in establishments that have set up or amended a skills reference system over the past three years.

Other characteristics of managerial practices seem favourable to the perception of job security. This is the case for regular communication between employees and their management (existence of regular interviews) and the quality of social dialogue, assessed by the existence of employee and employee representative consultations rather than decisions taken unilaterally by management in the event of difficulties. The establishment is further characterised by two indicators: one concerns the setting of precise and quantified objectives for employees; the other concerns incentive practices (Box 2). While there is no clear link between the perception of insecurity and the existence of objectives, employees who

Box 2 – **Creation of Indicators for Management by Objectives and Incentive Practices**

To create the indicator relating to management by objectives, we used the literature on managerial practices (Bloom & Van Reeven, 2010) and the work of Askenazy & Forth (2016). The indicator is created based on the positive answers to the following question:

"Have precise and quantified objectives been set in each of the following areas?" [yes/no]: quality; budgetary compliance; increasing market share; profitability.

The indicator is 1 if objectives are set for all areas, 0.75 if they are set for only 3 areas, 0.5 if they are set for 2 areas, 0.25 for 1 area and 0 if there are no explicit objectives set.

The incentive practices indicator is created based on the same principle, by combining 4 characteristics: employees' ownership of a portion of the company's share capital (by benefiting from stock options, for example), the existence of bonuses linked to collective performance, linked to individual performance and, lastly, the existence of a link between the results of employees' periodic evaluations and their salaries or bonuses. As with the foregoing indicator, the value ranges from 0 to 1 in accordance with the incentive methods in place.

Table A shows the proportion of employees by level of RJL perceived for the different values of these indicators.

Table A
Management Type and RJL

(In %)

	Low RJL (Security)	Unknown RJL	High RJL (Insecurity)
Management by objectives indicator			
0	64.1	22.7	13.2
0.25	67.6	19.4	13.0
0.50	68.4	19.6	12.0
0.75	67.7	20.9	11.4
1	67.3	19.5	13.2
Incentive practices indicator			
0	53.2	28.4	18.4
0.25	65.4	22.5	12.2
0.50	67.3	18.4	14.3
0.75	67.9	20.3	11.9
1	71.4	16.9	11.8

Coverage: Private sector establishments with more than 11 employees, with at least 15 months of seniority. Weighted data.
Sources: Dares, *REPONSE* 2011.

benefit from more performance related practices (bonuses, for example) express a perception of insecurity or uncertainty less often and of security more often (see Table A in Box 2).

After this initial descriptive approach, it is now necessary to identify the determinants of perceived insecurity and their respective effects, by separating those that are related to employees' characteristics and those that are related to the professional and organisational context within the establishment.

What are the Determinants of the Job Insecurity Perceived by Employees?

Insofar as we are seeking to understand what contributes to the formation of employees' perception of job insecurity, it is crucial to take into account, beyond the employees' own attributes, the elements of the employment context. To do this, the multi-level approach (Goldstein, 2003; Bryk & Raudenbush, 2002) is appropriate given the hierarchical structure of the data, where each employee is located in a particular establishment. Therefore, the dependent variable, reflecting the perception of job insecurity, is measured at the first level of the hierarchy and the explanatory variables are measured at the level of the individual and the level of the establishment. Failure to take into account this double source of heterogeneity would lead to estimation bias (Haile, 2015).

Estimation Strategy

To address the role of the employment context, a fixed-effects model (Model 1) is used as an initial approach: it consists of considering the unobserved contextual effects specific to each employing establishment as parameters to be estimated. However, the latter absorb the different observable variables that relate to the establishments. Therefore, to isolate the effects of each of these establishment variables, a multilevel random constant model (Models 2 and 3) is then used. This makes it possible to measure the associations between variables that characterise the practices in the workplace, in particular, and the job insecurity reported by employees. The aim is not so much to control for heterogeneity of the employment context to limit the bias in estimating the specific effects of individual attributes, but rather to highlight the effect of the establishments' organisational and human resources (HR) practices on the insecurity perceived by employees. In addition, while this approach allows the variance of the context to be considered as a potential source of information, it requires the validation of a strong assumption, according to which the unexplained establishment effects (i.e. those beyond the observable characteristics that describe the context) are independent of the individual explanatory variables. It should be remembered that the fixed-effect models are not based on such a hypothesis. In contrast, where the latter is verified and where the objective of the analysis is primarily to highlight context effects, as is the case here, the random constant model is preferable (Givord & Guillerm, 2016).

The job insecurity perception variable – that is, employees' assessment of the greater or lesser risk of losing their job over the coming year – is based on ordered response options: very high, high, unknown, low or no risk. By "cardinalising" this variable to be explained, it is possible to use linear probability models (see the details of this transformation in the appendix): the coefficients estimated using random constant linear model where the dependent variable is now "pseudo" continuous are equivalent to those derived from the ordered multinomial model (Origo & Pagani, 2009; Van Praag & Ferrer-i-Carbonell, 2006; or Van Praag *et al.*, 2004). It is then possible to interpret the coefficients of the linearised model thereby obtained as marginal effects.[6]

The estimation of the fixed-effects model used in the initial approach (Model 1) suggests that taking establishment effects into account as fixed effects is preferable to a standard linear estimation. The multilevel random constant model allows a further step as it includes both individual and establishment variables and controls for unobserved heterogeneity at both levels. This modelling is proving to be an approach preferable to simple linear regression[7]

6. Though the speed and flexibility of the estimates of the linear model make it possible to highlight the potential effects of interaction between individual and contextual variables, we are not pursuing in this manner with this contribution.

7. Advance estimation of a model without an explanatory variable makes it possible to identify the proportion of variance of individual perceptions that is attributable to differences between establishments. The intra-class correlation coefficient (ICC) is then 22%: the differences in individual perceptions for this portion would be due to the heterogeneity of the employing establishments or, in other words, 22% of variability in perceptions corresponds to the variability between the establishments. The magnitude of this coefficient, the significance of the variance of the constants in this empty model and the Likelihood Ratio test confirm the relevance of multilevel modelling and the existence of an establishment effect on individual perceptions (Bressoux, 2010).

and the integration of individual variables (Model 2) and then variables characterising the establishments (Model 3) shows that both are among the determinants of perceived employment insecurity. The proportion of variance in individual perceptions that remains attributable to differences between establishments is 15% (Table 4). At this stage, each establishment is characterised by variables relating to its managerial policy, organisational changes, social climate changes and trade union presence (the variables listed in Table 3, together with an indicator of trade union presence), in addition to the sector of activity, size and how long it has been established.

To what extent does the remaining unexplained part of the context correlate with individual variables? It can be assumed that the proportion of employees on temporary contracts at an institution, which is the form of contract most frequently offered to young people and those with few qualifications, is linked to the age and qualification variables. This variable was found to have no significant effect on perceived employment insecurity. Likewise, the proportion of managers, which can affect the recruitment and job stability of the most highly qualified, also has no significant effect on employees' feelings. Furthermore, the estimated coefficients and their significance in the fixed-effect models appear to differ very little from those obtained by the random constant model, which helps to demonstrate the robustness of the results.[8] Therefore, multilevel modelling with a random constant appears to be the most relevant.

Hereinafter, we comment successively on the role of employees' characteristics, then that of their environment, first the establishment and then the local economic context. The results are based on estimates from random constant models, where the dependent variable is "cardinalised" (cf. Table 4, Model 3).

Newly Hired Employees, or on Temporary Contracts, or Having Experienced Unemployment are More Likely to Report a Feeling of Insecurity

Firstly, the estimate confirms that there is no difference in the perception of job insecurity between genders. However, perceived job insecurity varies with age. In fact, for the youngest (under 30 years of age), perceived insecurity is lower than for the middle age group. It is at the ages corresponding to the time of building a career and the core of working life that employees more often express perceived insecurity. At that time in life, the responsibility of children who are still at home or in education certainly contributes to viewing the potential loss of employment more negatively than in the absence of dependent children (De Witte, 1999). In the opinion of Gallie *et al.* (2016), due to family responsibilities and skills obsolescence, employees over 35 years of age are significantly more concerned about a potential job loss. Being aged under 30 (rather than aged between 30 and 50) reduces the level of perceived insecurity by nearly 20%. Some younger workers, who are generally more susceptible to cyclical variations than other employees, at the start of their working lives, are objectively more subject to disrupted career paths and, therefore, to a more uncertain future for their current job, together with a manifestly greater objective risk of losing their jobs (Beduwé & Dupray, 2018).

In general, the higher the level of qualification held, the lower the perception of insecurity. The most highly qualified (with five years of higher education) are the employees for whom the imminent loss of their job is perceived as the least likely. This population has a better idea of its professional future and is also the one for which external mobility, when it takes place, is more often chosen. Insecurity is also lower among those with two years of higher education than for less qualified employees.

The type of employment contract should be considered with caution, insofar as permanent contracts are over-represented in the survey. However, it is demonstrated that having a temporary contract rather than a permanent contract "predisposes" employees to a greater perception of insecurity about the future.[9] In contrast, the perception of insecurity is lower among those with agency contracts than among those with temporary contracts. The perception among employees of the risk of losing their jobs depends on the consequences in terms of unemployment (of its duration) and of the associated loss of income. Though employees

8. One way of testing the independence of establishment effects and individual variables is to add, according to Mundlak (1978), the averages for each establishment to each of these variables and the statistical significance of the estimators obtained for these variables then constitutes a test of the independence hypothesis. Our results show that only the variable relating to short-time working is significant. This estimate, which is not reported here, is available from authors.

9. This can be explained through the low rate of conversion of temporary contract into permanent contracts (OECD, 2016).

Table 4
Linear Model - Estimation of the Level of Perceived Insecurity

	Model 1 Fixed Effects	Model 2 Random intercept	Model 3 Random intercept
Individual variables			
Women (ref. Men)	0.01 (0.02)	-0.02 (0.02)	0.00 (0.02)
Aged 16-29 (Ref. Aged 30-49)	-0.19*** (0.03)	-0.23*** (0.03)	-0.24*** (0.03)
Aged 50 or over	-0.07 (0.09)	-0.13 (0.08)	-0.12 (0.08)
Level of education (Ref. CAP-BEC)			
Unqualified	0.03 (0.03)	0.06** (0.03)	0.08*** (0.07)
BEPC	0.13*** (0.05)	0.12*** (0.04)	0.13*** (0.10)
2 years of higher education	-0.07** (0.03)	-0.05** (0.03)	-0.06** (0.06)
3/4 years of higher education	-0.03 (0.04)	-0.02 (0.03)	-0.02 (0.08)
5 or more years of higher education	-0.08** (0.04)	-0.08** (0.03)	-0.07** (0.07)
Temporary Contract (Ref. Permanent)	0.21*** (0.06)	0.17*** (0.05)	0.23*** (0.05)
Interim contract	- 0.68*** (0.20)	-0.35*** (0.11)	-0.26*** (0.11)
Seniority in the establishment (Ref. more than 10 years)			
Less than 5 years	0.03 (0.03)	0.04 (0.02)	0.08*** (0.03)
5 to 10 years	0.02 (0.03)	0.02 (0.02)	0.04* (0.02)
Having experienced short-time working	0.31*** (0.05)	0.31*** (0.03)	0.21*** (0.03)
Not having received ongoing training	0.10*** (0.02)	0.14*** (0.02)	0.10*** (0.02)
Establishment variables			
The establishment is not in Paris			0.11*** (0.03)
Business volume (Ref. increased)			
Stable			0.09*** (0.03)
Decreased			0.22*** (0.03)
Number of employees over time (Ref. increased)			
Stable			0.04 (0.03)
Decreased			0.16*** (0.08)
Systematic interviewing of managers and non-managers			-0.05* (0.03)
Introduction or amendment of a skills reference system			-0.05** (0.02)
Removal of positions			0.17*** (0.03)
Regular dissemination of information on employment development prospects			-0.04*** (0.02)
Index of precise and quantified objectives			0.09*** (0.04)

➔

Tableau 4 (contd.)

	Model 1 Fixed Effects	Model 2 Random intercept	Model 3 Random intercept
Index of incentive practices			-0.10** (0.05)
Union presence			0.10 (0.03)
Frequency of short strikes (less than 2 days) in the last 3 years (Ref. none)			
More than 5			-0.18*** (0.05)
3 to 5			-0.15*** (0.05)
1 to 2			-0.01 (0.04)
Reactions of management (Ref. consultation of employees and employee representatives to find common solutions)			
Unilateral decisions			0.25*** (0.02)
No particular initiative			0.27*** (0.03)
Never any difficulty			-0.04 (0.04)
Climate: Stressed (Ref. calm)			0.21*** (0.03)
Unemployment rate in the department of the establishment			0.04*** (0.02)
Intercept	-0.07*** (0.02)	-0.07*** (0.02)	-0.28*** (0.1)
Variance (establishment)		0.17 (0.01)	0.11 (0.1)
Variance (individual)		0.67 (0.01)	0.65 (0.1)
ICC		0.21 (0.01)	0.14 (0.1)
ICC empty model		0.22 (0.01)	0.22 (0.1)
R^2 adjusted	0.24		
F(14.6513)	10.89		
Prob. > F	0.00		
Log likelihood		-13,193.80	-11,977.36
Wald chi2		304.49	1002.18
Prob. > chi2		0.00	0.00
F(3505. 6513)	1.77		
Prob. > F	0.00		
LR test versus Chi2 linear regression (01)		447.10	210.5
Prob > chi2		0.00	0.00
Number of employees	10,033	10,033	9396
Number of establishments	3,506	3,506	3,281

*** p<0.01; ** p<0.05; * p<0.1
Notes: Models 2 and 3 include control variables for 11 industries, 6 establishment sizes (fewer than 20, 20 to 49, 50 to 99, 100 to 249, between 250 and 499, over 500) and 4 lengths of seniority (less than 5 years, between 5 and 9 years, between 9 and 19 years, between 20 and 49, 50 years or over)

who are most stable in terms of their employment contract feel insecure more often than those on interim contracts, this may reflect greater uncertainty regarding the possibility of dismissal[10] – agencies very rarely dismiss employees – together with the fact that they would have more to lose from a potential dismissal in a crisis context: the perception of the risk of job loss is influenced by the potential duration of unemployment and the associated loss of income (Gautié, 2009).

It is also noted that employees with low seniority within the establishment are more likely to perceive insecurity. This finding corresponds to the generally protective role of seniority on the French labour market (Behagel, 2003).[11]

On-the-job training seems to play a specific role. In fact, the likelihood of employees reporting a perception of insecurity is reduced among those who have received on-the-job training during the last three years. In other words, for employees, access to training would improve the level of security perceived: on the one hand, investment in training would contribute to sustainable job retention, with the employer expecting a return on its investment, and on the other hand, it would contribute to the employee's employability in the event of dismissal.

Lastly, experience of short-time working over the past three years has the expected effect on employees' perceptions, in line with other studies (Heckman & Borjas, 1980). Previous experience of unemployment is a factor that fosters fear of repeated job loss (Clark, 2001; Gallie *et al.*, 2016), while also contributing to making employees less confident about the future and more "sensitive" to the risk of unemployment. The additional insecurity perceived even exceeds that associated with having a temporary contract rather than a permanent contract.

The Situation of the Establishment and Managerial Practices Influence the Perception of Job Insecurity

What is the role of human resource management practices on the perception of job insecurity, once the employee characteristics have been controlled? To answer this question, the sector of activity, size of the establishment and seniority in the establishment are also controlled, as such characteristics are likely to influence the HR management practices implemented.

The Transformation of Jobs and the Decline in the Number of Employees, Logical Sources of Perceptions of Insecurity

Downward shifts in the volume of an establishment's workforce constitutes one expected factor among the determinants of perceptions of job insecurity (Gallie *et al.*, 2016; Reichert & Tauchmann, 2017). We show here that, logically, a decrease in the number of employees is associated with greater expressions of insecurity than when employee numbers have increased or remained stable. However, the effect of the decrease in business volume is even more important (with the level of perceived insecurity increasing by 22% and 16%, respectively).[12] Expectedly, job transformations, such as the removal of certain positions within the establishment in the recent past (within the last three years), increase the level of perceived insecurity (by 17%). In respect of the management of the workforce, Greenhalgh & Rosenblatt (1984) maintain that the subjective risk of job loss depends, in particular, on the decline of the organisation, which leads to adjustments likely to affect the continuity of employees' professional situations.[13]

Financial Incentives Reduce Perceived Insecurity, Management by Objectives Increases It

It is demonstrated that the implementation of incentive practices (measured using the indicator described in Box 2) within the establishment is associated with a perception of job security.[14] In other words, the modes of involvement seem to contribute to reducing the risk of job loss perceived by employees. This result is in line with that of Bryson *et al*. (2016), showing that

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10. Duhautois & Petit (2015) also show that the level of dismissals for economic reasons is rather high in France, which suggests that the legal constraints imposed on employers are not as strict as is often thought.

11. Nevertheless, at the beginning of working life, young people's concern over their professional future increases with their seniority in the establishment. This can be explained through the fear of losing a relatively privileged position (Beduwé & Dupray, 2018).

*12. After matching the data with the Labour Movement Declarations (*Déclarations de mouvements de main-d'œuvre - *DMMO), the turnover and economic lay-off rates in the various establishments in 2010 were found to have no significant effect on the perceived RJL (results not reported here).*

13. In respect of the organisation of work, once again, the indicator of a just-in-time production type was also shown to have no significant effect on the RJL.

14. The fact that the establishment is part of a family business has no effect on the perception of insecurity, contrary to that maintained by Bassanini et al. *(2013), in whose opinion job security is higher in this type of firm. They show that the dismissal rate is lower in family businesses than in other types of businesses.*

incentive practices have a positive and significant effect on job quality in France.

Other managerial practices can play an important role in reducing anxiety: for example, regular interviews with their supervisor can inform employees about their skills and their employment or career prospects, as well as providing them with more general information (and, thereby, potentially reduce uncertainty and subjective insecurity) regarding organisational changes and potential upward mobility (Milkovich *et al.*, 1976). The perception of job insecurity depends on the sense of powerlessness that can result from a lack of information on the expected level of performance. It is shown here that having regular interviews with their supervisor contributes to a perception of security: employees' level of employment insecurity is reduced, even if only slightly, all other things being equal. These practices may also reflect forms of employers' commitment to their employees (Renwick, 2003; Herriot *et al*., 1997). This result should be compared to the one reached for the establishment's social dialogue. In fact, when rather than consulting employees and their representatives during periods of difficulty to develop common solutions, management takes decisions unilaterally or does not have any particular initiative, perceived insecurity increases to a relatively significant extent. As a factor that contributes to the quality of social dialogue, the fact that employees (or their representatives) are consulted or can influence management decisions helps to reduce the level of insecurity felt.[15]

In contrast, managerial practices based on setting precise and quantified objectives appear to make employees feel more insecure. We show, in fact, that the existence of such objectives established for employees contributes to raising their perception of the RJL: this risk is then felt all the more strongly where such objectives are present and numerous (in the sense that they cover multiple aspects).

Lastly, in respect of management communication with all employees, when issued regularly, the dissemination of information on employment development prospects decreases perceived insecurity. At workstation level, the update or introduction of a skills reference system (over the past three years) is another factor that is associated with significantly increased perceived security. The existence of skills reference systems for jobs within the establishment may be used as a tool for skills development, which is positively linked to employees' perception of their employability (for example, Wittekind *et al.*, 2010). These management tools can be considered to help employees to obtain a more objective view of their skill level and, thereby, contribute to reducing their perception of job insecurity (or uncertainty). However, the dissemination of information by management and the existence of a skills reference system have only a limited impact on the level of insecurity perceived by employees.

A Deteriorated Local Economic or Social Context Raises Perceived Insecurity

Not surprisingly, we also observe that the higher the unemployment rate in the department in which the establishment is located, the higher the level of perceived insecurity; here we encounter the result found by Green (2009), who showed the link between regional unemployment rates and the perception of job insecurity. In the same vein, we observe a significant negative link between the level of perceived insecurity and the establishment being based in the Paris region: local employment opportunities and the proportion of skilled jobs that are much higher than elsewhere in France certainly contribute to this lower perception of insecurity.

Lastly, the perception of job insecurity appears to be associated with the social climate within the establishment (assessed in the survey by management representatives): a tense climate goes with a higher perceived risk of job loss. This effect is as important as that of a decrease in business volume. However, the impact of a tense social climate on employees' perceptions of insecurity can be more than offset by the practice of discussions between employees and managers (periodic interviews) and the consultation of employees in the development of solutions to the establishment's difficulties. However, it is difficult to interpret these associations further: in fact, though the perception of insecurity is stronger when the social climate is tense, that perception itself can contribute to a tense climate. Such a limitation on interpretation also affects the results obtained in relation to the link between perceived insecurity and union presence or strikes within the establishment. Indeed, we observe that union presence within the establishment increases the perception

15. Gallie et al. *(2016) show, in particular, that job insecurity is lower when employees can influence decisions relating to the reorganisation of work.*

of job insecurity among employees. In this respect, reverse causality may be considered: if the perception of job insecurity encourages unionisation, union presence would be more frequent where perceived insecurity is widespread. Bryson & Freeman (2013) have indeed shown that deteriorated working conditions increase the desire for union representation and, therefore, it is not surprising to find a negative association between union membership and the perception of job insecurity.[16] Amossé *et al.* (2016) show that neither union presence within the establishment nor the rate of unionisation have an impact on perceived job insecurity. The result obtained here, according to which union presence is associated with greater insecurity perceived by employees, is confirmed when conflict in the establishment is controlled for. The frequency of short-term strikes is negatively associated with perceived insecurity[17]: the more short-term strikes over the past three years, the lower the perceived insecurity. This could indicate a "reassuring" effect of the existence of a balance of power (of which strikes are the manifestation) or of a favourable outcome of these strikes, if they have influenced certain practices or decisions – however, our data do not allow us to go any further.

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Based on linked employer-employee data from the *REPONSE* 2011 survey, which allows taking into account the heterogeneity at the level of the establishment to which employees belong, we have shown that the perception of job insecurity depends on the characteristics of the establishment. The results obtained suggest that employees' perception of job insecurity is linked to the economic situation of their establishment and to that of the local labour market: a decline in business volume or employment volume, a tense climate within the establishment and high local unemployment are all factors that, quite logically, increase concern among employees regarding their jobs.

Managerial practices can influence risk perception. Those that contribute to employee engagement, whether in financial terms, through bonuses or incentive or profit-sharing schemes, or by means of the way in which employees relations are handled (regular discussions between employees and their supervisors, consultations, etc.), are associated with a lower level of insecurity or uncertainty. These results are in line with those of Amossé *et al*. (2016), also dealing with the link between establishment characteristics and employees' perception of job insecurity, but not addressing the impact of different managerial practices on that perception. For their part, Gallie *et al*. (2016) explored the latter aspect; however, they were unable to take into account the unobserved heterogeneity between the different institutions in a multilevel approach due to the absence of linked employer-employee data such as those used in this article.

