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Discrimination in Access to Employment: The Combined Effects of Gender, Origin and Address

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Abstract – This article measures discrimination in the recruitment of management assistants within the Métropole européenne de Lille (Lille European Metropolis) by combining the effects of gender, ethnic origin and address. A sample of 3,000 recruiters was drawn at random from within the companies belonging to the Métropole, to whom we sent information requests in October 2021. The fictitious applicant of North African origin received 27% fewer positive responses than the applicant of French origin. In this regard, men are only discriminated against based on their ethnic origin if they live in a priority neighbourhood for urban policy (*Quartier prioritaire de la politique de la ville*, QPV). The fact of living in a priority neighbourhood is advantageous for applicants of French origin, probably as a result of the recruitment bonus associated with the *Emplois francs* scheme, which was fully rolled out and enhanced in 2021; however, this does not benefit applicants of North African origin. These findings call for improved targeting of anti-discrimination measures to capture the populations discriminated against in disadvantaged areas.

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Academic studies focusing on measuring discrimination in access to employment largely favour correspondence tests, which consist of comparing the chances of success of two fictitious job applicants who are similar in all respects except for one characteristic: the one that the tests are aiming to quantify the effect of (Riach & Rich, 2002; Bertrand & Duflo, 2017; Neumark, 2018). Each test generally focuses on just one of the discrimination criteria prohibited by law. In his systematic review of 90 studies published in English using the correspondence test method and performed between 2005 and 2016, Baert (2017) lists only nine studies that look at more than one criteria. The majority of these rare multi-criteria studies look at two discriminating factors: gender and ethnic origin (Agerström *et al.*, 2012; Berson, 2012; Petit *et al.*, 2013; Edo & Jacquemet, 2014); ethnic origin and place of residence (Duguet *et al.*, 2010); gender and age (Albert *et al.*, 2011); ethnic origin and marital status (Arceo-Gomez & Campos-Vazques, 2014); religion and origin (Pierné, 2013); wealth and religion (Banerjee *et al.*, 2009); origin and employment status (Pierné, 2018); sexual orientation and physical appearance (Patacchini *et al.*, 2015); physical appearance and disability (Stone & Wright, 2013). Studies looking at more than two criteria are even rarer. One example is the study by Capéau *et al.