However, our results remain limited due to the possible bias of omitted variables, inherent in any descriptive analysis of the type conducted here. Other establishment characteristics that are not observable with the survey data could contribute to the effects obtained for managerial practices. Though it is possible here to interpret perceived job insecurity by linking it to a context (local labour market conditions, the economic and social situation of the establishment, human resources management and management policy), the matter of the non-random assignment of employees to different professional environments in terms of the employment security they offer is not considered. Lastly, to further, it would be necessary to take into account possible effects of interaction between individual variables and establishment characteristics that could further enrich the analysis. □

16. Even though, on an individual basis, being unionised appears to reduce perceptions of insecurity (Bryson et al.*, 2011).*
17. Other manifestations of conflict such as work-to-rule campaigns and disengagement have no significant impact.

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APPENDIX

LINEAR PROBABILITY MODEL - PROBIT ADAPTED OLS (POLS)

The method proposed by Van Praag & Ferrer-i-Carbonell (2006) consists of "cardinalising" an ordinal variable. This is an adjustment made to the scale of the categorical dependent variable by deriving the Z values of the standard normal distribution that correspond to the cumulative frequencies of the initial ordinal variable. For a given value of this original variable, the value of the "cardinalised" dependent variable is the expectation of a standard variable normally distributed, provided that it is in the interval between these two Z values that correspond to the class of the value of the original variable.

Therefore, Z is an ordered categorical variable related to the unobserved continuous variable Z^* as follows:

$$Z = j \text{ si } \mu_{j-1} < Z^* < \mu_j \text{ for } j=1,2,\ldots k.$$

This latent variable is partitioned into k intervals so that if modality j is observed then Z^* is situated in the interval between μ_{j-1} and μ_j.

Even without knowing the exact values of the latent variable, its conditional expectation can be calculated by using the properties of the normal distribution. The calculation of the "cardinalised" variable Y_C is then:

$$Y_C = E(Z^* / \mu_{j-1} < Z^* < \mu_j) = \left[\phi(\mu_{j-1}) - \phi(\mu_j)\right] / \left[\phi(\mu_j) - \phi(\mu_{j-1})\right]$$

where ϕ is the standard normal probability density function and ϕ is the standard normal cumulative density function. One of the advantages of this transformation is that the calculation time is considerably reduced, especially in the case of multilevel modelling, with the estimated model now being linear (Van Praag & Ferrer-i-Carbonell, 2006).

The Impact of the 'Scellier' Income Tax Relief on Building Land Prices in France

Pierre-Henri Bono* and Alain Trannoy**

Abstract – This study assesses the impact of a tax incentive scheme to boost private rental investment in force in France from 2009 to 2012, called the "Scellier scheme" (after the name of the minister who promoted it), on changes in the price of building land. A difference-in-differences estimation is implemented, drawing on data from the BNDP database covering the period 2004-2010. The definition of the control and treatment groups is based on the boundary between municipalities which are eligible for the Scellier scheme and municipalities which are not. The estimation results suggest that the scheme had an inflationary effect and point to land price capitalisation, with an increase in the price per square metre of around 7 euros in the first year and of 8 to 9 euros over 2009 and 2010, without a significant rise of the phenomenon in the second year, i.e. an increase of 8% in the first year and of 9 to 10% after two years. The regions where the market was the tightest saw the most rapid price increase, particularly the Mediterranean region.

JEL Classification: R28, R32, H31
Keywords: land price, income tax deduction, private rental investment, Scellier scheme

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Tax incentives are one of the main tools used by public authorities to encourage investment in the private sector. The chronic shortage of new rental housing in France – at least in certain areas of the country – has meant that increasing the supply of rental housing has become a major priority for the authorities. One of the key measures designed to put this commitment into practice are the tax incentive schemes implemented by the French government from 1984 onwards and aimed at boosting housing construction in the private rented sector. Between 1984 and 2017, there were 8 successive tax incentive schemes designed to encourage investment in the construction of new rental housing – all named after their promoter: the Méhaignerie scheme (1984-1997), the Périssol scheme (1996-1999), the Besson scheme (1999-2002), the Robien scheme (2003-2006), the Robien *recentré* ("re-centred") and Borloo *populaire* ("popular" Borloo) schemes (2006-2009), the Scellier scheme (2009-2012), the Duflot schemes (2013-2014) and the Pinel scheme (2014-).

These schemes initially granted limited tax relief (Méhaignerie and Quilès-Méhaignerie schemes) allowing investors/natural persons or companies not subject to corporate income tax to claim part of their investment as tax deductible. Since 1996 and the introduction of the Périssol scheme, a logic of property depreciation has been adopted, with depreciation representing a charge resulting in a capped real estate deficit and thus allowing for a reduction of the investor's taxable income.

We focus here on the "Scellier scheme", created under Article 31 of the Amending Finance Law for 2008 of 30 December 2008 in force between 2008 and 2012. The rapid succession of schemes, combined with the fact that they have tended to overlap, have made the task of assessing them very difficult – a task made all the more important by the fact that the public finances have been drawn on heavily under these schemes. According to the parliamentary report by Gilles Carrez (Carrez, 2011), a member of the French National Assembly, the total cost of the scheme for investments made between 1st January 2009 and 31 December 2012 was 11 billion euros, the effect of which will be felt until 2028. However, a small number of geographically limited *ad hoc* studies have been carried out. The Departmental Agency for Housing Information (*Agence départementale pour l'information sur le logement*, or ADIL), in partnership with the Pays de Brest Development and Urban Planning Agency (*Agence de Développement et d'urbanisme du pays de Brest*, ADEUPa-Brest, 2008), set out to assess the impact of new rental housing investment on the rental market and on the number of transactions in the Finistère *département*. Based on a survey of experts conducted in the first half of 2008, the study focuses solely on the Robien scheme and only provides descriptive results. According to the authors, 14% of new housing originates from rental investments. As is often the case with studies based on expert opinion, it is impossible to measure the aggregated local impact of the scheme. Another study sought to assess the impact of the Robien scheme on the real estate market in the Rhône-Alpes region (Rigaud *et al*., 2008). In this study, conducted under the aegis of the Regional Infrastructure Directorate for the Rhône-Alpes Region (*Direction Régionale de l'Équipement Rhône-Alpes*), the authors estimate that between 11 and 17% of the total amount of new housing across the region has benefited from the scheme.

It is unfortunate that French law has made no provision for the creation of a database allowing for a robust statistical assessment of the different schemes. Nevertheless, some government statistics are available. According to official reports (Carrez, 2011), the number of new properties built or purchased under these schemes between 1995 and 2009 is estimated at around 800,000, representing 20% of all new housing, over 50% of new builds intended for the rental housing market and nearly 80% of the construction of housing in the private rental sector. However, the most important counterfactual question remains unanswered by these statistics: how many properties would have been built without these tax incentives?

This study is limited in scope: in contrast to a recent study by Chapelle *et al*. (2018) which aimed to establish the impact of the scheme on several relevant dimensions (price, type of buyer, housing production), we focus on the impact of the Scellier scheme on the price of developed land. The emphasis placed on building land arises directly out of a simple tax incidence analysis. It is well known that any scheme which aims to subsidise demand risks being taken over in part by sellers. The degree of shifting to sellers depends on the elasticity of supply and demand. Land prices were chosen since they capitalise structural changes in the real estate market more quickly than properties. Housing prices often require a little more time to adjust to new legislation. Furthermore, rental investment incentive mechanisms generally involve

a purchase of developed land. At a theoretical level, these mechanisms may be understood as an increase in the demand for land for residential development. In the land market, if the land supply curve remains unchanged because, for example, of town planning schemes, this should be reflected by an increase in land prices. This increase must be greater in the short term than in the long term. This is because, in the short term, the amount of available land is set, while in the medium term land reserved for other purposes (agricultural, commercial or industrial) may be converted into land earmarked for residential development. The increase in the price of such land makes the change of land use more profitable for owners, provided the land-use plan (*plan d'occupation des sols*) and, more recently, the local development master plan (*plan local d'urbanisme*) allow it of course.

It is therefore reasonable to assume that part of the financing of these rental investment incentive schemes disappeared as a result of an increase in the price of building land. The aim of this study is to contribute to quantifying the impact of the Scellier scheme on building land prices. Our estimation may be described as local and uses a specific provision of the scheme not applicable to previous schemes (Robien, Borloo, etc.). The Scellier scheme provides for a zoning plan that excludes part of the territory of metropolitan France from its scope of application. The division into eligible and non-eligible zones allows for a land price comparison procedure to be used based on a difference-in-differences estimation. Such an estimation on either side of a boundary was first implemented by Black (1999) in the United States. In France, Fack & Grenet (2010) use spatial matching: a counterfactual is individually assigned to each transaction on the other side of the boundary to assess the impact of the *carte scolaire* (map of school catchment areas) on real estate prices.

Data extracted from the *Base Nationale des Données Patrimoniales* or BNDP (French National Wealth Data Bank) covering the period 2004-2010 are used to estimate the difference-in-differences coefficients. A strategy is developed for the control and treatment groups that uses the data on either side of the boundary between the zones eligible and notn eligible to the scheme. Overall, the evidence appears to suggest that, at a national level, the implementation of the Scellier act led to an increase in the price per square metre of around 7 euros in the first year and of 8 to 9 euros in 2009 and 2010. In terms of growth rate, this represents a price increase of 8% in the first year and of 9% to 10%, without a significant acceleration, in the second year of implementation (2010). The regions where the market was the tightest saw the most rapid price increases, especially the Mediterranean region, where the Scellier law appears to have been a real boon for building land owners, with an increase of around 25% over two years. These estimates apply on both sides of the boundary delimiting the area of application of the Scellier scheme. They cannot be extended further without precaution. This is a well-known limitation of impact assessment methods, the significance of which should not be underestimated here.

The paper is structured as follows: We begin by describing the main provisions of the Scellier scheme and its geographical scope of application. The estimation strategy and the database (BNDP database) are then presented. The next section presents the results and comments. Robustness tests are then performed and are followed by a brief conclusion.

The Scellier Scheme

Between 2009 and 31 December 2012, the Scellier scheme used income tax relief as a rental investment incentive mechanism, conditional on compliance with a maximum rent limit and a commitment to rent the property for a period of 9 years. A detailed description of the scheme as set out in the Official Tax Bulletin is given in Box 1 below.

One of the chief differences between the Scellier scheme and previous schemes is that it only applies to part of the territory of metropolitan France.[1] France is split into 4 zones. Whereas under the Robien scheme all 4 zones were included, only 3 are eligible under the Scellier scheme. In addition to excluding part of the national territory from its scope of application, the zoning plan allows for rent ceilings to be adjusted according to the local real estate market.

Figure I shows the division of the different zones relating to the Scellier law applicable from 4 May 2009. The municipalities eligible for the Scellier scheme are those located in zones A, B1 and B2. Municipalities in zone A are those

1. The four overseas départements *are excluded from the study since these are covered by a specific scheme known as the "Scellier* outremer*" (overseas Scellier) scheme.*

Box 1 – **The Scellier Rental Investment Scheme**[(a)]

With effect from 1st January 2009, the Scellier income tax relief scheme applies to taxpayers domiciled in France and purchasing or building new properties in certain areas of the national territory characterised by an imbalance between housing supply and demand, which they undertake to rent out unfurnished as a principal residence for a minimum period of nine years. For the same tax year, a single property qualifies taxpayers for the new tax relief. The purchase of the property, or the submission of the building permit application in the case of a property which the taxpayer is having built, must take place no later than 31 December 2012.

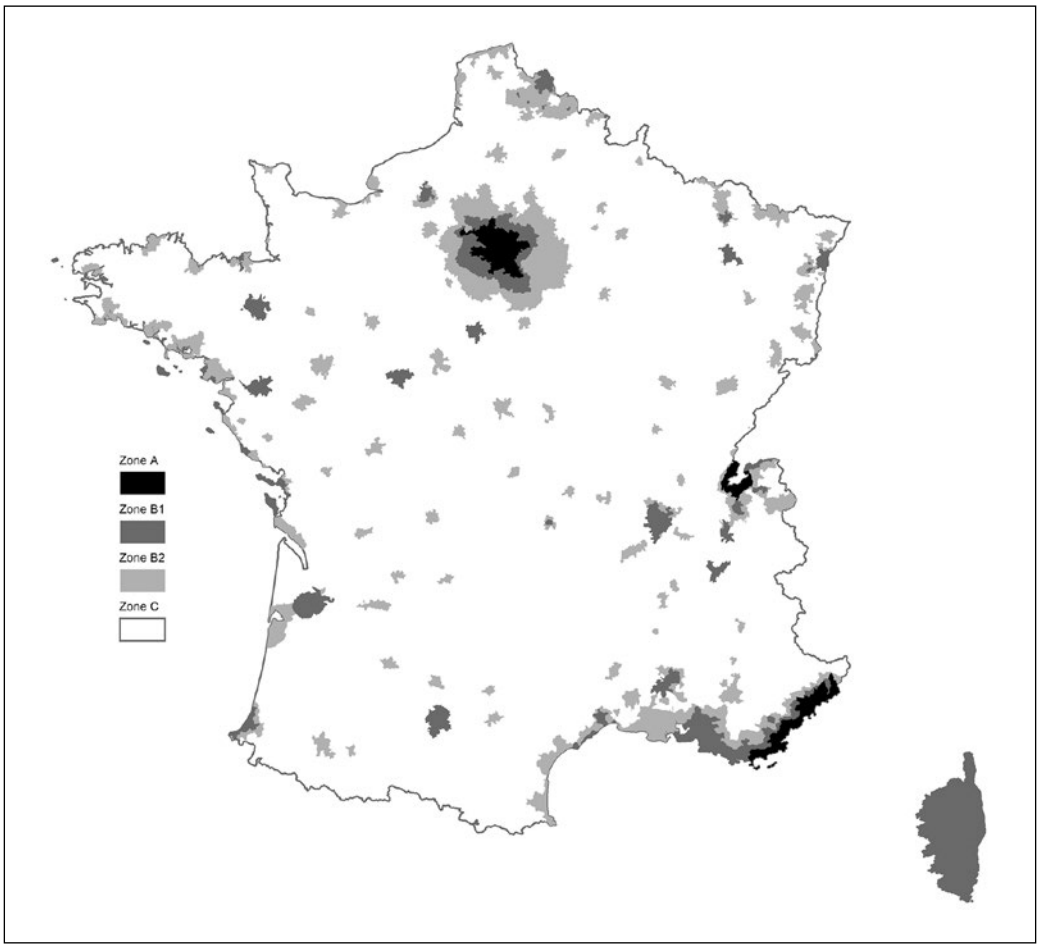
Tax relief also applies to taxpayers subscribing for units between 1st January 2009 and 31 December 2012 in a real-estate investment trust (SCPI) making such investments. Tax relief is calculated based on the cost price or amount of subscriptions, up to an annual limit of €300,000. The rate of tax relief is fixed at 25% for investments made in 2009 and 2010 and at 20% for investments made in 2011 and 2012. The relief is spread over nine years, at a rate of one ninth of its amount per year.

Where the lease is granted in the intermediate rental sector, taxpayers benefit, in addition to tax relief, from a specific deduction fixed at 30% of the gross income earned from the lease of the property. In cases where the property remains leased in the intermediate rental sector after the lease period, taxpayers benefit, in three-year periods and up to a limit of six years, from additional tax relief equal to 2% per year of the cost price of the property.

For investments made in 2009, taxpayers can choose between the "Robien" and "Borloo" schemes and the new tax relief, without, however, having the option of combining these benefits for the same investment.

(a) Translated from Bulletin officiel des impôts n° 52 *(15 mai 2009, 5 B-17-09).*

Figure I
Scellier Zoning



Notes: Each shade of grey corresponds to a zone that is subject to the scheme. The municipalities shown in white are not subject to the scheme.
Sources: Official Scellier zoning.

where the real estate market is the tightest, followed by municipalities in zone B1 and, lastly, municipalities in zone B2. Municipalities in zone C are not eligible. A further minor complication is that between 1st January 2009 and 3 May 2009, the eligible zones were those based on the Robien zoning. We will ignore this complication and the assumption will be that at the time of the implementation of the law, only the Scellier zoning plan existed. The differences between the Robien and Scellier zonings are also relatively limited. In total, 1,068 municipalities changed zones as follows: 18 changes from A to B; 255 changes from B1 to B2; 16 changes from B1 to A; 23 changes from B2 to B1; 36 changes from C to B1; 720 changes from C to B2. No municipalities left the scheme in May 2009 (transfer from zone A, B1, B2 to C), which is an important point.

Table 1 provides an overview of population distribution by zone. Based on the Insee's 2007 census, 40% of the population of metropolitan France is located in zone C. Of the 60% of the population residing in an eligible zone, 16% of the population is located in zone A, while zones B1 and B2 each contain 22% of the population.

Methodology

The dependent variable is the price per square metre applied to sales of building land over a six-month period. The parameter of interest is the impact of the Scellier scheme on that price, i.e. the methodology used involves comparing changes in the average price per square metre between sales of building land belonging to a group of municipalities eligible for the scheme and sales of building land belonging to a group of non-eligible municipalities. Based on the two groups, the change in the average price per square metre before and after the implementation of the Scellier scheme is estimated using difference-in-differences (Ashenfelter & Card, 1985). We further describe, first, the construction of the control and treatment groups and, second, the data source used to construct a statistical series by municipality relating to changes in building land prices over six-month periods. Lastly, the estimation method is presented.

Construction of the Groups of Municipalities

The construction of the two groups of municipalities is a key step in obtaining reliable difference-in-differences estimates. Border effects are used to control for structural effects. Only those municipalities located at the boundary of an eligible zone are included in the treatment group, while only non-eligible municipalities located in zone C adjacent[2] to a municipality in the treatment group are selected for the control group. Two "control group × treatment group" pairs (detailed below) are constructed on this basis.

Groups with Adjacent Municipalities, All Zones

For the treatment group, the first pair of groups is constructed by including all the municipalities eligible for the Scellier scheme (zones A, B1 and B2) adjacent to a non-eligible municipality. For the control group, municipalities located in

2. The notion of adjacent municipality is purely geographical. Two municipalities will be deemed to be adjacent if they share at least one municipal border.

Table 1
Population Distribution by Area

Area	Number of municipalities		Average municipal population	Sum of the population in the zone (% of the total)
A	590	1999 population without double counting	15,162	8 945 692 (15.86 %)
		2007 municipal population	16,220	9 569 783 (16.06 %)
B1	1,636	1999 population without double counting	7,481	12 239 225 (21.71 %)
		2007 municipal population	7,899	12 922 146 (21.68 %)
B2	3,191	1999 population without double counting	4,081	13 022 346 (23.09 %)
		2007 municipal population	4,207	13 423 831 (22.52 %)
C	31,139	1999 population without double counting	712	22 180 644 (39.34 %)
		2007 municipal population	760	23 680 632 (39.74 %)

Sources: Insee, Permanent population census in 2007.

zone C adjacent to an eligible municipality in zones A, B1 and B2 only are selected. This first selection process has the advantage of considering a large number of municipalities for each of the groups. However, it has the disadvantage of keeping municipalities located in all the eligible areas with highly heterogeneous municipal structural characteristics in the treatment group, in particular between the municipalities of zones A and B2. This pair will be termed "Groups with adjacent municipalities, all zones".

On average, municipalities in the treatment group are more populous and more densely populated and have a higher 4-taxes tax potential per resident than municipalities in the control group (Table A1 in Appendix 1). Although these differences in level do not invalidate the difference-in-differences hypothesis relating to a common trend shared by the groups, it highlights the need to be cautious and to introduce control variables. The map below (Figure II) provides an overview of the geographical location of the two groups.

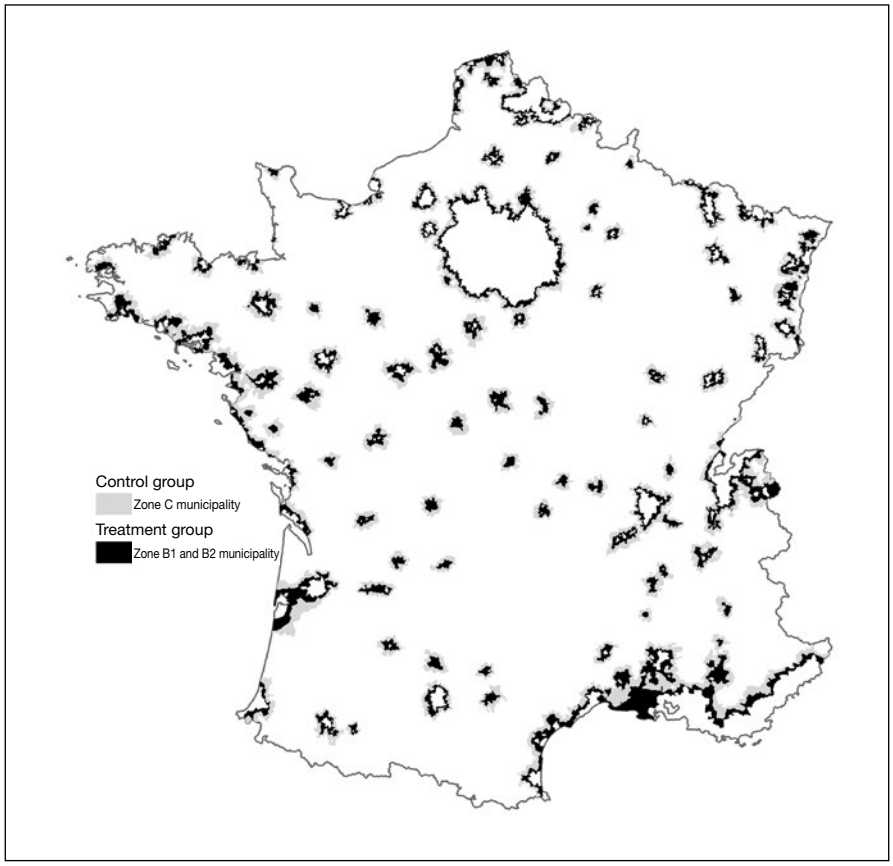
Groups with Adjacent Municipalities, Zone B2 Only

To reduce the structural differences between municipalities, the pair formed of a treatment group and a control group is modified. The treatment group is now composed of eligible municipalities located in zones B2 only which are adjacent to a non-eligible municipality. The control group is composed of municipalities located in zone C adjacent to a municipality in zone B2 only. By only considering municipalities in zone B2 in this pair of groups, the structural differences which can have an impact on land prices are reduced by retaining municipalities in the significantly more homogeneous treatment group. This pair will be termed "Groups with adjacent municipalities, zone B2 only" (Figure III).

From the BNDP Database to the Work Database

This study was made possible by extracting data from the French National Wealth Data Bank

Figure II
Groups with Adjacent Municipalities, All Zones



Notes: The map above illustrates the first definition of the control and treatment groups. The municipalities in black belong to the treatment group while those in grey belong to the control group.
Sources: Treatment by the authors based on the definitions of the Scellier zoning.

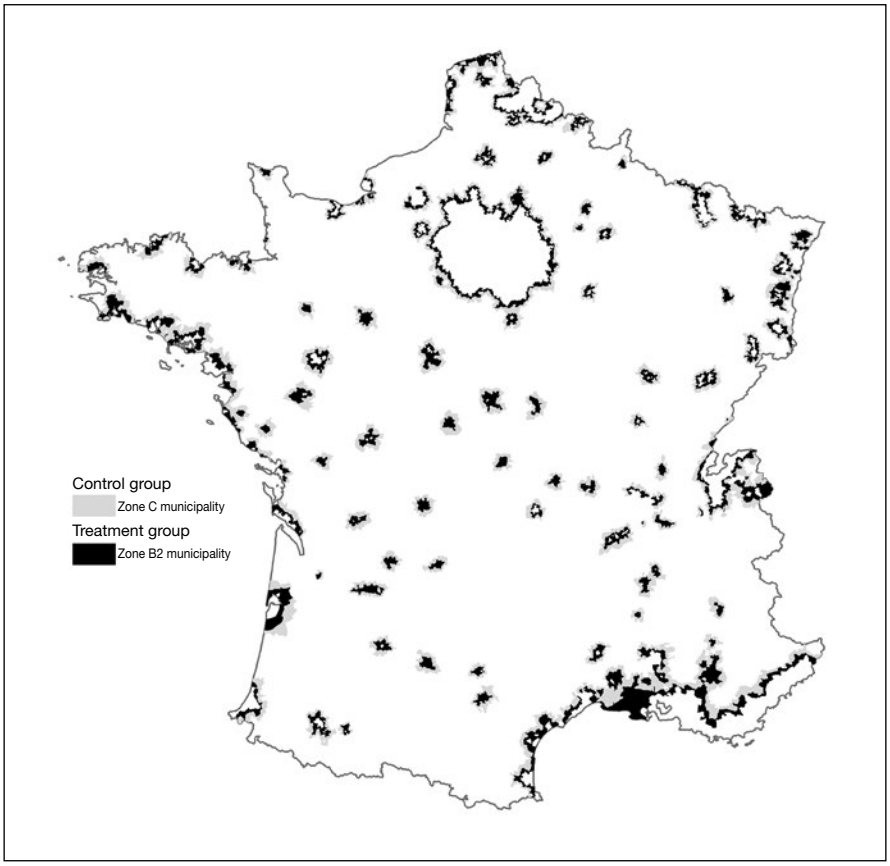
(BNDP) relating to sales of building land over the period 2004-2010. Designed for the purpose of consulting the wealth data of the DGFiP, the tool was implemented in 2005 and is fed by the MAJIC[3] and FIDJI[4] systems in particular. The BNDP application matches data from FIDJI and MAJIC. Matching is performed using a common identifier: the cadastral references of the property. The data retrieved from the BNDP correspond to the status of the property as shown in the cadastral database on the date of the transaction except for VEFAs (off-plan sales), which can be updated at a later stage to show the premises scheduled for construction.

To our knowledge, this study is the first academic study conducted on the basis of an extraction from the BNDP data. The task of statistical analysis was made difficult by the limited amount of information available about the structure of the BNDP database and about the different tables that compose it, as well as the relationships between them. The BNDP database – a reference tool for the revenue authority – was not originally designed for that purpose and so this difficulty is to be expected. We go now into the procedure performed to obtain the working database, i.e. a statistically usable database.

The first task consisted in extracting the data from the BNDP. BNDP is a tax tool and the base unit corresponding to a line of the database is a tax record. Therefore, for one transfer (sale, gift, inheritance, etc.), there are as many lines as there are tax records corresponding to the change of status of the property. For example, if a plot of land is purchased by several buyers, there will be as many lines or groups of lines as there are buyers. In such cases, the difficulty is to reconstruct the total sale price of the land

3. MAJIC: Mise À Jour des Informations Cadastrales *(Cadastral Data Update). This file relates to the management of the cadastre and ownership records, consistent with the property file.*
4. FIDJI: Fichier Informatisé des Données Juridiques Immobilières *(Computerised File of Legal Property Data). This file ensures the maintenance of the property file, intended for the publication of rights in immovable property, as well as the collection of transfer-related taxes.*

Figure III
Groups with Adjacent Municipalities, B2 Zone



Notes: The map above illustrates the first definition of the control and treatment groups. The municipalities in black belong to the treatment group while those in grey belong to the control group.
Sources: Treatment by the authors based on the definitions of the Scellier zoning.

according to the different tax records. We chose to base our analysis on building land. The extraction from the BNDP database therefore concerns all tax records relating to land with a tax regime compatible with a construction between 2004 and 2010. 1.7 million records were obtained. Once the data extracted, several operations were necessary to build the work base; they are described in Box 2. The constructed base, statistically exploitable, contains 454,921 observations including the sale price, the surface area of the land and the municipality of the property.

Comparison of the Information Contained in BNDP and PERVAL

The PERVAL database[5] of the Notaries of France (excluding Île-de-France) is the dataset used by almost all estimates of the impact of housing public on housing prices. Thus, it is worth it to compare the available information in both databases. By carrying out a matching process between the PERVAL database and the

5. *https://www.perval.fr/*

Box 2 – **Construction of the Work Base**

In what follows we detail the key stages leading to the database.
- Elimination of all exact duplicate lines, i.e. lines with the same value for each variable. The database contains a significant number of exact duplicate lines.
- Elimination of observations corresponding to transfers in overseas *départements*.
- Creation of a unique parcel identifier as follows:

Year of sale || Month of sale || municipality code || Section prefix || section code || plan number

A transfer may correspond to several parcels.
- A transfer identifier is created: SAGES code C. H. || publication reference
- The SAGES code is the registration reference. All records with the same transfer code form part of the same transaction.
- The sale price is calculated by adding up all the distinct prices for each transfer identified by the unique parcel identifier.
- All lines with a duplicated parcel identifier are removed. In other words, one line only per parcel sold is retained.
- The surface area of the sale is calculated by adding up all the surface areas of the different parcels included in the same transfer.
- All the lines with a duplicate transfer identifier are removed.
- We therefore have a database with one line per sale with the sum of the distinct sale prices as the sale price and the sum of the surface areas of the different parcels as the surface area. The price per square metre is calculated.
- For each transfer, we associate the code of the Scellier zone.
- Observations with a price per square metre higher than two standard deviations for the same six-month period and for the same zone are removed.

Table A below lists the number of lines and references per year for the raw database (i.e. without any transformation).

Based on volumetrics, we find that out of a total of 1.7 million lines, 552,066 lines are exactly identical (for all the values of each of the variables). These can be removed since they do not contain any additional information, giving a total of 1.2 million different lines. Of these 1.2 million different lines, there are just 470,321 different transfers, i.e. transfers associated with a unique identifier as defined here.

Table A
Volumetry – Raw Database and Work Database

	Number of lines	Without double lines	Number of unique identifiers	Work database
2004	113,151	71,151	33,260	31,921
2005	196,895	125,989	55,705	55,023
2006	258,122	175,416	74,821	73,536
2007	313,965	214,723	87,657	85,859
2008	325,168	220,711	87,390	85,097
2009	249,556	175,432	64,949	62,888
2010	250,549	171,918	67,139	60,597
Total	1,707,406	1,155,340	470,321	454,921

Sources: BNDP/DGFiP database; authors' computation.

BNDP extraction, we were able to better understand exactly what the sale prices contained in the BNDP database correspond to. Based on a comparison with the PERVAL data, we find that a significant number of transactions are carried out without paying taxes, the net price being equal, in such cases, to the gross price. In the BNDP database, the only available price is the gross price, and it is not possible to work back to the net price. Nevertheless, we do not believe that using a gross price will bias the results.

The comparison allows us to identify another difference between the BNDP and PERVAL databases relating to how the surface area of properties is captured. The PERVAL database contains one line per transfer, meaning that there is only one line for transfers involving several parcels. By contrast, in the BNDP database, for each transfer there is a line for easements or other deeds or records relating to a change of ownership. These structural differences mean that surface area is captured differently in each database. Thus, in BNDP, the surface area is generally greater than in PERVAL. These differences are detailed in Appendix 2 along with an example. The average price per square metre across the control and treatment groups varied between 12 and 18 euros over the 6 months immediately preceding the implementation of the Scellier scheme. Two years later, the difference ranged between 27 and 33 euros (Figure IV and Table A1 in Appendix 1).

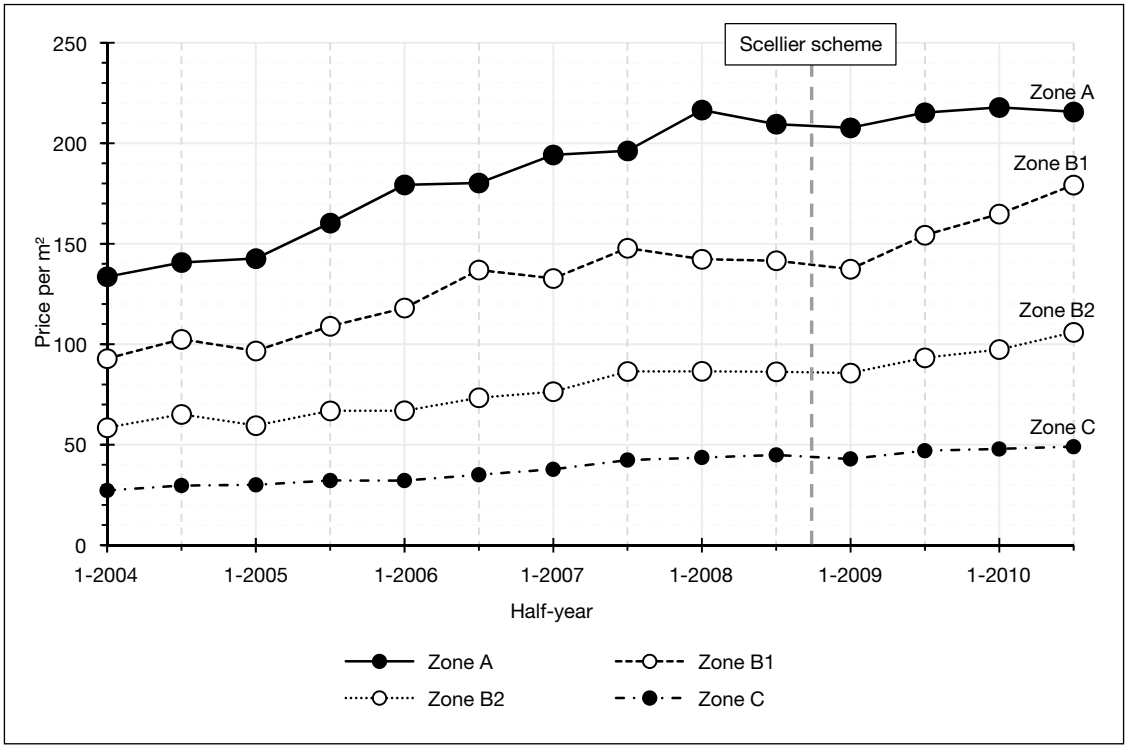
Estimation Method

The methodology used is simply based on two groups (control group sales and treatment group sales) and two periods (before and after the introduction of the Scellier scheme). The difference-in-differences parameters are estimated using a linear regression model. Let P_i be the average sale price of building land. The general regression model estimated by ordinary least squares is:

$$P_i = \beta_0 + \beta_1 T_i + \beta_2 D_i + \beta_3 \left(B_i \times D_i\right) + \sum_{k=1}^{K} \delta_k X_{ki} + \sum_{l=1}^{L} \gamma_l Z_{li} + \epsilon_i$$

T_i is a dummy variable equal to 1 if the sale took place during the second period and

Figure IV
Change in the Average Price per Square Metre by Zone Over Six-Month Periods



Notes: The curves represent the change in the average price per square metre over a six-month period for each of the zones.
Sources: BNDP/DGFiP database; treatment by the authors.

D_i is a variable equal to 1 if the sale belongs to the treatment group. X_{ki} is a control variable measured at the level of the municipality. Z_{li} is a location indicator variable. The parameter of interest is β_3 and is equivalent to the difference-in-differences estimate. ε_i is the error term.

A total of 4 specifications are used (without controls, with controls, with controls and indicator variables of employment zone and, lastly, without controls and with only municipality indicator variables). The five control variables are all measured at the level of the municipality: the population of the municipality, useful for capturing the effects of population size and density and thus allowing for the availability of developed land to be captured: the greater the density of a city, the less available real estate there is and the higher the price. Two variables measure the level of wealth of the population of the municipality where the sale takes place. The "4 taxes" tax potential per resident measures the financial capacity of the municipality to levy local taxes and is an indicator of the density of economic capital. In the medium term, this indicator may be endogenous to the Scellier scheme since additional properties and residents mean additional residence and property taxes. However, in order for this effect to be felt, the programme needs to have been completed, and two years after the launch of the scheme appears to be a sufficiently short period for this to be unlikely to occur in practice. The percentage of taxable households measures the wealth of the residents within the municipality. The ZAUER classification (Insee zoning of rural space into urban areas and employment areas, 1999) is used to characterise the type of municipality.[6] The classification is used to describe the type of municipality (urban, rural, etc.). The variable is dichotomised into 5 dummy variables equal to 1 if the sale takes place in a municipality of the ZAUER classification and 0 if it does not. The modality urban municipality is taken as reference.

For the purpose of the implementation of the difference-in-differences method, the reference period is the second half of 2008. Working on six-month periods enables more detailed price trends to be captured and allows for an assessment of inertia in terms of the response of prices to the introduction of the scheme. The estimated standard deviations of all the estimates take into account the cluster effects at the level of employment zones. Employment zones were selected to serve both as an indicator variable for location and for taking into account cluster effects in the construction of the estimated standard deviations since it is, in our view, the most pertinent division. At a finer level, such as municipalities or the EPCIs (Public Inter-Municipal Cooperation Establishments), there are too many municipalities or EPCIs with too few transfers, which may bias the standard deviation estimates.[7]

Results

The estimation parameter is the average price per square metre of land over 6-month periods. Figures V and VI illustrate the six-month mean of price changes by zone for the two definitions of the control and treatment groups. We find that prior to the implementation of the scheme, the changes in the control and treatment groups are remarkably similar from the second half of 2005 onwards. At worst, there is a slight adjustment of the control group over the treatment group. These similarities are shared by both groups, regardless of the definition of the control and treatment groups.

For the all-zone treatment group, the price increase between the second half of 2008 and the second half of 2010 was 22.30 euros, compared to 6.40 euros for the control group; for the second treatment group (zone B2 only), the corresponding figures are 20.40 euros and 5.40 euros, respectively.

We compare the difference in differences before and after the implementation of the scheme with the expectation of obtaining non-significant estimates prior to the implementation of the Scellier law. Thus, we have a temporal depth of 54 months before (from the first half of 2004), i.e. 4 six-month periods, and a temporal depth of 24 months (until the second half of 2010) after the scheme, i.e. 7 six-month periods.

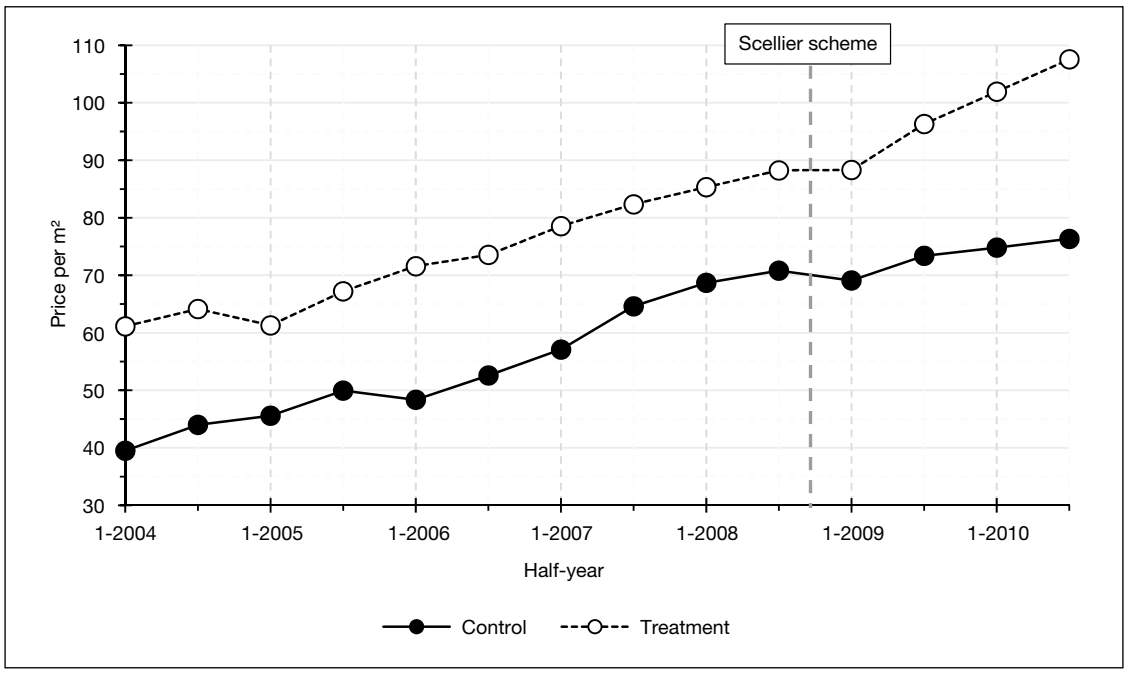
Table 2 shows all the results for the two choices relating to the control and treatment groups and our three specifications with and without control variables. Only the coefficient associated with the impact of the public policy and its standard deviation are reported. For the period following the implementation of the law, these coefficients may be directly interpreted as the impact in

6. In particular, it allows for the phenomenon of peri-urbanisation to be captured by drawing on attractiveness in terms of employment.
7. The tests conducted with the EPCIs yield results similar to those obtained with employment zones.

euros of the inflationary effect of the scheme. For earlier periods, the expectation is that they are not significant.

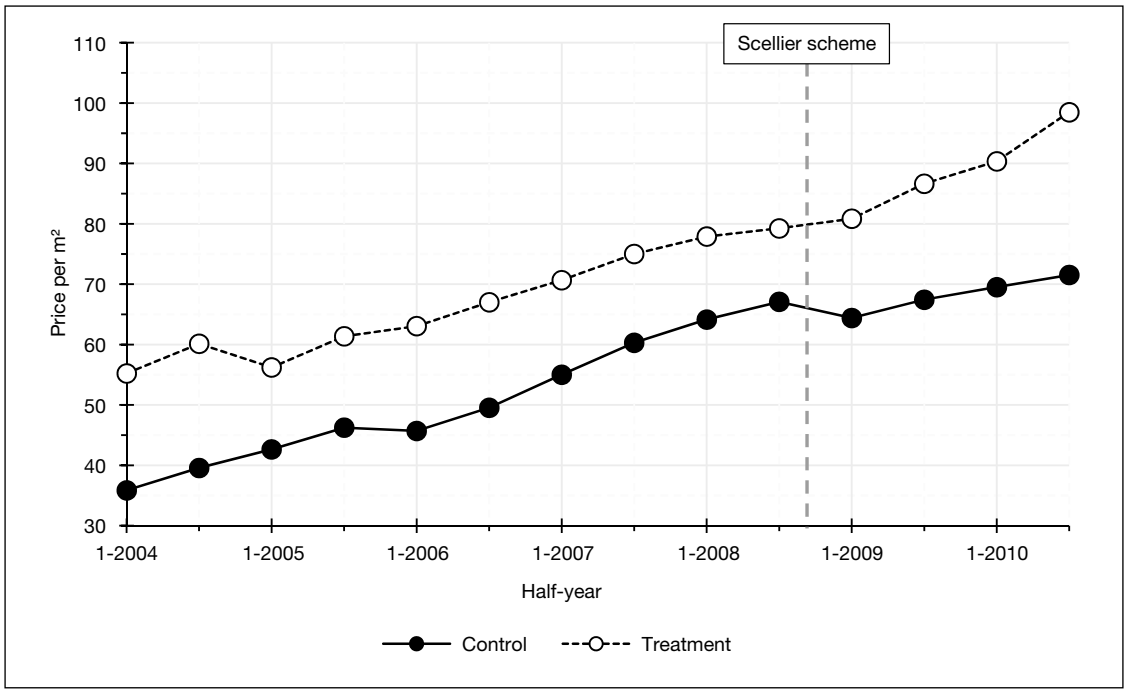
The results are entirely consistent with an inflationary effect of the Scellier scheme on the zone in question. Prior to the implementation

Figure V
Change in the Prices Per Square Meter Over a Six-Month Period for the Control and Treatment Groups, All Zones



Notes: The curves represent the change in the average price per square metre over a six-month period for the control and treatment groups.
Sources: BNDP/DGFiP database; treatment by the authors.

Figure VI
Change in the Prices Per Square Metre Over a Six-Month Period for the Control and Treatment Groups, B2 Zone Only



Notes: The curves represent the change in the average price per square metre over a six-month period for the control and treatment groups.
Sources: BNDP/DGFiP database; treatment by the authors.

of the scheme, the difference-in-differences estimates are not significant and are often close to zero, thus supporting the hypothesis of a common trend shared by the control group and the treatment group. After the implementation of the scheme, the estimates are positive and significant except for the first half of 2009. Two reasons may account for the fact that no effect was observed in the first post-reform six-month period: either we see the effects of the former scheme continuing beyond the date of its repeal, a scheme which, again, applies to the entire national territory, or it may be that some time is needed for the scheme to get underway and for investors to come to the fore. According to our estimates, the inertia effect is half a year. The two explanations are not necessarily contradictory. From 18 months onwards, the estimates are all significant at the 1% threshold.

The results are robust to the addition of control variables and location variables at the level of the employment zones. The estimates with control variables are slightly lower for the all-zone adjacent groups and slightly higher with the B2-only adjacent groups. However, the results remain within the 95% range of the results without control variables. It is with

Table 2
Difference-in-Differences Results Price per Square Metre (Reference: Second Half of 2008)

	Without control		With controls		With control and employment zone indicator variables		With municipality indicator variables	
	All zones	Zone B2 only	All zones	Zone B2 only	All zones	Zone B2 only	All zones	Zone B2 only
- 54 months 1st semester 2004	-4.20 (3.96)	-7.20* (4.30)	-5.08 (3.92)	-5.52 (4.26)	-0.17 (2.71)	-1.30 (2.89)	3.67 (2.96)	4.61 (3.25)
- 48 months 2nd semester 2004	-2.71 (3.14)	-8.40** (3.66)	-3.54 (2.92)	-5.96* (3.44)	1.07 (2.35)	-1.54 (2.53)	2.25 (2.27)	2.02 (2.45)
- 42 months 1st semester 2005	1.73 (3.27)	-1.40 (2.90)	1.15 (3.18)	0.03 (2.96)	1.48 (2.19)	0.02 (2.26)	2.61 (2.26)	3.52 (2.35)
- 36 months 2nd semester 2005	0.18 (2.87)	-2.97 (2.66)	-0.71 (2.87)	-2.46 (2.77)	-0.24 (2.22)	-2.30 (2.04)	-1.54 (2.00)	-1.63 (2.14)
- 30 months 1st semester 2006	-5.80* (3.47)	-5.19** (2.54)	-5.36* (2.96)	-4.35* (2.39)	-2.06 (2.29)	-1.63 (2.04)	0.30 (1.99)	0.79 (2.13)
- 24 months 2nd semester 2006	-3.52 (2.81)	-5.30** (2.63)	-2.56 (2.59)	-3.76 (2.54)	-1.46 (2.08)	-2.96 (1.95)	-1.16 (1.75)	-0.88 (1.92)
- 18 months 1st semester 2007	-4.02 (2.59)	-3.49 (2.81)	-3.81 (2.55)	-2.91 (2.77)	-2.79 (2.10)	-2.03 (2.04)	1.19 (1.74)	1.78 (1.93)
- 12 months 2nd semester 2007	-0.28 (4.49)	-2.53 (4.07)	-0.84 (4.13)	-2.99 (3.65)	-0.58 (2.25)	-1.87 (2.42)	-2.14 (1.93)	-2.71 (2.15)
- 6 months 1st semester 2008	0.82 (4.48)	-1.59 (3.54)	-0.34 (4.16)	-1.40 (3.13)	1.27 (2.18)	0.66 (1.88)	-1.08 (1.69)	-2.02 (1.59)
Six-month reference period (2nd half of 2008)								
+ 6 months 1st semester 2009	1.77 (2.31)	4.27 (2.70)	1.44 (2.37)	3.65 (2.74)	-0.46 (1.79)	0.63 (2.15)	1.06 (1.52)	1.66 (1.77)
+ 12 months 2nd semester 2009	5.47** (2.50)	7.04** (3.05)	4.93* (2.62)	7.13** (2.95)	5.37*** (1.96)	6.88*** (2.22)	6.25*** (1.73)	7.45*** (2.06)
+18 months 1st semester 2010	9.67*** (2.30)	8.67*** (2.66)	9.31*** (2.23)	8.19*** (2.51)	7.88*** (1.87)	6.83*** (2.00)	7.53*** (1.74)	6.47*** (1.95)
+ 24 months 2nd semester 2010	13.79*** (4.03)	14.79*** (4.56)	12.88*** (3.66)	13.73*** (4.09)	9.37*** (2.30)	9.13*** (2.65)	9.28*** (2.17)	7.80*** (2.50)

Note: Standard errors are estimated taking into account clusters at the level of employment zones. *** significant <1%, ** significant at 5%, * significant at 10%.

the location variables that the results differ most significantly, being systematically lower without, however, changing the sign of the effect.

If we focus on the results with the B2 adjacent zone and with controls, which provide the best guarantee, we obtain an order-of-magnitude estimate of around 7 euros after 12 months, and does not vary across the specifications. Over a 24-month horizon, the results are more variable and fluctuate within a range of 8 to 15 euros. A value of 8 to 9 euros is used as the central value, which remains within the confidence interval of the impact after one year and which therefore reflects the fact that the increase was not significantly greater in the second year. If we compare these figures to the price of zone B2 over the second half of 2008, i.e. 89.71 euros per square meter, we obtain a price increase of 8% in the first year and of 9 to 10% during the two years after the implementation of the scheme.

Robustness Checks

In this section, the research protocol is modified to assess the robustness of our results according to the choices made.

The first robustness check involves changing the reference period from the second half of 2008 to the first half of 2008. The results are shown in Table A3-1 in the Appendix 3. The change in reference period does not affect the trend of our prior results or their order of magnitude. The inflationary effect varies between 10 and 14 euros depending on the specification chosen.

The second robustness test involves difference-in-differences estimates between zone B2 and the section of zone B2 adjoining zone C, i.e. the second treatment group, with the second half of 2008 still serving as the pivot period. This placebo-type test is used to determine whether the treatment group in the "B2 adjacent" analysis behaves differently across zone B2 as a whole. Since zone B2 as a whole is treated, the hypothesis tested is that there is no difference, in particular after treatment.[8] The results are shown in Table A3-2 in the Appendix 3. We see that there is no long-term trend towards price divergence between the two zones. However, we see various shocks in given periods, for example during the second half of both 2004 and 2005 and also, albeit less systematically (for example, non-significant with control and employment zone), during the first half of 2009. We investigate now the possibility that the first two shocks are linked to the evolution of another scheme, using the same zoning as the Scellier zoning: the zero interest loan or PTZ (*prêt à taux zero* in French).

And What if the Phasing in of the PTZ Interfered with Our Results?

Introduced by the government in 1995 to boost access to home ownership for low- and medium-income households, the PTZ allows for a reduction in the borrower's affordability ratio and thus ensures effective demand. The appeal of the PTZ increased following the option introduced in 2005 of benefiting from it in order to finance the purchase of an old property without there being an obligation to carry out works. Between January 2009 and June 2010, the amount of the PTZ was doubled for new property purchases as part of the economic stimulus package. This specificity of the PTZ may be a source of bias in our estimates. However, unlike the Scellier scheme, zone C is covered by the PTZ, and the zoning only modifies the loan ceilings. The PTZ exists prior to the Scellier scheme and its eligibility remains unchanged during the period. In order to verify that the PTZ does not lead to a bias in our estimates, we analyse the volume of loans and related trends over time, in particular during the period of analysis, between the various control and treatment groups.

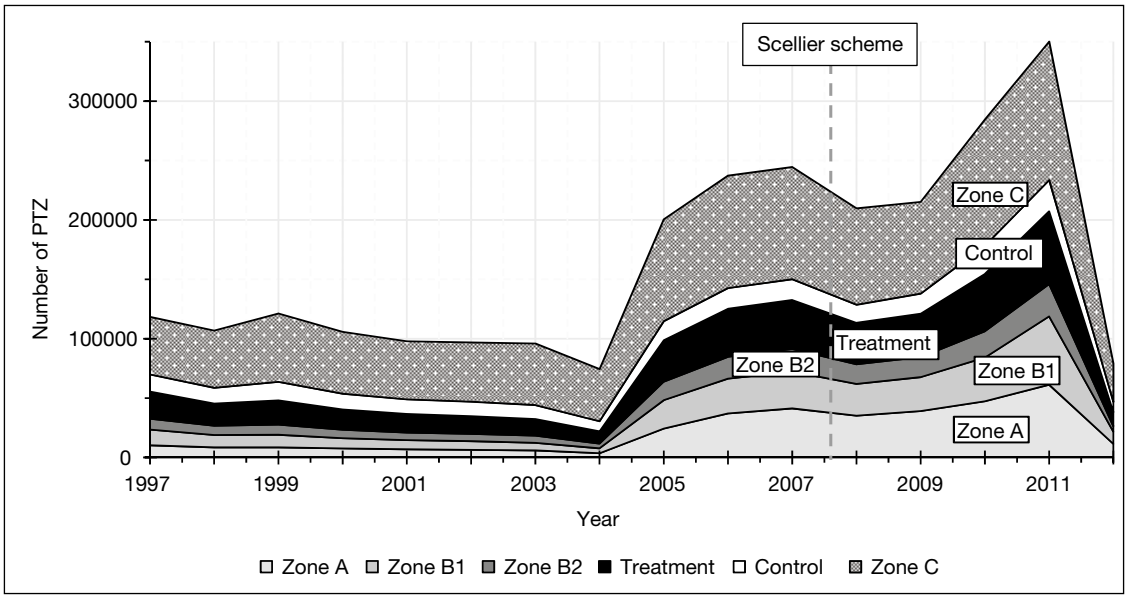
Figure VII shows the trend in the number of loans per zone for the all-zone control and treatment groups. The data here come from French Ministry of housing (CGDD) and provide all the PTZ loans by municipality and year. We see an increase in the volume of loans before and after the implementation of the Scellier scheme. However, this increase is common to all zones. Figure VIII provides the same analysis, but in percentage terms. It is in the rest of zone C, which is outside the control group, that the number of loans relative to the total loans decreases.

However, the distribution of the volume of loans between the control and treatment groups does not appear to change. Indeed, when examining the ratio of the number of loans in the control

8. Another placebo test might have been conducted between zone C adjacent to zone B2 and part of zone C which would have been adjacent to this zone. However, this test was not performed because of a lack of sales in the latter.

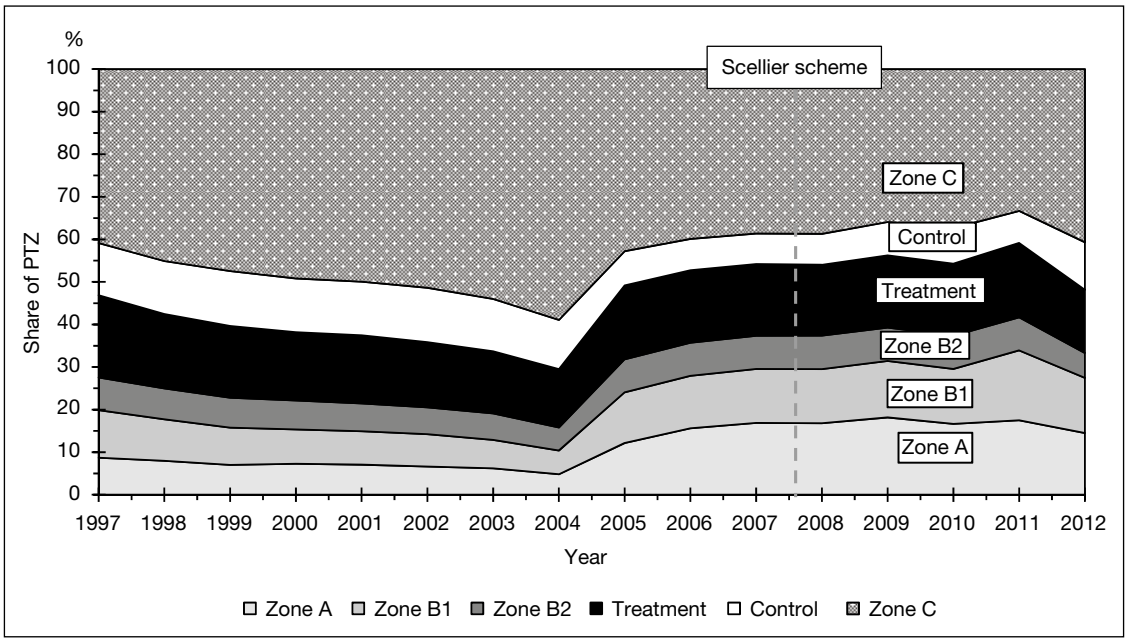
zone to the treatment zone (Figure IX) we find that the ratio increases slightly during the analysis period, meaning that in relative terms the number of loans in the control zone increases relative to the treatment zone. The land pressure resulting from the PTZ is therefore transferred to the control group rather than the treatment group. This phenomenon suggests that any impact that the PTZ may have on our estimations takes the form of a downward bias, reducing the

Figure VII
Number of PTZ Loans by Zone (Adjacent Groups, All Zones)



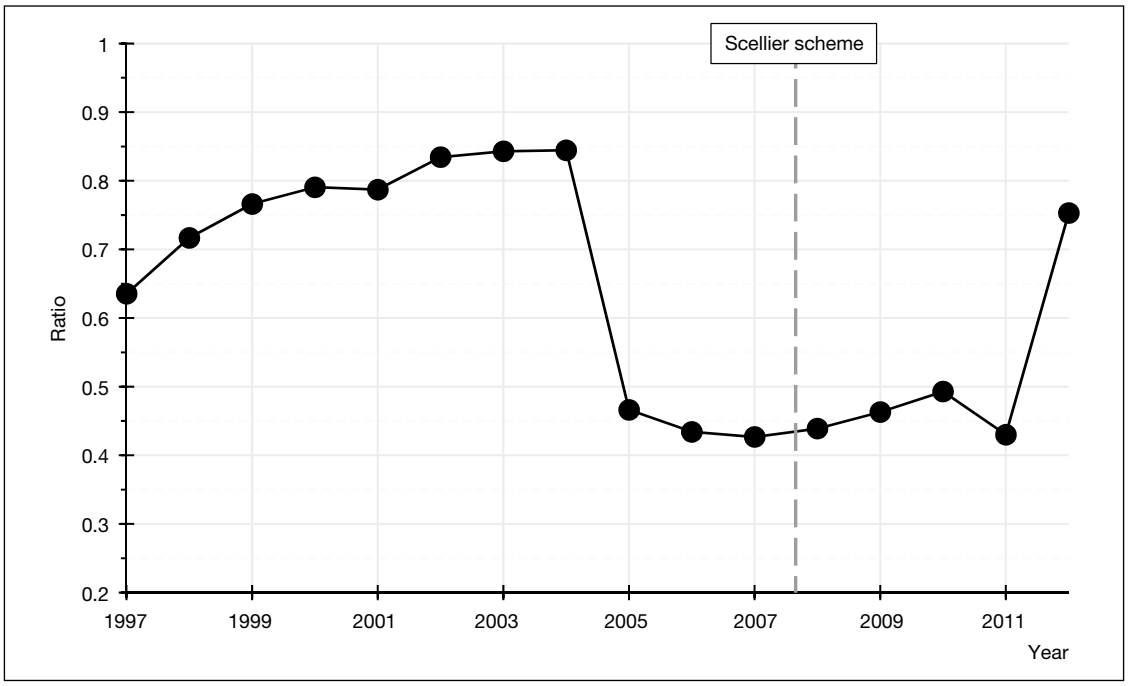
Notes: Each area represents the number of PTZ by zone. Zone C is to be understood without the PTZ located in the zone of the control group and zones B2, B1 and A are to be understood without the PTZ in the zone of the treatment group. No shocks were found in relation to the volume of loans before and after the implementation of the Scellier scheme.
Sources: CGDD; treatment by the authors.

Figure VIII
Share of PTZ Loans by Zone (Adjacent Groups, All Zones)



Notes: cf. Figure VII
Sources: CGDD; treatment by the authors.

Figure IX
Ratio of the Number of PTZ Loans of the Control Group to the Treatment Group (Adjacent Groups, All Zones)



Notes: Annual change in the ratio of the number of PTZ in the control group to the treatment group. No significant change is found before and after the implementation of the Scellier scheme, which could bias our results.
Sources: CGDD; treatment by the authors.

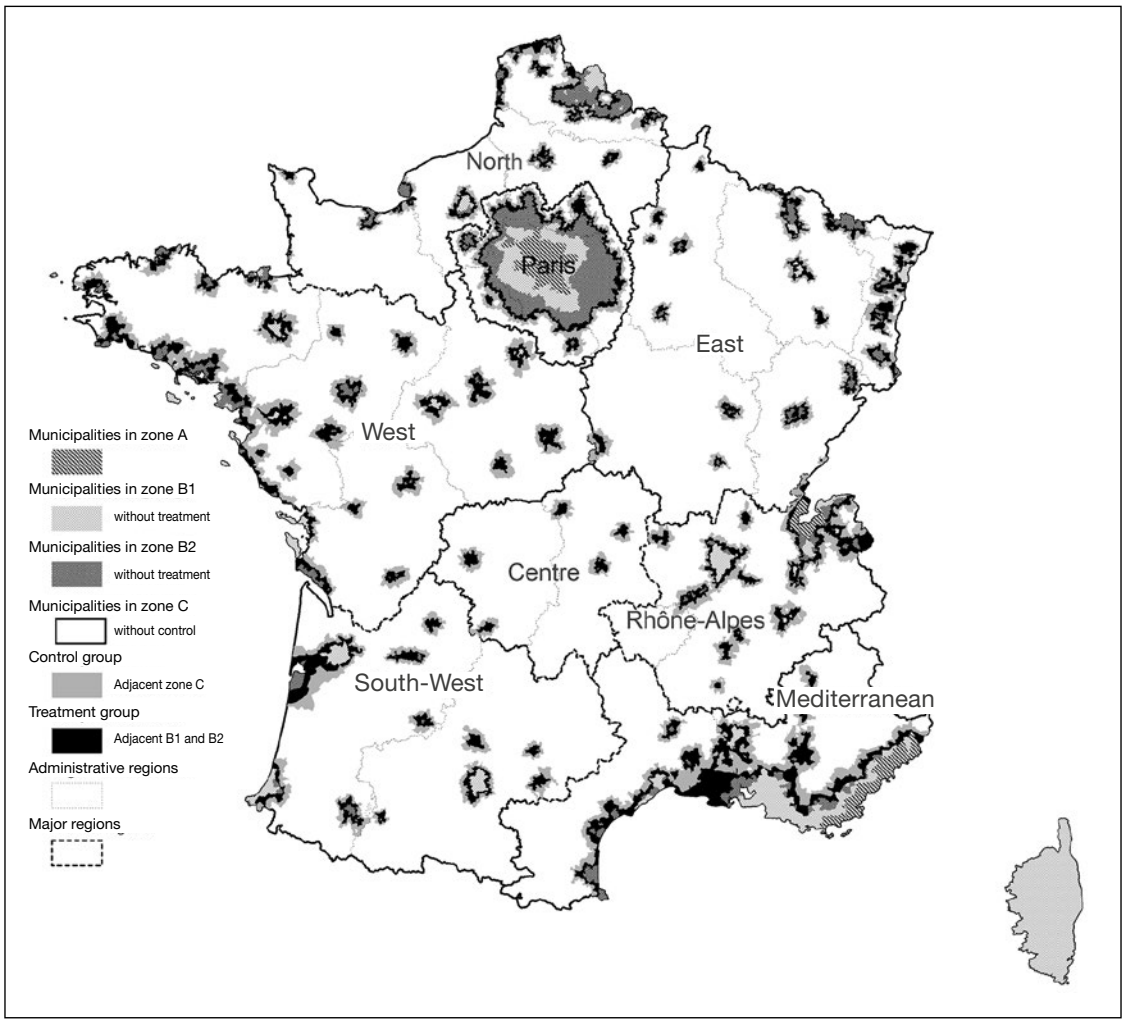
impact of the Scellier scheme rather than the opposite. The finding related to the all-zones control and treatment groups also applies to the definition with the B2 adjacent municipalities only. The corresponding figures are shown in Appendix 4.

Spatial Variability of the Impact of the Scellier Scheme

Lastly, this final subsection focuses on the spatial variability of the effect. We divide the territory of metropolitan France into different major regions based on groupings of historical administrative regions and inspired from the ZEAT (*Zones pour l'étude et l'aménagement du territoire*, a division of the French territory into 8 major regions) except for the Paris region, where we use an *ad hoc* redivision to incorporate the Scellier zoning around the ZEAT of this region. The map in Figure X shows the different major regions, the Scellier zoning plan and the all-zone control and treatment groups.

Two major regions are particularly tight: the Paris region and the region bordering the Mediterranean. These are the only regions to have a large zone A (cf. Figure I), except for the municipalities around Lake Geneva which are part of the Rhône-Alpes region. Combes *et al*. (2016, see their Figure I, panel b) showed that the urban zones with the highest land prices are all located in these 3 regions. This prompts us to attempt a regional estimate, still based on a difference-in-differences approach, specific to these three major regions. The results are shown in Table 3, with only the specification of the common indicator variables being reported. We find that, without the Mediterranean and Paris regions, the estimates of the difference-in-differences coefficients remain significant and positive 6 months after the implementation of the scheme and not significant and close to zero before its implementation. Therefore, the results are consistent with the constant trend hypothesis. However, we find that the inflationary effect is smaller than for France as a whole. The difference amounts to approximately 2 euros per square metre of land compared to France as a whole. The results for the estimates by major region are more contrasted. The impact for the Mediterranean region is very important and significant, amounting to approximately 30 euros per square metre per year compared to 7 euros for France as a whole.

Figure X
Partition into Major Regions - Control Group and Treatment Group, All Zones



Notes: The partition into major regions is based on the administrative regions except for Paris, which takes into account the spread of the different groups outside the administrative regions.
Sources: Treatment by the authors based on the definition of the control and treatment groups.

Table 3
Results for the Major Regions with Municipality Indicator Variables as Control

	Without Paris and Mediterranean region		Mediterranean region		Paris region		Rhône-Alpes	
	All zones	Zone B2 only	All zones	Zone B2 only	All zones	Zone B2 only	All zones	Zone B2 only
- 54 months 1st semester 2004	5.93** (2.94)	6.09* (3.43)	-30.19** (11.53)	-24.03* (12.03)	-24.11* (12.65)	-24.11* (12.65)	15.04 (9.70)	8.41 (7.46)
- 48 months 2nd semester 2004	3.44 (2.27)	3.66 (2.52)	-19.75* (9.77)	-16.76 (11.04)	-9.32 (11.35)	-9.32 (11.35)	-3.57 (5.58)	-8.37* (4.32)
- 42 months 1st semester 2005	2.29 (2.35)	3.53 (2.43)	-12.44 (10.04)	-11.86 (10.35)	-1.78 (11.70)	-1.78 (11.70)	4.19 (6.75)	1.30 (6.25)
- 36 months 2nd semester 2005	-0.51 (1.77)	0.25 (1.84)	-33.38** (12.58)	-30.45** (13.74)	-4.77 (13.07)	-4.77 (13.07)	-5.40 (6.83)	-8.33 (5.24)
- 30 months 1st semester 2006	0.35 (1.66)	0.85 (1.83)	-10.95 (10.84)	-5.71 (10.88)	-16.06 (16.49)	-16.06 (16.49)	-6.18 (7.68)	-7.51 (7.15)

➔

Table 3 (contd.)

	Without Paris and Mediterranean region		Mediterranean region		Paris region		Rhône-Alpes	
	All zones	Zone B2 only	All zones	Zone B2 only	All zones	Zone B2 only	All zones	Zone B2 only
- 24 months 2nd semester 2006	0.03 (1.69)	0.41 (1.81)	-28.54*** (7.99)	-21.96** (7.99)	-7.39 (6.36)	-7.39 (6.36)	-5.45 (5.64)	-5.90 (5.59)
- 18 months 1st semester 2007	0.69 (1.79)	1.78 (1.86)	-1.42 (11.44)	1.70 (12.78)	2.27 (6.36)	2.27 (6.36)	0.97 (5.09)	2.02 (7.17)
- 12 months 2nd semester 2007	-2.71 (1.75)	-3.23 * (1.84)	1.34 (7.06)	-0.04 (8.56)	-0.05 (9.55)	-0.05 (9.55)	-8.92* (5.17)	-6.12 (5.09)
- 6 months 1st semester 2008	-1.57 (1.74)	-2.39 (1.60)	0.04 (7.42)	-0.69 (7.61)	-0.44 (5.16)	-0.44 (5.16)	6.86 (4.83)	1.12 (4.68)
Six-month reference period (2nd semester 2008)								
+ 6 months 1st semester 2009	0.05 (1.42)	0.01 (1.63)	9.03 (7.60)	9.73 (8.31)	9.73* (5.51)	9.73* (5.51)	8.49 (5.86)	12.15** (5.74)
+ 12 months 2nd semester 2009	3.97*** (1.52)	4.79*** (1.80)	32.19*** (6.05)	31.63*** (7.10)	7.67 (5.44)	7.67 (5.44)	8.44 (5.03)	7.88 (5.59)
+18 months 1st semester 2010	5.3*** (1.66)	3.67** (1.69)	30.78*** (8.87)	31.33*** (10.06)	12.21* (5.81)	12.21* (5.81)	8.25 (5.15)	3.53 (6.81)
+ 24 months 2nd semester 2010	6.59*** (1.97)	5.72** (2.19)	29.09** (12.11)	23.89* (13.69)	23.91 (20.24)	23.91 (20.24)	17.20*** (5.97)	17.14** (7.44)

Note: Standard errors are estimated taking into account clusters at the level of employment zones. *** significant <1%, ** significant at 5%, * significant at 10%.

The picture is more mixed for the Paris and Rhône-Alpes regions. While the estimation results are positive, they are not all significant. The results are identical for the two definitions of the control and treatment groups for the Paris region, because in this particular region the two definitions coincide. For the Rhône-Alpes region, an effect at 24 months is significant at the 5% threshold at least and the scale is impressive, at around 17 euros. However, because of the smaller amount of data, these results lack power and are therefore weak.

* *
*

It is hardly surprising that a scheme designed to ensure effective demand for building land in order to boost the construction of rental housing should lead in the short term to an increase in land prices. This result is consistent with both the theoretical proposition and the results of Chapelle *et al.* (2018) using the FILOCOM database. These results may be described as causal impacts. However, the well-known weakness of this type of approach is that the results cannot be extrapolated beyond the border zones studied. To avoid such a result, the building land constraint would have needed to have been loosened first. It is interesting to see that this rather undesirable collateral effect of the policy is significant above all in the Mediterranean region – a region presenting a range of obstacles to an active land policy. In addition to the fact that the urbanised area bordering the coast is generally constrained towards the interior by the relief, another factor is that the area is a wine-growing region with a price per hectare ranking among the highest for agricultural land and has a significant number of second homes, making the public policy task of loosening the supply of land more difficult. Our main conclusion, therefore, is that urban planning policy must come with, and even precede, any scheme designed to boost rental housing construction. In a sense, policies had put the cart before the horse, and it is not certain that substantial progress has been made since then. □

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Table A1
Descriptive Statistics, All Zones

	France			Municipalities extracted from the BNDP					
	Adjacent municipalities, all zones			Adjacent municipalities, all zones			Adjacent municipalities, B2 only		
	Control group (standard deviation)	Treatment group (standard deviation)	*t* stat (p-value)	Control group (standard deviation)	Treatment group (standard deviation)	*t* stat (p-value)	Control group (standard deviation)	Treatment group (standard deviation)	*t* stat (p-value)
Number of municipalities concerned	2795	2027		1880	1472		1646	1212	
Average municipal population in 1999 (Insee)	1283.69 (1579.33)	5180.69 (14674.63)	-13.93 (0.00)	1453.45 (1710.08)	6406.98 (16958.50)	-12.58 (0.00)	1380.22 (1629.53)	5770.74 (15466.60)	-11.43 (0.00)
Average municipal population in 2002 (Insee)	1425.73 (1722.14)	5385.80 (14834.30)	-13.98 (0.00)	1624.53 (1881.64)	6657.09 (17140.75)	-12.63 (0.00)	1531.16 (1771.95)	5970.06 (15470.63)	-11.54 (0.00)
Average population density in 2007 (Inhabitants per hectare)	1.08 (1.06)	3.27 (4.79)	-23.38 (0.00)	1.16 (1.06)	3.72 (5.26)	-20.58 (0.00)	1.13 (1.04)	3.27 (4.60)	-18.25 (0.00)
Average in percentage of taxable households in 2007 (Insee/DGFIP)	59.90 (8.98)	61.06 (9.19)	-4.39 (0.00)	60.08 (8.91)	60.82 (9.17)	-2.35 (0.02)	59.35 (8.86)	59.71 (9.13)	-1.07 (0.29)
Average "4 taxes" tax potential per inhabitant 2008 (DGCL)	488.92 (356.73)	633.68 (461.47)	-12.28 (0.00)	496.83 (379.66)	650.38 (452.62)	-10.68 (0.00)	499.02 (385.97)	630.88 (457.09)	-8.34 (0.00)
Municipalities in an urban cluster (Insee/ZAUER99)	0.02 (0.12)	0.49 (0.50)	-48.28 (0.00)	0.02 (0.13)	0.54 (0.50)	-43.23 (0.00)	0.02 (0.13)	0.47 (0.50)	-35.28 (0.00)
Monocentric municipalities (Insee/ZAUER99)	0.66 (0.47)	0.40 (0.49)	18.71 (0.00)	0.65 (0.48)	0.36 (0.48)	17.79 (0.00)	0.61 (0.49)	0.40 (0.49)	11.63 (0.00)
Multicentric municipalities (Insee/ZAUER99)	0.20 (0.40)	0.07 (0.25)	13.00 (0.00)	0.20 (0.40)	0.06 (0.24)	11.62 (0.00)	0.22 (0.42)	0.07 (0.26)	10.90 (0.00)
Municipalities in a rural employment cluster (Insee/ZAUER99)	0.02 (0.12)	0.02 (0.14)	-1.12 (0.26)	0.02 (0.13)	0.02 (0.14)	-0.62 (0.54)	0.02 (0.14)	0.03 (0.16)	-0.87 (0.38)
Municipalities in the commuter belt of a rural employment cluster (Insee/ZAUER99)	0.11 (0.32)	0.03 (0.17)	10.85 (0.00)	0.11 (0.31)	0.03 (0.16)	9.42 (0.00)	0.12 (0.33)	0.03 (0.17)	8.86 (0.00)
Average price of the zone, second half of 2008 (BNDP)				81.41 (64.11)	99.28 (80.28)	-13.36 (0.00)	78.16 (64.40)	89.71 (73.38)	-8.31 (0.00)
Average price of the zone, second half of 2009 (BNDP)				83.07 (67.38)	108.72 (85.08)	-16.75 (0.00)	78.33 (67.85)	98.55 (79.29)	-12.35 (0.00)
Average price of the zone, second half of 2010 (BNDP)				87.80 (68.36)	121.57 (91.10)	-17.91 (0.00)	83.56 (69.37)	110.11 (82.26)	-13.63 (0.00)

Note: The p-values of the t tests are the p-values for a bilateral test.

APPENDIX 2

BNDP VS PERVAL

We have access to the PERVAL data for the years 2000, 2002, 2004, 2006 and 2008. We therefore have 3 years in common with the BNDP database (2004, 2006 and 2008). To understand how the BNDP database functions, we identified the PERVAL transfers recorded in the BNDP database and vice versa. For this, we created a key for each database as follows:

year of sale || month of sale || municipality code || section prefix || section code || plan number

Since all these variables are found in both databases and identify a single transfer, we were able to match the two databases. There are, of course, a number of input errors or technical differences between the two databases, but on the whole the method works. We found that there were transfers in the BNDP extraction but not in the PERVAL database, while there were also a significant number of transfers in the PERVAL database not found in the BNDP database.

Table A2
Comparison of BNDP and PERVAL Databases

Frequency Percentage in column	2004	2006	2008
Transfers listed in PERVAL and not found in the extraction from the BNDP database	49,687 82.08 %	39,507 62.12 %	25,653 47.79 %
Transfers found in PERVAL and in the extraction from the BNDP database	10,850 17.92 %	24,089 37.88 %	28,023 52.21 %
Total	60,537	63,596	53,676

Sources: BNDP and PERVAL database; treatment by the authors.

82% of the transfers recorded in PERVAL in 2004, 38% in 2006 and 52% in 2008 had no equivalent in our BNDP extraction, meaning that for 2004 and 2006 and, to a lesser extent, 2008, the extraction is far from exhaustive.

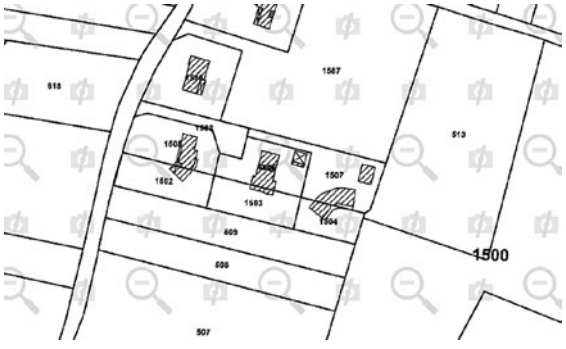
The Surface Area in Question

PERVAL and BNDP capture surface areas differently. First, the very structures of the databases create differences. BNDP contains one (or more) line(s) per parcel sold. To determine the surface area of the sale (which may relate to several parcels), all the surface areas of the distinct parcels included in a sale must be added up. A sale is defined in the BNDP database by a unique identifier which is the concatenation of the "SAGES code C. H." and the "publication reference". The PERVAL database, composed of a single line per sale, includes one cadastral parcel even if the sale relates to several parcels.

For example, consider the sale captured in both PERVAL and BNDP relating to parcels 1504 and 1507 on the following map (Figure A2-I). In PERVAL, only parcel 1504 is recorded. The surface area of the plot of land corresponds to the sum of the surface areas of parcels 1504 and 1507. In the BNDP database, there is one line for parcel 1504 and one line for parcel 1507, but also one line for parcel 1508 (for the right of way up to the house). For each of the lines, the total sale price and the surface area of each parcel are shown. Thus, the total surface area corresponding to the sale is the sum of the surface areas recorded over three lines. For the BNDP, this sum differs from the surface area in PERVAL, where the surface area of parcel 1508 is missing. The difficulty is that it is not possible to systematically determine the parcels corresponding to a right of way. The effect of these differences between the databases is to give a lower average price per square metre for BNDP compared to PERVAL.

Figure A2
Cadastre Corresponding to Parcels 1504 and 1507 and Aerial Photography

A2-A – Cadastre



A2-B – Aerial Photography

Sources: Cadastre (https://cadastre.gouv.fr/scpc/accueil.do) for the plan and Google Maps for the photo.

APPENDIX 3

CHANGE IN REFERENCE PERIOD AND PLACEBO TEST

Table A3-1
Difference-in-Differences Results Price per Square Metre (Reference: First Half of 2008)

	Without controls		With controls		With controls and employment zone indicator variables		With municipality indicator variables	
	All zones	Zone B2 only	All zones	Zone B2 only	All zones	Zone B2 only	All zones	Zone B2 only
- 54 months 1st semester 2004	-5.02 (4.91)	-5.61 (4.90)	-4.92 (4.93)	-4.65 (5.06)	-4.02 (3.10)	-3.77 (3.24)	2.26 (4.30)	1.81 (4.43)
- 48 months 2nd semester 2004	-3.52 (4.59)	-6.81* (3.84)	-3.40 (4.49)	-5.00 (3.95)	-2.55 (2.82)	-4.00 (2.78)	1.22 (3.12)	0.30 (3.08)
- 42 months 1st semester 2005	0.91 (3.90)	0.19 (3.72)	1.36 (3.91)	1.20 (3.82)	-0.98 (2.33)	-1.14 (2.24)	3.34 (2.62)	4.15 (2.53)
- 36 months 2nd semester 2005	-0.64 (4.05)	-1.38 (3.40)	-0.32 (4.00)	-1.05 (3.52)	-1.34 (2.35)	-1.91 (2.32)	3.80 (2.61)	3.15 (2.73)
- 30 months 1st semester 2006	-6.61 (4.38)	-3.60 (4.09)	-4.66 (3.98)	-2.63 (3.85)	-3.89 (2.61)	-2.26 (2.77)	3.20 (2.89)	3.52 (3.17)
- 24 months 2nd semester 2006	-4.34 (4.01)	-3.71 (3.68)	-2.22 (3.93)	-2.27 (3.50)	-2.62 (2.36)	-3.16 (2.28)	0.46 (2.30)	0.34 (2.42)
- 18 months 1st semester 2007	-4.84 (4.45)	-1.90 (3.70)	-3.44 (4.28)	-1.32 (3.70)	-4.47* (2.70)	-2.59 (2.17)	2.32 (2.55)	3.82* (2.26)
- 12 months 2nd semester 2007	-1.10 (2.97)	-0.94 (3.17)	-0.34 (3.02)	-1.39 (3.31)	-1.56 (2.04)	-2.16 (2.17)	-0.82 (1.79)	-1.03 (1.92)
Six-month reference period (1st semester of 2008)								
+6 months 2nd semester 2008	0.82 (4.48)	-1.59 (3.54)	-0.34 (4.16)	-1.40 (3.13)	1.27 (2.18)	0.66 (1.88)	-1.08 (1.69)	-2.02 (1.59)
+12 months 1st semester 2009	2.59 (4.02)	2.68 (3.30)	1.47 (3.79)	2.54 (3.05)	1.99 (2.25)	2.36 (2.10)	2.91 (2.26)	2.87 (2.35)
+18 months 2nd semester 2009	6.29 (4.16)	5.45 (3.61)	4.76 (3.94)	5.94* (3.44)	7.99*** (2.15)	8.64*** (2.07)	7.07*** (2.52)	8.51*** (2.75)
+24 months 1st semester 2010	10.49** (4.98)	7.08** (3.38)	9.11 * (4.63)	7.01** (3.12)	10.09*** (2.50)	8.70*** (2.31)	7.94 *** (2.46)	8.75*** (2.64)
+30 months 2nd semester 2010	14.60** (6.15)	13.20** (5.48)	12.6** (5.70)	12.56** (5.09)	12.80*** (3.30)	12.16*** (3.41)	10.00*** (3.39)	10.59*** (3.80)

Note: Standard errors are estimated taking into account clusters at the level of employment zones.
*** significant <1%, ** significant at 5%, * significant at 10%.

Table A3-2
Difference-in-Differences Results Price per Square Metre (Placebo Effect)

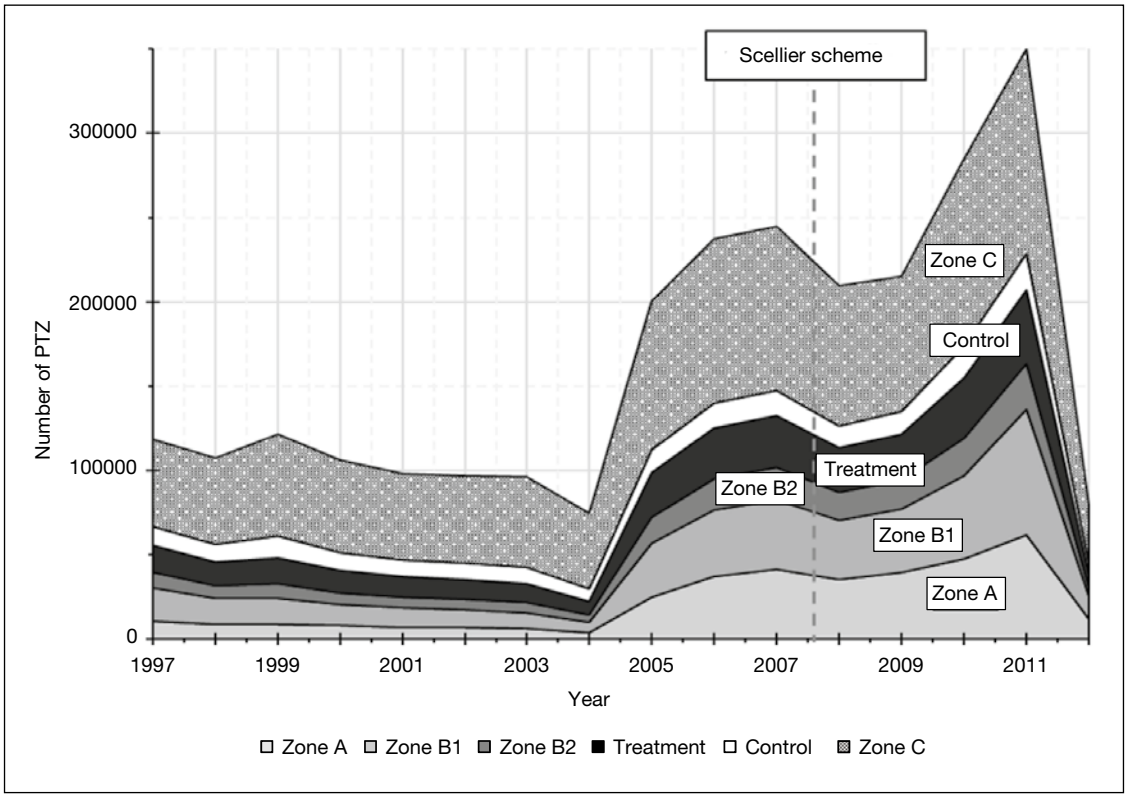
	Without controls		With controls		With controls and employment zone indicator variables		With municipality indicator variables	
	All zones	Zone B2 only	All zones	Zone B2 only	All areas	Zone B2 only	All zones	Zone B2 only
- 54 months 1st semester 2004	-8.87 (6.37)	-11.96* (6.23)	-9.51 (6.28)	-11.47* (6.19)	-7.06 (4.56)	-8.18* (4.51)	-3.61 (5.11)	-4.30 (5.23)
- 48 months 2nd semester 2004	-3.01 (7.78)	-8.00 (7.57)	-4.19 (6.95)	-6.88 (6.71)	-9.22** (4.59)	-11.20** (4.46)	-9.35 (5.83)	-10.45* (5.87)
- 42 months 1st semester 2005	-8.95** (4.17)	-12.86*** (3.80)	-8.73** (3.99)	-11.19*** (3.73)	-9.85*** (3.60)	-10.87*** (3.55)	-5.69* (3.20)	-6.05* (3.24)
- 36 months 2nd semester 2005	-2.99 (3.95)	-6.15* (3.62)	-4.05 (3.81)	-6.59* (3.61)	-6.57** (3.03)	-7.58** (2.91)	-7.14*** (2.72)	-7.31*** (2.73)
- 30 months 1st semester 2006	-11.07*** (4.18)	-11.53*** (3.05)	-11.00*** (4.09)	-11.23*** (3.39)	-10.49*** (3.64)	-9.94*** (3.69)	-8.80*** (2.78)	-8.55*** (2.84)
- 24 months 2nd semester 2006	0.57 (4.40)	-1.89 (3.61)	0.32 (4.06)	-1.90 (3.44)	-3.00 (3.19)	-3.67 (3.18)	-2.79 (2.81)	-2.91 (2.86)
- 18 months 1st semester 2007	-2.45 (4.78)	-3.57 (4.50)	-1.33 (4.72)	-2.23 (4.61)	-0.51 (4.39)	-1.56 (4.35)	2.69 (4.08)	2.30 (4.22)
- 12 months 2nd semester 2007	2.55 (5.12)	0.90 (4.43)	1.26 (4.79)	-1.25 (3.94)	-3.44 (3.52)	-4.30 (3.61)	-0.23 (2.90)	-0.61 (2.95)
- 6 months 1st semester 2008	2.09 (5.28)	0.52 (4.62)	-0.57 (4.87)	-1.60 (4.11)	-1.63 (3.65)	-1.48 (3.64)	-1.92 (2.86)	-2.36 (2.86)
Six-month reference period (2nd semester 2008).								
+6 months 1st semester 2009	6.47** (2.81)	7.99*** (3.00)	5.47* (2.96)	6.78** (3.29)	2.52 (2.56)	3.23 (2.60)	4.87** (2.46)	5.12** (2.56)
+12 months 2nd semester 2009	2.17 (4.82)	1.52 (4.94)	2.07 (5.09)	1.92 (4.93)	1.35 (3.88)	1.38 (3.79)	2.62 (3.21)	2.33 (3.23)
+18 months 1st semester 2010	3.36 (3.98)	0.79 (3.86)	3.44 (4.08)	0.42 (3.77)	-1.03 (3.68)	-2.43 (3.52)	-0.67 (3.37)	-2.37 (3.29)
+24 months 2nd semester 2010	0.71 (6.86)	0.64 (6.77)	-0.28 (7.15)	-0.52 (6.94)	-1.30 (5.01)	-2.93 (4.87)	0.37 (5.77)	-2.14 (5.61)

Note: Standard errors are estimated taking into account clusters at the level of the employment zones.
*** significant <1%, ** significant at 5%, * significant at 10%.

APPENDIX 4

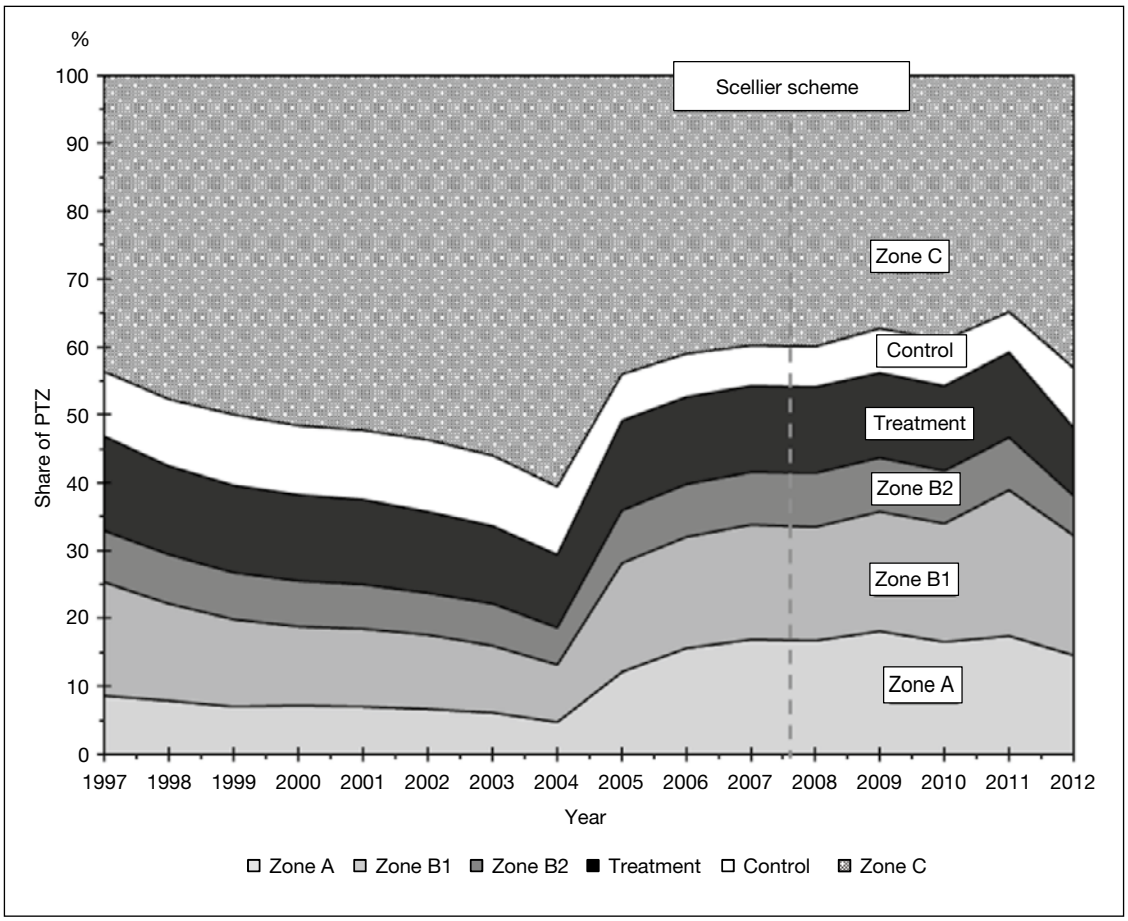
PTZ ZONE B2 ONLY

Figure A4-I
Number of PTZ by Zone (Adjacent Groups, B2 Only)



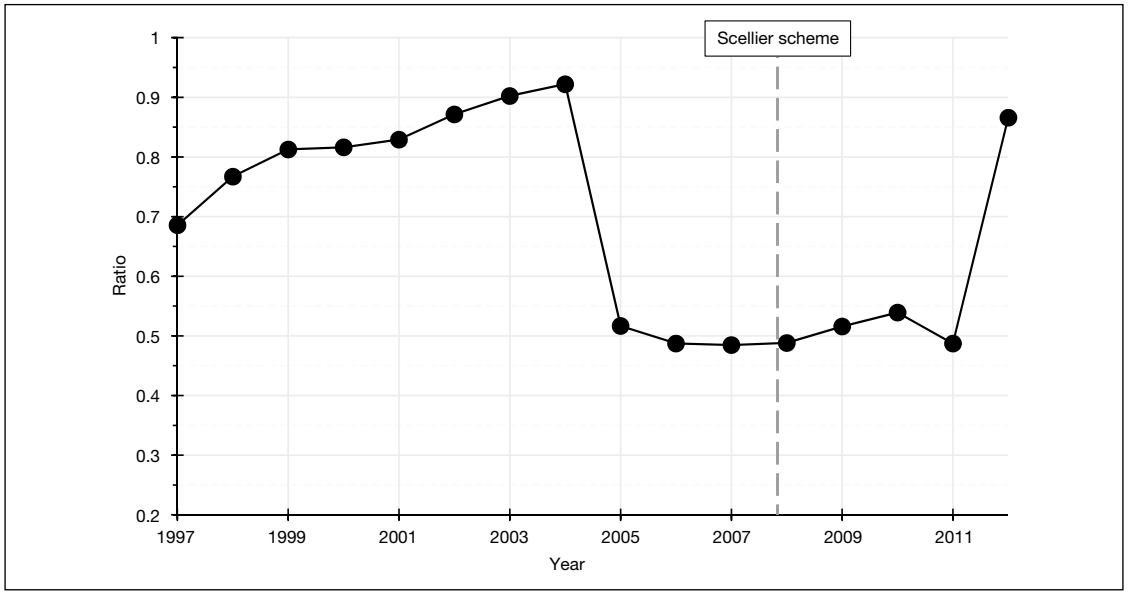
Notes: Zone C is to be understood without the PTZ located in the zone of the control group and zones B2, B1 and A are to be understood without the PTZ in the zone of the treatment group. No shocks were found in relation to the volume or distribution of loans before and after the implementation of the Scellier scheme.
Sources: CGDD; treatment by the authors.

Figure A4-II
Distribution of the PTZ by Zone (Adjacent Groups, B2 Only)



Notes: Zone C is to be understood without the PTZ located in the zone of the control group and zones B2, B1 and A are to be understood without the PTZ in the zone of the treatment group. No shocks were found in relation to the volume or distribution of loans before and after the implementation of the Scellier scheme.
Sources: CGDD; treatment by the authors.

Figure A4-III
Ratio of the Volume of Loans of the Control Group to the Treatment Group (Adjacent Groups Only, B2 Only)



Notes: Annual change in the ratio of the number of PTZ in the control group to the treatment group. No significant change is found before and after the implementation of the Scellier scheme, which could bias our results.
Sources: CGDD; treatment by the authors.

Productivity Growth and Resource Reallocation in France: The Process of Creative Destruction

Haithem Ben Hassine*

Abstract – Based on a large sample of French firms, this article examines the contribution of resource reallocation and of the learning effect to changes in total factor productivity (TFP) before (2000-2007) and after (2008/2009-2012) the 2008 crisis. First, we show that there was very little TFP growth before the crisis and that a fall occurred between 2008 and 2012. Second, we show that the evolution of TFP is highly dependent on the learning effect, as measured here by internal firm performance. Its negative contribution after the crisis is indicative of the difficulties experienced by firms in France in adjusting their production scale rapidly and effectively. However, this effect was reduced by 1) a process of resource reallocation towards the most productive continuing firms, which only really took hold from 2009 onwards, and 2) an earlier Schumpeterian process of creative destruction (cleansing effect), the first signs of which appeared in 2008.

JEL Classification: L2, L25, O4, C10
Keywords: total factor productivity, resource reallocation, learning, process of creative destruction, Schumpeter

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In 2009, the number of firms created in France, excluding the "*auto-entrepreneur*" status[1], fell by almost 21.5% compared to the previous year (Hagège & Clotilde, 2012). At the same time, 8,033 additional business failures were recorded, an increase of 14.5% compared to 2008. Failing firms exiting the market, but also the least productive continuing firms, serve to free up resources for the best performers. The transfer of resources to the most productive firms – a process known in the literature as "resource reallocation" – is not without consequences for aggregate productivity trends and, therefore, for employment and wealth creation.

In examining aggregate productivity trends, the literature has mainly focused on the role of resource reallocation and internal performance specific to firms (learning effects). In periods of crisis, the effects on their contributions can be ambiguous. On the one hand, a decline in demand leads to a decline in production and, consequently, a decrease in the productive performance of firms. On the other hand, the crisis served to "clean up" the various sectors by crowding out the worst performing companies, possibly reducing entry barriers for potential entrants and allowing survivors to restructure in order to return to their pre-crisis levels of growth. In this context, it is not inconceivable that the 2008 financial crisis played a major role in the process of creative destruction through the net flows of new business start-ups in France. The churn of firms, conducive to the process of resource reallocation, may lead to productivity gains, as suggested, for example, in a study by Foster *et al*. (2006) focusing on the US retail sector of the 1990s.

In this paper, we examine the process of resource reallocation between French firms and its contribution to sectoral and national productivity growth before (2000-2007) and after (2008-2012 and 2009-2012) the 2008 crisis with the twofold aim of 1) differentiating the contribution of learning to the evolution of sectoral productivity and the contribution due to resource reallocation with a view to understanding the mechanisms underlying the slowdown in productivity from the early 2000s onwards and 2) examining the evolution of these mechanisms following the 2008 crisis with a view to capturing a potential Schumpeterian process of creative destruction (cleansing effect).[2] To this end, several methods are used to decompose total productivity (Griliches & Regev, 1995; Foster *et al.*, 2015; Melitz & Polanec, 2015).

In this study, as in Carreira & Teixeira (2016) and Martin & Scarpetta (2012), among others, resource reallocation is measured based on changes in market shares. The aim is also to assess the learning capacity of firms and its effects on aggregate productivity growth. Learning capacity is measured by the evolution of the TFP of continuing firms. TFP is estimated per sector using the Levinsohn & Petrin (2003) method – abbreviated to "LP" in the remainder of the paper – based on a sample group of firms covering the period 2000-2012. The data are drawn from the Insee's complete and consolidated SUSE file[3] (FICUS[4]) before 2008 and Insee's annual statistics on companies (ESANE[5] and FARE[6]) from 2008 onwards.

To assess the effect of the 2008 crisis on both learning and resource reallocation mechanisms in France, we compare the results obtained with several decompositions. The results obtained show that aggregate productivity grew on average by 0.66% per year between 2000 and 2007. They also clearly highlight the effects of the 2008 crisis, which had a major impact on productivity across all sectors, with an average decline of 0.32% per year between 2008 and 2012. However, a slight rebound in productivity is observed from 2009 onwards, with an average annual growth rate of 0.36% between 2009 and 2012. Before the 2008 crisis, and depending on the decomposition method used, the learning effect and resource reallocation each contribute significantly to the evolution of aggregate productivity in France (one to two thirds). During the post-crisis period, the results obtained highlight a learning effect representing the main factor behind the decline in productivity in France, with a contribution ranging between 280% and 138% depending on the chosen method. However, two mechanisms played a key role in mitigating the decline: 1) a process of resource reallocation to continuing firms, the effect of which is positive and continues to grow after the crisis over the 2009-2012 period, and

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1. For further details on the "auto-entrepreneur" status, see: https://www.insee.fr/en/metadonnees/definition/c2066.

2. The Schumpeterian process of creative destruction refers here to the entry of new firms into a (competitive) market which, through innovation (whether product, process, organisational, marketing or other innovations) results in the disappearance and obsolescence of old firms and ensures the permanent renewal of production structures. For a formal theoretical framework relating to the Schumpeterian hypothesis, see Aghion & Howitt (1992).

3. Unified Corporate Statistics System (Insee).

4. Complete Consolidated SUSE file.

5. Elaboration of Annual Statistics of Companies.

6. File approaching the results of ESANE.

2) a Schumpeterian process of creative destruction, which contributed positively to aggregate TFP growth before the crisis and played a greater role in the post-crisis period, regardless of the post-crisis period chosen (2008-2012 or 2009-2012). However here, the Schumpeterian process should be seen above all as having a cleansing effect – a process mostly driven by the disappearance of the least productive firms.

The remainder of the paper is organised as follows: after a literature review, a section is devoted to presenting the different methods for decomposing aggregate productivity. We then present the data used and descriptive statistics, before examining the results obtained and discussing them. The paper ends with concluding remarks.

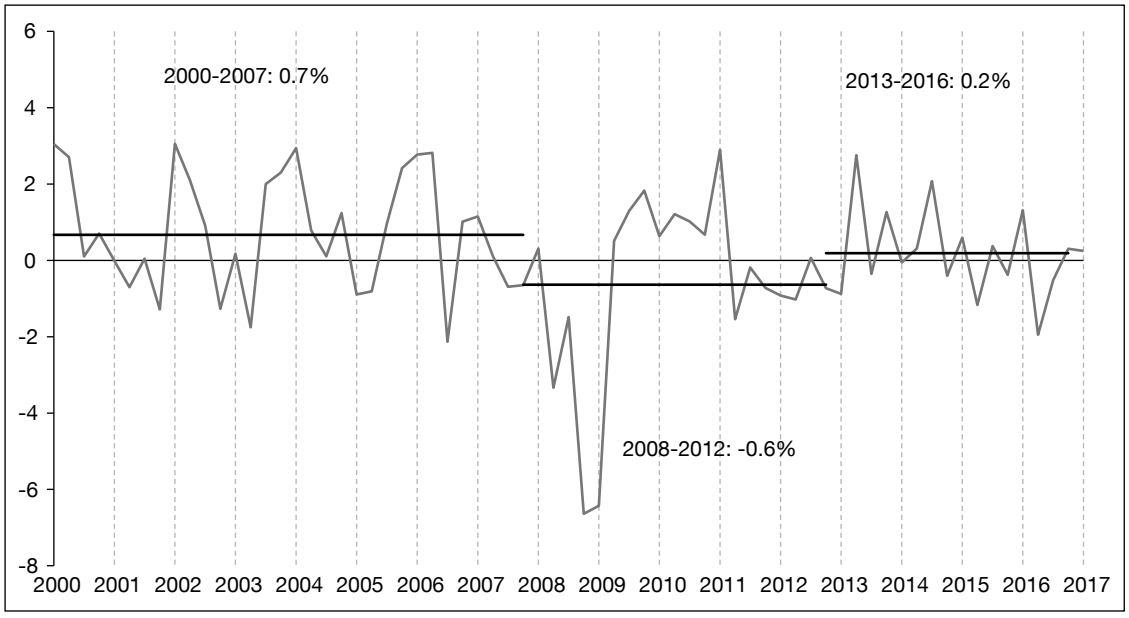
Literature Review

A recent literature on resource reallocation and the impact of the process of business renewal and growth on the slowdown in aggregate total factor productivity (TFP) has emerged (see, in particular, Berthou, 2016; Midrigan & Xu, 2014; Restuccia & Rogerson, 2013; Hsieh & Klenow, 2009). In evidence in France since the early 2000s, the decline increased after the 2008 crisis, as shown by an estimate of total factor productivity (Figure I).[7]

A first explanation for the slowdown may be found in the difficulty of reallocating resources to the most productive firms (Cette *et al.*, 2017). When not prevented by labour market rigidities or by frictions in the credit market (Musso & Schiavo, 2008), resource reallocation reflects market share gains for successful firms benefiting from production factors adapted to their activity. Another explanation for the slowdown in productivity growth is the inability of firms to adapt to an increasingly changing and highly competitive environment. Some studies have emphasised this explanation, arguing that the internal performance specific to firms (learning effect, to use the terminology of Baldwin & Rafiquzzaman, 1995), is the main source

7. Here, TFP growth is estimated by adjusting the growth in value added of market sectors with two terms: the growth rate of capital services, estimated as the growth in the net capital stock of financial and non-financial firms and the growth rate of labour services, estimated as the growth rate of hours worked in the market sector. Each of these terms is weighted by the share of each factor (labour or capital) in value added. The weighting coefficient takes a fixed value equal to 35% for the capital factor and to 65% for the labour factor.

Figure I
Estimation of Total Factor Productivity (TFP) Growth in France (Annualised Quarterly Growth Rate, 2000-2016)



Reading Note: The annualised quarterly growth rate of TFP corresponds to the growth rate of TFP over a year if it were to vary over the year at the same rate as during the quarter considered.
Coverage: All market sectors
Sources: Insee; author's calculations.

of aggregate productivity growth and decline (Foster *et al.*, 2015; Hallward-Driemeier & Rijkers, 2013; Griffin & Odaki, 2009). The theoretical literature distinguishes between active learning (Ericson & Pakes, 1995) and passive learning (Jovanovic, 1982). In the active learning model of Ericson & Pakes, firms are able to develop their productivity through investments (in R&D, physical capital, etc.), in the knowledge that the investments made do not have an immediate effect, that they have uncertain returns and that the economic environment may result in increased competitive pressures in the markets. In this analytical framework, firms that are unable to adapt to changes in the environment by making sufficient investment compared to their competitors or by increasing their productivity will collapse and disappear from the market. Others will be able to increase their level of productivity and, consequently, the productivity of their sector.

The passive learning model assumes that firms face uncertainty in terms of their level of productivity/performance. For Jovanovic (1982), potential market entrants cannot know their level of productivity in advance and only discover their chances of survival and their level of growth after they have entered the market. However, what they can know is the distribution of the sector's performance. Their presence in the market will enable them to discover their level of productivity gradually, given their a priori performance. Once this level is known, firms may either remain in the industry or leave if their productivity level is too low. This type of learning may result in a Schumpeterian process of creative destruction with a net entry effect (entries minus exits), the level of which will depend on the learning capability of firms once they entered the market.

Many studies have shown that the potential productivity gains associated with a better allocation of resources are significant. Hsieh & Klenow (2009) estimate them at between 30% and 50% in the case of China between 1998 and 2005 and between 40% and 60% in the case of India between 1987 and 1994 if both countries had an economic efficiency level equivalent to that of the United States. In their general equilibrium model, which takes into account the diversity of firms and market distortions, they measure resource misallocation[8] (sub-optimal allocation) in both countries based on the gap with the productivity of U.S. firms (as a benchmark). Petrin & Sivadasan (2011) , for their part, contend that a better allocation of resources, measured by reducing the gap between the marginal productivity of Chilean firms and the cost of their production factors by one unit, could have led to an increase in their aggregate value added of 0.5% on average between 1982 and 1994. Foster *et al*. (2001) use techniques to decompose the evolution of aggregate productivity. They estimate that the reallocation of labour input between firms entering and exiting the same sector accounts for more than 25% of U.S. industrial productivity growth between 1977 and 1987. Lentz & Mortensen (2008) show that the reallocation of labour in Denmark over the period 1992-1997 contributed more than 50%.

In the case of France, Cette *et al*. (2017) posit, based on an analysis of the dispersion of firm productivity, that resource reallocation has deteriorated since the early 2000s. The study by Fontagné & Santoni (2015) takes a similar position, showing that misallocation applies particularly to small and old firms. Osotimehin (2016) considers, on the one hand, the significance of reallocation towards the most productive continuing firms and, on the other, the process of creative destruction. The author shows that, over the period 1989-2007, the contribution of reallocation towards the most productive continuing firms to the evolution of French sectoral total factor productivity (TFP) is greater than that resulting from a Schumpeterian process of creative destruction.

Different methods of decomposing the evolution of productivity have been proposed to quantify the effect of reallocation on sectoral productivity change. The results vary according to the period studied and, above all, according to the decomposition method used. The first decomposition was proposed by Baily *et al*. (1992) – hereinafter abbreviated to BHC. With this method, the effect of the creative destruction process is highly sensitive to the number of firm entries and exits: if, at a given level of productivity, there are more entries than exits, the net effect (entries minus exits) will invariably be negative (Haltiwanger, 1997). Foster *et al*. (2001) – hereinafter abbreviated as FHK – and Griliches & Regev (1995)

8. In this study, the term "misallocation" refers to the misallocation of resources between companies due to market imperfections. A recent literature has emerged that examines various channels of misallocation such as constraints on access to credit (Midrigan & Xu, 2014), the survival of "zombie" firms (McGowan et al.*, 2017) and regulatory distortions (Ordonez, 2014).*

– hereinafter abbreviated as GR – propose two decomposition methods that correct this bias by taking into account a "size" effect. The FHK decomposition calculates the contribution of entries and exits as a deviation from average sectoral productivity at the beginning of the period, while GR calculates their contribution relative to the average aggregate productivity between two years (*t* and *t–k*). According to GR, the FHK method is sensitive to measurement errors. For its part, the GR method poses a problem related to the interpretation of learning and reallocation effects. Melitz & Polanec (2015) – hereinafter abbreviated as MP – show, with reference to the 1995-2000 period of strong growth in Slovenia, that all these methods suffer from a bias related to the overestimation of the contribution of entering firms, thereby underestimating the contribution of reallocation to the most productive continuing firms, which is two to three times greater than with the GR and FHK methods. The results obtained in this study do not support this claim and the PM method appears to be equally sensitive, at least for the period studied.[9]

Methodology

Aggregate productivity for the entire economy or sector P_t at time *t* is defined as a weighted average of the productivity of each firm:

$$P_t = \sum_i \theta_{it} p_{it}$$

Where θ_{it} represents the share of the value added of firm *i* at time *t* and p_{it} measures the log of TFP. Although other performance measures have been used in the literature, this study focuses on TFP, estimated by the Levisohn & Petrin (2003) method (see Box).

The first decomposition proposed by Baily *et al*. (1992) shows four components of the change in aggregate productivity:

$$\Delta P_t = \underbrace{\sum_{i\in C} \theta_{it-k} \Delta p_{it}}_{\textit{Within effect}} + \underbrace{\sum_{i\in C} \Delta\theta_{it}\ p_{it}}_{\textit{Between effect}} + \underbrace{\sum_{i\in N} \theta_{it}\ p_{it} - \sum_{i\in X} \theta_{it-k}\ p_{it-k}}_{\textit{Net Entry effect}}$$

where Δ is the rate of change (TFP being expressed in logarithms) over a period of *k* years between the first year $t - k$ and the last year *t*; *C*, *N* and *X* are categories of continuing, entering and exiting firms[10], respectively.

Productivity growth is divided into two distinct effects: the learning effect (or learning process)

9. See the section on "The Scale of the Schumpeterian Process" for a comparative analysis of the results using the MP decomposition on the one hand and using the FHK and GR decompositions on the other.

10. A firm is deemed to be "continuing" if it was trading in t – k *and in* t. *A firm is deemed to be "exiting" if it was trading in* t – k *and non-existent in* t. *If it was trading in* t *and non-existent in* t – k, *it has the status of an "entering" firm.*

Box – **TFP Estimated by the Levinsohn & Petrin Method (2003)**

To calculate TFP, we estimate a Cobb-Douglas production function with two production factors (capital and labour) without imposing the nature of returns to scale:

$$y_{ijt} = ptf_{ijt} + \beta_{lj} l_{ijt} + \beta_{kj} k_{ijt} + \varepsilon_{ijt}$$

where y_{ijt} is the value added of firm *i* in sector *j* in year *t*, deflated by its annual price index; Parameter ptf_{ijt} is total factor productivity; l_{ijt} the number of employees at year end and k_{ijt} physical capital stock, deflated by the annual investment price index. All variables are expressed in logarithms and the price indices used are at the sector level. The estimates are conducted on a sector-specific basis according to the ten-sector aggregated classification of the NAF rev 2 over the period 2000-2012. The statistical unit is the firm (*l'entreprise*) within the meaning of the LME. Parameter ε_{ijt} is the idiosyncratic error term measuring potential productivity shocks.

Among the recent methods for estimating production functions, this study uses the method developed by Levinsohn & Petrin (2003). One of the main advantages of this semi-parametric method is that unobserved productivity shocks can be controlled for. Olley & Pakes (1996) use investment as a proxy to approximate this shock. To reduce attrition bias, we follow Levinsohn & Petrin (2003) in using intermediate consumption, which is less likely to have a null value compared to investment.

The results show significant differences in the elasticity of estimated production factors between sectors (see Appendix 2). These differences reflect the heterogeneity of production technologies used and the difference in capital intensity.[(a)]

(a) Based on firm data (FICUS) for France, Blanchard & Mathieu (2016) show that the elasticity of production factors (capital and labour) estimated using the methods of Levinsohn & Petrin (2003), Olley & Pakes (1996) and Ackerberg et al. (2015) yield very similar results.

of firms and a resource reallocation effect. Here, the first term is considered to represent the share of productivity due to learning that results from the evolution of productivity in continuing firms, corresponding to the *within effect*. The second term is the *between effect* of continuing firms, which measures the variation of productivity following a change in the composition of market shares. Finally, the last two terms measure the *net entry effect* of the creative destruction process.

Unlike those that follow, this decomposition is not calculated relative to a reference productivity level, which means that the contribution of entering firms is invariably positive and the contribution of exiting firms is invariably negative regardless of their level of productivity.

To mitigate this problem related to the contribution of entries-exits, FHK, but also GR, propose a method of decomposition in which the contribution of entries-exits is calculated relative to a reference level of aggregate productivity.

The FHK Method (Foster, Haltiwanger & Krisan, 2001)

For FHK, the reference productivity level is the average productivity at the beginning of the period. A distinction is drawn between five effects commonly referred to as the *within effect*, the *between effect*, the *cross effect*, the *entry effect* and the *exit effect*, presented in that order below:

$$\Delta P_t = \underbrace{\sum_{i\in C}\theta_{it-k}\Delta p_{it}}_{\text{Within effect}} + \underbrace{\sum_{i\in C}\Delta\theta_{it}\left(p_{it-k}-P_{t-k}\right)}_{\text{Between effect}} + \underbrace{\sum_{i\in C}\Delta\theta_{it}\Delta p_{it}}_{\text{Cross effect}} + \underbrace{\sum_{i\in N}\theta_{it}\left(p_{it}-P_{t-k}\right)-\sum_{i\in X}\theta_{it-k}\left(p_{it-k}-P_{t-k}\right)}_{\text{Net Entry effect}}$$

The first term – the *within effect* – represents the share of the evolution of productivity due to learning; the second term is a *between effect* measuring the contribution of resource reallocation to continuing firms. An increase in market share leads to a positive *between effect* if the firm's productivity is higher than the average productivity of the sector at the beginning of the period. The third term – the covariance (cross effect) between productivity and firm size – is positive when the firm's productivity and market shares vary in the same direction. This term shows that in order for a firm to contribute to TFP growth it must be increasingly efficient and gain market shares even if its productivity is lower than the average productivity of its sector. Therefore, the cross term reflects a reallocation process, albeit not necessarily towards the most productive firms. Finally, the last two terms measure the effect of market entries and exits. Taking into account the net effect of entries, it is possible to assess the effect of the creative destruction process on aggregate productivity.

The FHK decomposition method raises measurement issues acknowledged by the authors themselves. The calculation of the various contributions relative to average productivity at the beginning of the period may overestimate the contribution of the entry effect and therefore underestimate the contribution of continuing firms. Entering firms are not, by construction, included in the calculation of average productivity at the beginning of the period, which appears in the between and net entry effect terms. By not taking into account entering firms in the calculation of the reference productivity level, their contribution will be overestimated while the contribution of continuing firms will be underestimated.

The GR decomposition can be used to control these measurement errors since the reference productivity level is calculated using a time average including entering and continuing firms.

The GR Method (Griliches & Regey, 1995)

GR measures reference productivity as the average aggregate productivity between two periods ($\bar{P}$):

$$\Delta P_t = \underbrace{\sum_{i\in C}\bar{\theta}_i\Delta p_{it}}_{\text{Within effect}} + \underbrace{\sum_{i\in C}\Delta\theta_{it}\left(\bar{p}_i-\bar{P}\right)}_{\text{Between effect}} + \underbrace{\sum_{i\in N}\theta_{it}\left(p_{it}-\bar{P}\right)-\sum_{i\in X}\theta_{it-k}\left(p_{it-k}-\bar{P}\right)}_{\text{Net Entry effect}}$$

The first term always represents the *within effect* but now weighted by the time average of the market shares of firm *i*. The *between effect* and the *net entry effect* are calculated relative to temporal average productivity. The advantage of this decomposition is that it is less sensitive to measurements errors. However, it may pose a problem when interpreting contributions. The within and between effects are interdependent since, in the first case, the weighting used is the average of the market shares while, in the

second case, the weighting is their difference (Duhautois *et al*., 2008). Moreover, the decomposition does not show a cross term that might reflect a possible mechanism for reallocating to firms that become more productive over the period studied, regardless of their initial level of productivity.

Decomposition Based on the MP Method (Melitz & Polanec, 2015).

Based on the static decomposition by Olley & Pakes (1996):

$$P_t = \sum_i \theta_{it} p_{it} = \bar{p}_t + \sum_i \left(\theta_{it} - \bar{\theta}_t\right)\left(p_{it} - \bar{p}_t\right)$$
$$= \bar{p}_t + cov\left(\theta_{it}, p_{it}\right)$$

MP propose a dynamic decomposition that takes into account the entry-exit movements of firms:

$$\Delta P_t = \underbrace{\Delta \bar{p}_t}_{Within\ effect} + \underbrace{\Delta cov\left(\theta_{it}, p_{it}\right)}_{Cross\ effect}$$
$$+ \underbrace{\sum_{i \in N} \theta_{it} \left[\sum_{i \in N} \frac{\theta_{it}}{\sum_{i \in N} \theta_{it}} p_{it} - \sum_{i \in C} \frac{\theta_{it}}{\sum_{i \in C} \theta_{it}} p_{it} \right]}_{Net\ Entry}$$
$$\underbrace{- \sum_{i \in X} \theta_{it-k} \left[\sum_{i \in X} \frac{\theta_{it-k}}{\sum_{i \in X} \theta_{it-k}} p_{it-k} - \sum_{i \in C} \frac{\theta_{it-k}}{\sum_{i \in C} \theta_{it-k}} p_{it-k} \right]}_{effect}$$

With: $\Delta \bar{p}_t = \frac{1}{n_t} \sum_{i \in C} p_{it} - \frac{1}{n_{t-k}} \sum_{i \in C} p_{it-k}$ and $cov\left(\theta_{it}, p_{it}\right)$
$$= \sum_{i=C} \left(\theta_{it} - \bar{\theta}_t\right)\left(p_{it} - \bar{p}_t\right)$$

The first term represents the *within effect*. It differs from the within effect obtained with the BHC, FHK and GR methods. The focus is on a non-weighted average of the productivity of continuing firms. It is based on the first term of the decomposition of Olley & Pakes (1996) by taking the difference of this average between year t and year $t - k$. The second term – *cross effect* – also corresponds to the cross term of the Olley & Pakes decomposition in variation. Therefore, it cannot be compared to the FHK method (calculated as a deviation from the productivity of continuing firms over the initial period).

In what follows, we present and compare the results of the different decomposition methods applied to French data. Since no one method prevails over the others, a comparative analysis of the results obtained with the three decomposition methods – FHK (2001), GR (1995) and MP (2015) – remains pertinent.

Data

The data used are drawn from the FICUS file for the period 2000-2007 and from the ESANE file for the period 2008-2012. Both databases cover all firms subject to corporate income tax. They contain information on, among other things, value added, investment and fixed assets. The employment variables are taken from the Annual Declarations of Social Data (*Déclarations annuelles de données sociales*, or DADS).

Estimates of labour and capital elasticities by sector are carried out using the notion of "*entreprise*" ("firm") as defined in Law No. 2008-1354 on the Modernisation of the Economy (*Loi de modernisation de l'économie*, LME), which takes into account the "group" dimension (see Appendix 2).[11] The Financial Links Between Enterprises Survey (LIFI) was therefore used. Insee data by sector of activity are also used to obtain deflators of value added, capital, intermediate consumption and investment.

Firms with more than 9 employees are selected to ensure the estimates are not sensitive to measurement errors with a significant impact on very small firms. As in Guillou & Nesta (2015), ten sectors were selected, representing nearly 90% of market value added: five manufacturing sectors (Food, beverages and tobacco products, Coke and refined petroleum products, Equipment and machinery, Transport equipment, Other industrial products), the construction sector and four main categories within the service sector ("Low- and medium-" technology business services including "Transport and storage" and "Administrative and support services"; High-technology business services including "Information and communication" and "Scientific and technical services"; Financial and real estate activities; Other services including "Sale and repair" and "Accommodation and food services").

*11. All the variables used in this study are aggregated (unconsolidated) to characterise the new statistical unit: "*entreprise*" ("firm") within the meaning of the LME. The aggregation only concerns legal entities with an ownership percentage greater than or equal to 50% and whose group head is a resident. The sector of the firm corresponds to the sector of the legal entities with the greatest weight of value added in the firm, provided such weight exceeds 50%. Where no sector exceeds the 50% threshold, the weight is measured by the number of employees. If neither of the two criteria verifies this condition, a classification based on value added is used (Cahn* et al.*, 2016). In this context, the notion of continuance (or survival) is linked to the continuance (survival) of the group's leadership. For a comparison of the results obtained for firms as legal units or in the meaning of the LME, see Online complement C2. A link to Online complements is provided at the end of the article.*

The period studied (2000-2012) is of particular interest because it is marked by the 2008 crisis and the beginning of the recovery from 2009 onwards. A relatively significant number of firm entry/exit movements occurred during the period. Table 1 shows the average number of entering, exiting and continuing firms associated with each sub-period. The number of entering and exiting firms[12] is higher over the period 2000-2007 (8,615 and 5,118 firms on average, respectively) compared to the period 2008-2012 (2,883 and 6,361 firms on average, respectively) and the period 2009-2012 (2,219 and 6,648 firms on average, respectively). Given the counting method used, this difference is explained by the fact that the first period is longer than the second.[13]

The opposite is true of continuing firms since, by construction, the four-year survival rate is higher than the eight-year survival rate. However, continuing firms over the 2000-2007 period are not significantly different from those of the 2008-2012 period, at least in terms of productive performance. The average TFP of continuing firms over the periods 2000-2007 and 2008-2012 is 3.98 and 4.02, respectively (see Table in Appendix 1).

Figure II shows the trends in the average TFP of all the firms included in the sample as well as the average TFP of continuing, entering and exiting firms.[14] The TFP of all firms shows an upward trend until 2008 before reaching its post-crisis low point in 2009. The average productivity of entering and continuing firms is higher than that of exiting firms over the entire study period. In addition, the productivity gap between entering and exiting firms appears to increase over the years, especially in the post-crisis period. From this point of view, the market selection process appears to play a key role in the evolution of aggregate TFP by replacing the least productive firms with more productive firms. These trends conceal very different realities depending on the sector.

While the average productivity of entering and continuing manufacturing firms decreased between the sub-periods 2000-2007 and 2008-2012 (see table in Appendix 1), the business services sector, where the average productivity of entering and exiting firms continued to grow after 2008, may have benefited from a better allocation of available resources. However, a simple descriptive analysis is not sufficient to determine the various mechanisms for reallocating resources between firms and their contribution to productivity growth. Therefore, in what follows, we propose to conduct an analysis aimed at understanding the different elements of TFP growth and decline and at identifying the sectors most likely to experience a process of firm churn and resource reallocation.

12. We checked that entries (exits) actually correspond to entries (exits) in (from) the base and that a given entry (exit) was not related to an increase (decrease) in the number of employees above (below) the chosen threshold of 10 employees. However, exits related to merger and acquisition transactions cannot be controlled for.

13. Accounting for entries (exits) each year from 2001 to 2007 (2000 to 2006) requires combining the number of entering (exiting) firms over seven years, which automatically gives a higher number than if the counting is conducted over four years, for example from 2009 to 2012.

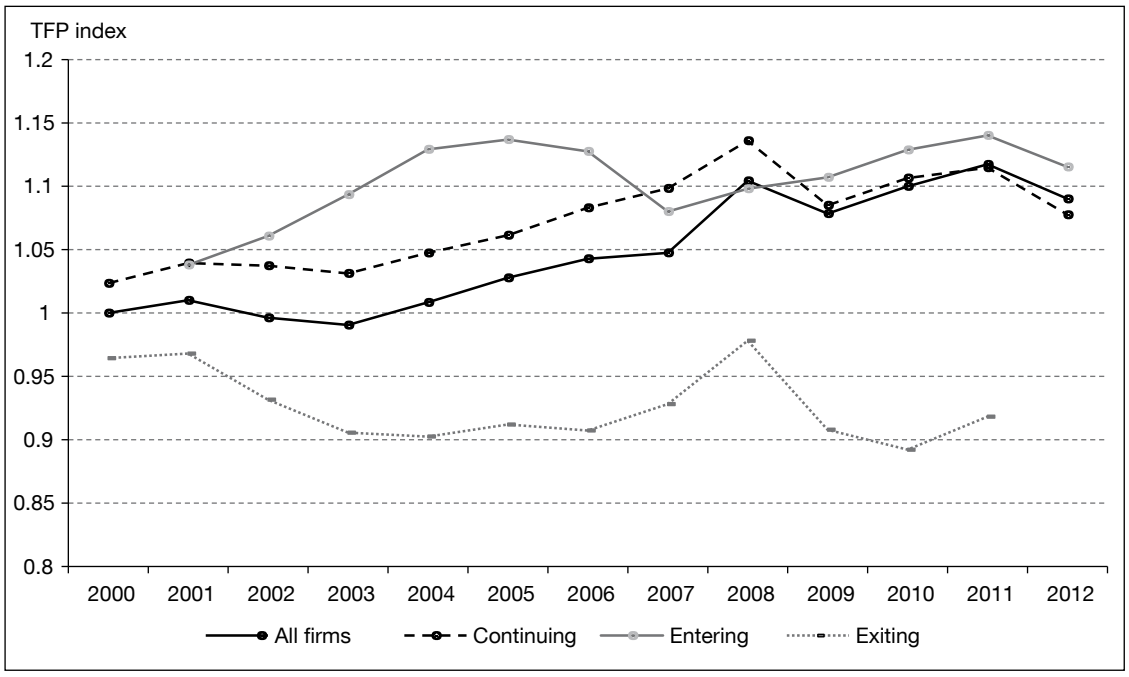
14. The method of counting by firm type is the same as above but over the entire study period: a firm is deemed to be "continuing" if it was trading in 2000 and in 2012. It is deemed to be an "exiting" firm if it was trading in 2000 and non-existent in 2012 and "entering" if it was trading in 2012 and non-existent in 2000.

Table 1
Number of Firms by Type

Type of firm	Average annual number		
	2000-2007	2008-2012	2009-2012
Entering	8,615	2,883	2,219
Exiting	5,118	6,361	6,648
Continuing	19,111	32,296	41,589

Reading Note: The average annual number corresponds to the number of firms in the sub-period considered divided by the number of years of observation of the same sub-period, i.e. seven years (four years, respectively) for entering and exiting firms and eight years (five years, respectively) for continuing firms over the period 2000-2007 (2008-2012, respectively). The same principle is used to count the number of firms over the period 2009-2012. Here, this is used to control for selection bias due to the implementation of Insee's new system for the production of structural business statistics (transition from FICUS to ESANE (from 2008).
Coverage: All firms (within the meaning of the LME) with more than 9 employees subject to corporate income tax (excluding public and agricultural sectors).
Sources: Insee, FICUS-FARE-DADS; Insee and DGFiP, LIFI.

Figure II
Average TFP of all Firms and by Type



Notes: Average TFP – normalised by the average TFP of firms across the entire sample, weighted by the weight of value added as a proportion of total value added. The TFP index is normalised to 1 in 2000 for all firms.
Coverage: All firms (within the meaning of the LME) with more than 9 employees subject to corporate income tax (excluding public and agricultural sectors).
Sources: Insee, FICUS-FARE-DADS; Insee and DGFiP, LIFI.

Sources of Sectoral Productivity Growth and Decline: Reallocation or Learning?

First Lessons from a Global Analysis

Table 2 shows that between 2000 and 2007 aggregate TFP in France increased at an average rate of 0.66% per year while it fell by 0.32% per year on average between 2008 and 2012. In other words, the crisis led to a decline in aggregate productivity in France over the period 2008-2012.[15]

The first lesson from the different decomposition methods is that, depending on the method used, total resource reallocation (*Between* + *Cross* + *Net Entry*) accounts for between one and two thirds of the change in aggregate productivity between 2000 and 2007 (Figure III). Over the period, firm-specific performance (learning effect) also contributes significantly to the change in aggregate productivity (one to two thirds). Given the absence of objective indicators demonstrating the superiority of one method over another, this interval may be interpreted as an interval giving the boundaries of the contribution of each component to the evolution of aggregate TFP.[16] Figure III highlights the significance of the process of total resource reallocation, which served to offset the negative impact of the learning effect, thereby limiting the decline in aggregate productivity after the 2008 crisis. Therefore, France appears not to suffer from a problem of resource misallocation (sum of the reallocation of resources to continuing firms and between entering and exiting firms). On the contrary, resource reallocation even appears to have acted as a shock absorber against the decline in aggregate productivity during the post-crisis period.

The Learning Effect: Main Factor of the Decrease in Productivity in France Between 2008 and 2012

The relatively significant decline in TFP (-0.32%) after the crisis is the result of a

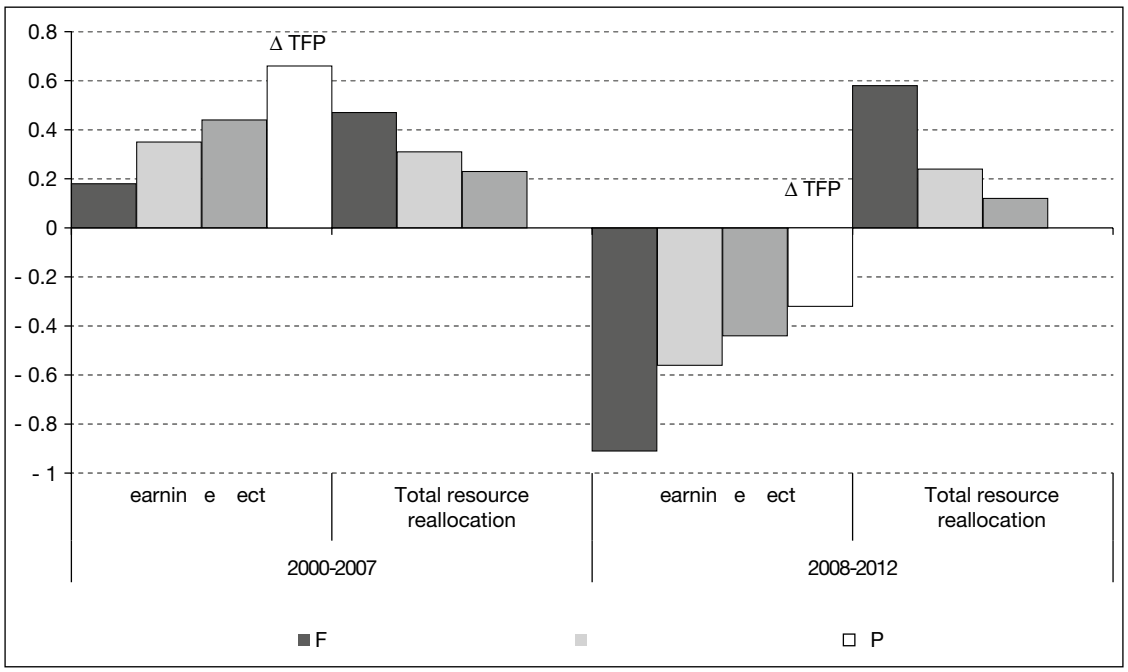
15. The changes in TFP estimated using the LP method (2003) are consistent with those obtained from Insee's quarterly national accounts data (cf. Figure I).
16. The results obtained do not corroborate MP's claim that FHK and GR overestimate the contribution of entering firms (Melitz & Polanec, 2015) since the contribution of such firms, according to the MP method, is greater than that of the FHK method during the post-crisis period.

Table 2
Decomposition of the Average Annual Growth Rate of TFP Using FHK, GR and MP (All Sectors of Activity)

Period	ΔP_t (%)	Learning	Reallocation toward continuing firms	Entry	Exit	Net entry
FHK						
2000-2007	0.66	0.18 (28)	0.18 (27)	0.18 (28)	-0.11 (-17)	0.29 (44)
2008-2012	-0.32	-0.91 (281)	0.28 (-87.5)	0.02 (-6)	-0.28 (-88)	0.30 (-94)
GR						
2000-2007	0.66	0.35 (54)	0.04 (6)	0.10 (15)	-0.17 (-26)	0.27 (41)
2008-2012	-0.32	-0.56 (175)	-0.04 (13)	0.04 (-13)	-0.24 (75)	0.28 (-88)
MP						
2000-2007	0.66	0.44 (66)	0.10 (15)	0.01 (2)	-0.12 (-19)	0.13 (20)
2008-2012	-0.32	-0.44 (138)	-0.24 (75)	0.04 (-13)	-0.32 (100)	0.36 (-113)

Reading Note: The aggregate TFP of French sectors increased on average by 0.66% per year between 2000 and 2007. According to the FHK decomposition, the learning process (Within) contributes 0.18 pp while resource reallocation towards continuing firms contributes 0.18 pp (Reallocation towards continuing firms = Between + Cross). The process of reallocation of firm entry-exits contributes 0.29 pp (Entry – Exit). The values in brackets are in percentage and represent the share of each component in the aggregate TFP growth rate.
Coverage: All firms (within the meaning of the LME) with more than 9 employees subject to corporate income tax (excluding public and agricultural sectors).
Sources: Insee, FICUS-FARE-DADS; Insee and DGFiP, LIFI.

Figure III
Evolution of the Average Annual TFP Growth Rate (Δ TFP) and Contribution of the Learning Effect and Total Resource Reallocation



Notes: Total resource reallocation = Reallocation towards continuing firms + Net entry.
Coverage: All firms (within the meaning of the LME) with more than 9 employees subject to corporate income tax (excluding public and agricultural sectors).
Sources: Insee, FICUS-FARE-DADS; Insee and DGFiP, LIFI.

relatively significant decrease in the learning effect (*within effect*). The (negative) predominance of this component during the period 2008-2012 is robust to the different decomposition methods, with its share in the decrease in productivity amounting to approximately 280% with the FHK method, 175% with GR and 138% with MP. In the pre-crisis period, the learning effect contributes positively to TFP growth, accounting for nearly a third with FHK, more than a half with GR and more than two thirds with MP. These results confirm those previously reported by Carreira & Teixeira (2016) for Portugal, where the learning effect accounts for the most significant contribution of the decline in productivity during the post-crisis period (2008-2012). This effect, which measures internal productivity gains in firms, depends on the ability of firms to optimise their own production processes by permanently adjusting their production factors in order to respond to potential adverse shocks. The 2008 shock – initially a financial shock before spreading to the real economy – revealed the difficulties faced by French firms in responding to a negative demand shock, a process that requires a rapid and effective adjustment of production scale. The pro-cyclical nature of productivity (Basu & Fernald, 2000; Cette *et al*., 2015) in the case of France, appears to transit via the *within* component, which represents the main factor behind the decline in aggregate productivity in France between 2008 and 2012.

The Scale of the Schumpeterian Process of Creative Destruction Before and After the Crisis

The three decomposition methods used in this study show that the Schumpeterian process of creative destruction contributes positively to the evolution of TFP both before and after the 2008 crisis. The *net entry effect* is positive and increased between the two periods. Before the crisis, it made a significant and increasing contribution of nearly 0.3 pp according to the FHK and GR methods, with exiting firms having a greater impact. These contributed -0.28 pp (-0.24 pp and -0.32 pp, respectively) between 2008 and 2012, while entering firms contributed just +0.02 pp (+0.04 pp and +0.04 pp, respectively), using the FHK (GR, MP, respectively) method. The positive contribution of exiting firms is mainly due to a "cleansing effect" given their low productivity compared to the average sectoral productivity level (cf. Figure II). Therefore, the process of creative destruction after the crisis appears to find expression mainly in the destruction dimension.

Moreover, we find that the FHK and GR methods overestimate the contribution of entries but only during the period 2000-2007. However, in the post-crisis period, they no longer show the significant contribution of entering firms. Moreover, the contribution decreased to such an extent that a very similar result is now obtained with the MP decomposition. The contribution of entering firms with the MP method is even greater than with the FHK method (+0.02 pp compared to +0.04 with MP). The weak positive contribution of entering firms, combined with a relatively significant contribution from the exit of the least productive firms after the crisis, helped to mitigate the decline in TFP through a greater cleansing effect in the post-crisis period. The idea that the crisis enabled firms to restructure, a process involving a better allocation of resources, is also found in Gamberoni *et al*. (2016). Based on firm data covering the period 2002-2012 from five major euro area countries (Belgium, France, Germany, Italy and Spain), the authors show that the crisis resulted in a better allocation of labour in 2008, 2009 and 2012.

Resource Reallocation to Continuing Firms: a Positive Contribution Before the Crisis but a Mixed Contribution in the Post-Crisis Period

The intuitive notion that an effective market selection process should allow resources to be reallocated to the best performing firms is confirmed by the results obtained with the three decomposition methods for the period 2000-2007. Resource reallocation towards continuing firms contributed positively to aggregate TFP growth between 2000 and 2007 (+0.18 pp according to FHK, +0.04 according to GR and +0.10 according to MP). Using the GR and MP methods, the association between firms' market share growth and their relative efficiency decreased significantly between 2008 and 2012 compared to the pre-crisis period, reflecting a poor allocation of resources to the most productive continuing firms in France after the crisis. By contrast, the results obtained with the FHK method (*Between effect* + *Cross effect*)[17] over the period 2008-2012 suggest an improvement in the reallocation of resources (0.28 pp). The difference between the results obtained with the

17. *The contribution of each of these components is detailed in the Online complement C1.*

FHK method and the other two methods is due to the cross term of the FHK decomposition, which measures the simultaneous variation in productivity and market share of continuing firms, regardless of their level of performance and/or market share at the beginning of the period. It does not necessarily measure a reallocation to the most productive firms since it is not calculated as a deviation from an average. In other words, it measures market share gains achieved by the most dynamic firms – i.e. those that are simultaneously increasing their productive performance.

The 2009-2012 Period: Signs of Recovery due to Resource Reallocation and Persistent Difficulties with the Learning Effect

The period of instability that began in the first quarter of 2008 and continued until the third quarter of 2009 before signs of recovery were observed (Cabannes *et al*., 2010 ; Bricongne *et al*., 2010) raises questions about the speed of adjustment of business activity in France. This section examines the role of learning and resource reallocation in the recovery observed from the end of 2009 onwards. The hypothesis adopted here suggests that the entry-exit movements observed up to the end of 2008 result from a selection process independent of the impact of the crisis and that if there was a cleansing effect associated with the financial crisis, it should be measured from 2009 onwards.[18]

Table 3 shows the decompositions of the 2000-2007 and 2008-2012 periods, completed with the decomposition of the evolution of aggregate TFP over the period 2009-2012. The results show that aggregate productivity increased between 2009 and 2012 (by 0.36% per year on average) but declined between 2008 and 2012 (-0.32% per year on average). However, the growth rate did not return to the level of the pre-crisis period (0.66% per year on average between 2000 and 2007). These results confirm the findings of Cette *et al*. (2017), who report a "drop in productivity, with an average annual growth from 2008 onwards […] lower than or equal to that observed in previous sub-periods".

The three decomposition methods used here provide some explanations for the slight return to aggregate TFP growth between 2009 and 2012. Despite the slightly greater contribution of the learning effect compared to the 2008-2012 period, the difficulties experienced by continuing firms in adjusting their production scale rapidly and effectively (learning effect) continue to drive aggregate productivity growth down. On the other hand, the mechanisms for reallocating resources to the most productive continuing firms appear to play an increasingly significant role in adjusting activity (positive TFP growth). The FHK method highlights a significant improvement in this effect, which increased by +0.10 points, from +0.28 pp per year on average over the 2008-2012 period to +0.38 pp per year on average over the 2009-2012 period. The GR and MP methods also show an improvement in the reallocation of resources towards the most productive continuing firms over the 2009-2012 period, although its contribution remains moderate (19% of aggregate TFP growth with GR and 38% with MP). Above all, it is the combination of this effect with the net entry effect that enabled a return to a low rate of aggregate productivity growth from 2009 onwards. Not only is this contribution persistent, but it also increased, with a weight of more than 120% over the 2009-2012 period, compared to less than 95% over the 2000-2007 and 2008-2012 periods, regardless of the decomposition method used.

These results represent one of the main contributions of this study since they shed new light on the efficiency of the selection process of the French market, which is often considered to be rigid, with significant frictions in terms of the adjustment of production factors (Calavrezo & Zilloniz, 2016 ; Dhyne *et al*., 2015). These results confirm, to a certain extent and without loss of generality, those reported by Cochard *et al*. (2010) highlighting the responsiveness of the French labour market.

Confirmation of the General Trend at the Sectoral Level

Table 4 shows the results of the different decompositions of TFP growth by sector according to the three methods. The findings show that the effects at the sector level deviate only slightly from the general trend. All sectors were affected by the crisis except the "Manufacture of food, beverages and tobacco products" sector, which recorded a higher growth rate after the crisis

18. By starting the post-crisis period in 2007, there is an increased risk of the results being biased, potentially, by the introduction of the Insee's new system for the production of structural business statistics (transition from FICUS to ESANE from 2008). Since the crisis coincides with this change, the choice of sub-periods – 2000-2007 on the one hand and 2008-2012 and 2009-2012 on the other – means that the results may be deemed to be independent from this development.

Table 3
Decomposition of the Average Annual Growth Rate of TFP Using FHK, GR and MP (All Sectors of Activity)

Period	ΔP_t (%)	Learning	Reallocation towards continuing firms	Entry	Exit	Net entry
FHK						
2000-2007	0.66	0.18 (28)	0.18 (27)	0.18 (28)	-0.11 (-17)	0.29 (44)
2008-2012	-0.32	-0.91 (281)	0.28 (-87.5)	0.02 (-6)	-0.28 (-88)	0.30 (-94)
2009-2012	0.36	-0.45 (-125)	0.38 (105)	0.08 (22)	-0.36 (-100)	0.44 (122)
GR						
2000-2007	0.66	0.35 (54)	0.04 (6)	0.10 (15)	-0.17 (-26)	0.27 (41)
2008-2012	-0.32	-0.56 (175)	-0.04 (13)	0.04 (-13)	-0.24 (75)	0.28 (-88)
2009-2012	0.36	-0.16 (-44)	0.07 (19)	0.07 (19)	-0.37 (-103)	0.44 (122)
MP						
2000-2007	0.66	0.44 (66)	0.10 (15)	0.01 (2)	-0.12 (-19)	0.13 (20)
2008-2012	-0.32	-0.44 (138)	-0.24 (75)	0.04 (-13)	-0.32 (100)	0.36 (-113)
2009-2012	0.36	-0.24 (-67)	0.14 (39)	0.07 (19)	-0.40 (-111)	0.47 (131)

Reading Note: The aggregate TFP of French sectors increased on average by 0.36% per year between 2009 and 2012. According to the FHK decomposition, the learning process (Within) contributes -0.45 pp while resource reallocation towards continuing firms contributes +0.38 pp (Between + Cross). The process of reallocation of firm entries-exits contributes 0.44 pp (Entry – Exit). The values in brackets are in percentage terms and represent the share of each component in the aggregate TFP growth rate.
Coverage: All firms (within the meaning of the LME) with more than 9 employees subject to corporate income tax (excluding public and agricultural sectors).
Sources: Insee, FICUS-FARE-DADS; Insee and DGFiP, LIFI.

Table 4
Decomposition of the Average Annual Growth Rate of TFP Using the FHK, GR and MP Methods

Sector	2000-2007										2008-2012									
	ΔP_t (%)	Learning			Reallocation towards continuing firm			Net entry effect			ΔP_t (%)	Learning			Reallocation towards continuing firm			Net entry effect		
		FHK	GR	MP	FHK	GR	MP	FHK	GR	MP		FHK	GR	MP	FHK	GR	MP	FHK	GR	MP
Manufacture of food, beverages and tobacco products	0.73	0.56	0.73	0.88	0.15	0.01	0.09	0.02	-0.01	-0.23	1.17	0.70	1.15	1.64	0.29	-0.21	-0.61	0.18	0.23	0.14
Manufacture of coke and refined petroleum products	1.78	2.32	3.22	4.58	0.69	-0.42	-0.33	-1.23	-1.01	-2.48	-7.67	-6.29	-6.83	-7.44	-1.24	0.35	-0.05	-0.14	-1.19	-0.19
Manufacture of equipment and machinery	4.13	3.01	3.33	4.32	0.31	-0.09	-0.19	0.80	0.89	-0.01	-2.24	-1.61	-1.51	-1.72	-0.17	-0.04	0.04	-0.46	-0.69	-0.56
Manufacture of transport equipment	1.47	0.51	0.69	0.82	0.26	0.11	0.19	0.70	0.69	0.46	-3.29	-3.37	-3.20	-3.40	-0.09	-0.06	-0.26	0.17	-0.02	0.36
Manufacture of other industrial products	1.83	0.88	1.07	1.29	0.27	0.06	0.14	0.68	0.72	0.41	0.12	-0.56	-0.30	-0.28	0.30	0.04	-0.02	0.38	0.38	0.42
Construction	-0.85	-0.88	-0.68	-0.90	0.27	0.04	0.09	-0.24	-0.21	-0.04	-2.55	-3.07	-2.84	-2.90	0.13	-0.06	-0.23	0.40	0.36	0.59
Services to low- and medium-technology firms	0.54	0.22	0.32	0.43	0.06	0.00	0.04	0.26	0.22	0.07	0.24	-0.32	-0.02	0.24	0.20	-0.10	-0.36	0.36	0.36	0.36

➔

Table 4 (contd.)

Sector	2000-2007										2008-2012									
	ΔP_t (%)	Learning			Reallocation towards continuing firm			Net entry effect			ΔP_t (%)	Learning			Reallocation towards continuing firm			Net entry effect		
		FHK	GR	MP	FHK	GR	MP	FHK	GR	MP		FHK	GR	MP	FHK	GR	MP	FHK	GR	MP
Services to high-technology firms	0.99	0.45	0.60	0.91	0.12	0.00	-0.01	0.42	0.37	0.10	0.42	-0.14	0.28	0.54	0.30	-0.12	-0.36	0.26	0.26	0.24
Financial and real estate activities	1.08	0.30	0.54	0.65	0.23	0.06	0.18	0.55	0.48	0.25	1.81	0.48	0.83	1.08	0.44	0.04	-0.08	0.89	0.95	0.81
Other services	0.21	0.01	0.21	0.21	0.26	0.06	0.17	-0.06	-0.06	-0.17	0.08	-0.52	-0.14	0.06	0.32	-0.06	-0.28	0.28	0.28	0.30
All	0.66	0.18	0.35	0.43	0.18	0.04	0.10	0.29	0.27	0.13	-0.32	-0.91	-0.56	-0.44	0.28	-0.04	-0.24	0.30	0.28	0.36

Note: 'Learning' = Within effect; 'Reallocation towards continuing firms' = Between effect + Cross effect for FHK, Between effect for GR, Cross effect for MP; 'Net entries' = Entry – Exit. The results of this table are obtained by using the formulas described in the methodology section by aggregating the TFP of firms at a sector level. The results of the "All" line are obtained by aggregating TFP at a national level. The decomposition of the average annual growth rate of sectoral TFP does not take into account reallocations between sectors. Osotimehin (2016) shows that cross-sectoral reallocations play a limited role in aggregate productivity trends.
Coverage: All firms (within the meaning of the LME) with more than 9 employees subject to corporate income tax (excluding public and agricultural sectors).
Sources: Insee, FICUS-FARE-DADS; Insee and DGFiP, LIFI.

(1.17%) compared to the pre-crisis period (0.73%), thanks to a significant learning effect. In the manufacturing industry, the "Manufacture of coke and refined petroleum products", "Manufacture of equipment and machinery" and "Manufacture of transport equipment" sectors were particularly affected by the crisis. Reallocations to continuing firms and entry-exit movements contributed almost nothing, if not negatively, to TFP growth in these sectors. More generally, in manufacturing sectors, it was essentially the negative effect of learning that contributed to the decline in their productivity. Once again, neither the creative destruction mechanism nor the mechanism of resource reallocation towards the most productive continuing firms acted as a shock absorber in reducing the decline in aggregate TFP.

In the business services sectors, entry-exit movements clearly contributed to maintaining growth over the 2008-2012 period at a level lower than that of the pre-crisis period (but nonetheless positive), regardless of the decomposition method used. The contribution of resource reallocation is more mixed in the case of the business services sectors ("low- and medium-technology" and "high-technology" sectors). The FHK method is alone in producing a positive effect. The GR and MP methods yield generally negative reallocation effects after the 2008 crisis.

In financial and real estate activities, the Schumpeterian creative destruction effect played a significant role in the evolution of TFP both before and after the crisis. This result is consistent with the findings of Guillou & Nesta (2015) and may be explained by the early and immediate effect of the crisis on this sector (as early as 2008). In other sectors, transmission mechanisms are thought to have delayed the effects of the crisis.

* *
*

This study examined the contributions of resource reallocation towards the most productive firms and of firm performance (learning effect) to the evolution of aggregate TFP in France before and after the 2008 crisis.

The results obtained show that the 2009 crisis had a negative impact on aggregate TFP. The learning effect, as measured here by the *within* component, was found to be the main factor behind the decline in aggregate TFP after the crisis. The total effect of resource reallocation (reallocation towards continuing firms + *net entry effect*) was found to act as a shock absorber against the decline in aggregate productivity during the post-crisis period. The three decomposition methods (FHK, GR and MP) show that the process of resource reallocation towards the most productive continuing firms was underway before the crisis. After the

crisis, over the period 2008-2012, only the FHK method shows a positive effect of reallocation towards the most productive continuing firms. By contrast, the GR and MP decomposition methods highlight a misallocation of resources to the detriment of the most productive firms during the same period. The period 2009-2012 saw a slight return to aggregate TFP growth, a trend driven by the mechanisms of resource reallocation towards the most productive continuing firms. These mechanisms indicate a moderate but positive and robust contribution to the different decomposition methods.

The results for the post-crisis period also point to a cleansing effect through a Schumpeterian process of creative destruction. However, the effect of this mechanism was more destructive than creative, a result confirmed by the main decompositions and periods used. At least two explanations can be put forward. First, in absolute terms, the contribution of entering firms after the crisis is very limited compared to the contribution of exiting firms. This implies a relatively significant contribution of the net entry effect (the balance of entries minus exits), which was almost equivalent to the contribution of exiting firms. Second, the post-crisis period is too short to capture the long-term effects of the crisis, a key assumption in the Schumpeterian approach according to which the renewal of production structures represents a relatively long-term process. Overall, the market selection process appears to have played a key role in the evolution of aggregate TFP in the post-crisis period since it eliminated the worst performing firms while entering firms played a more limited role.

These average trends conceal sectoral disparities. The results show that the crisis did not affect all sectors of the French economy to the same extent. The manufacturing sectors suffered the most from the 2008 crisis. This may be explained at least in part by their limited ability to adjust their production scale compared to the service sectors and by poorer resource allocation. The "business services" sector experienced a less pronounced decline in productivity growth than the manufacturing sector. In the service sector, the reallocation of resources to continuing firms and the creative destruction process may have offset the negative contribution of the learning effect.

This study assessed the contribution of the learning capacity of firms and of resource reallocation on productivity growth in France. However, we have yet to understand the reasons for the very low level of productivity growth we are currently seeing (0.2% per year on average between 2013 and 2016; cf. Figure I). The results presented suggest that the causes of the slowdown in aggregate productivity growth are to be found in the inability of entering firms to maintain a higher level of productivity over a sufficiently long period of time compared to continuing firms. Indeed, the replacement of exiting firms by entering firms whose productivity gains increase rapidly in the first few years and fade after four years (see Figure II) raises questions about the "impoverishing" effect of the creative destruction process, a problem representing a first avenue for future research. The second avenue concerns the impact of so-called "zombie" firms, which manage to remain in business for several years despite the persistent economic and financial difficulties they experience, on the learning effect and, consequently, on the slowdown in productivity gains. Such firms, which should have disappeared, tend to distort competition, to prevent the proper allocation of resources and to put "healthy" firms at risk. □

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APPENDIX 1

EVOLUTION OF AVERAGE TFP

Table A1
Average of TFP by Sector and by Type of Firm Before and After the Crisis

Sectors	Before (2000-2007)			After (2008-2012)		
	Continuing	Entering	Exiting	Continuing	Entering	Exiting
Manufacturing	3.84	3.74	3.74	3.79	3.69	3.70
Construction	4.13	4.16	3.95	3.99	3.98	3.78
Services to "low- and medium-technology" firms	3.85	3.86	3.72	3.93	3.90	3.67
Services to "high-technology" firms	4.30	4.37	4.17	4.42	4.50	4.30
Financial and real estate activities	4.29	4.34	4.32	4.31	4.35	4.00
Other services	4.02	3.98	3.80	4.08	3.99	3.81
Average (all sectors of activity)	3.98	4.02	3.81	4.02	4.02	3.79

Notes: The weighted average by value added is calculated for the entire sample for each sub-period by sector and type of firm. For entering firms, the first year of each sub-period is not taken into account in calculating the average. For exiting firms, the last year of each sub-period is not taken into account in calculating the average.
Coverage: All firms (within the meaning of the LME) with more than 9 employees subject to corporate income tax (excluding public and agricultural sectors).
Sources: Insee, FICUS-FARE-DADS; Insee and DGFiP, LIFI.

APPENDIX 2

ECONOMETRIC RESULTS

Table A2-I
Estimation of Production Factors by Sector Using the LP Method (10-Sector Aggregated Classification)

	Manufacture of food, beverages and tobacco products	Manufacture of coke and refined petroleum products	Manufacture of equipment and machinery	Manufacture of transport equipment	Manufacture of other industrial products
Log L	0.533*** (0.007)	0.496*** (0.087)	0.463*** (0.010)	0.590*** (0.019)	0.591*** (0.004)
Log K	0.195*** (0.008)	0.316* (0.184)	0.231*** (0.012)	0.231*** (0.035)	0.217*** (0.008)
Number of observations	124,392	987	69,818	12,331	319,875
Number of firms	13,048	113	7,421	1,289	33,339

Table A2-II
Estimation of Production Factors by Sector Using the LP Method (10-Sector Aggregated Classification)

	Construction	Services to low- and medium-technology firms	Services to high-technology firms	Financial and real estate activities	Other services
Log L	0.570*** (0.003)	0.726*** (0.003)	0.641*** (0.004)	0.627*** (0.010)	0.589*** (0.003)
Log K	0.197*** (0.003)	0.133*** (0.005)	0.151*** (0.004)	0.159*** (0.008)	0.162*** (0.003)
Number of observations	503,541	271,480	261,601	94,557	937,728
Number of firms	51,344	30,326	29,632	11,415	96,260

Significant coefficients at the 10% * threshold, 5% ** threshold, 1% *** threshold.
Notes: LP is a two-step estimation method (see box). Since the elasticity of labour is estimated in the second step, the standard deviations are biased. To correct this bias, we estimate robust standard deviations using a bootstrap with 250 replications. The standard deviations are shown in brackets.
Coverage: All firms (within the meaning of the LME) with more than 9 employees subject to corporate income tax (excluding public and agricultural sectors).
Sources: Insee, FICUS-FARE-DADS; Insee and DGFiP, LIFI.

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Economie et Statistique / Economics and Statistics publie des articles traitant de tous les phénomènes économiques et sociaux, au niveau micro ou macro, s'appuyant sur les données de la statistique publique ou d'autres sources. Une attention particulière est portée à la qualité de la démarche statistique et à la rigueur des concepts mobilisés dans l'analyse. Pour répondre aux objectifs de la revue, les principaux messages des articles et leurs limites éventuelles doivent être formulés dans des termes accessibles à un public qui n'est pas nécessairement spécialiste du sujet de l'article.

Soumissions

Les propositions d'articles, en français ou en anglais, doivent être adressées à la rédaction de la revue (redaction-ecostat@insee.fr), en format MS-Word. Il doit s'agir de travaux originaux, qui ne sont pas soumis en parallèle à une autre revue. Un article standard fait environ 11 000 mots (y compris encadrés, tableaux, figures, annexes et bibliographie, non compris éventuels compléments en ligne). Aucune proposition initiale de plus de 12 500 mots ne sera examinée.

La soumission doit comporter deux fichiers distincts :

- Un fichier d'une page indiquant : le titre de l'article ; le prénom et nom, les affiliations (maximum deux), l'adresse e-mail et postale de chaque auteur ; un résumé de 160 mots maximum (soit environ 1 050 signes espaces compris) qui doit présenter très brièvement la problématique, indiquer la source et donner les principaux axes et conclusions de la recherche ; les codes JEL et quelques mots-clés ; d'éventuels remerciements.
- Un fichier anonymisé du manuscrit complet (texte, illustrations, bibliographie, éventuelles annexes) indiquant en première page uniquement le titre, le résumé, les codes JEL et les mots-clés.

Les propositions retenues sont évaluées par deux à trois rapporteurs (procédure en « double-aveugle »). Les articles acceptés pour publication devront être mis en forme suivant les consignes aux auteurs (accessibles sur https://www.insee.fr/fr/information/2410168). Ils pourront faire l'objet d'un travail éditorial visant à améliorer leur lisibilité et leur présentation formelle.

Publication

Les articles sont publiés en français dans l'édition papier et simultanément en français et en anglais dans l'édition électronique. Celle-ci est disponible, en accès libre, sur le site de l'Insee, le jour même de la publication ; cette mise en ligne immédiate et gratuite donne aux articles une grande visibilité. La revue est par ailleurs accessible sur le portail francophone Persée, et référencée sur le site international Repec et dans la base EconLit.

Main objectives of the journal

Economie et Statistique / Economics and Statistics publishes articles covering any micro- or macro- economic or sociological topic, either using data from public statistics or other sources. Particular attention is paid to rigor in the statistical approach and clarity in the concepts and analyses. In order to meet the journal aims, the main conclusions of the articles, as well as possible limitations, should be written to be accessible to an audience not necessarily specialist of the topic.

Submissions

Manuscripts can be submitted either in French or in English; they should be sent to the editorial team (redaction-ecostat@insee.fr), in MS-Word format. The manuscript must be original work and not submitted at the same time to any other journal. The standard length of an article is of about 11,000 words (including boxes if needed, tables and figures, appendices, list of references, but not counting online complements if any). Manuscripts of more than 12,500 words will not be considered.

Submissions must include two separate files:

- A one-page file providing: the title of the article; the first name, name, affiliation-s (at most two), e-mail et postal addresses of each author; an abstract of maximum 160 words (about 1050 characters including spaces), briefly presenting the question(s), data and methodology, and the main conclusions; JEL codes and a few keywords; acknowledgements.
- An anonymised manuscript (including the main text, illustrations, bibliography and appendices if any), mentioning only the title, abstract, JEL codes and keywords on the front page.

Proposals that meet the journal objectives are reviewed by two to three referees ("double-blind" review). The articles accepted for publication will have to be presented according to the guidelines for authors (available at https://www.insee.fr/en/information/2591257). They may be subject to editorial work aimed at improving their readability and formal presentation.

Publication

The articles are published in French in the printed edition, and simultaneously in French and in English in the online edition. The online issue is available, in open access, on the Insee website the day of its publication; this immediate and free online availability gives the articles a high visibility. The journal is also available online on the French portal Persée, and indexed in Repec and EconLit.

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Au sommaire du prochain numéro :
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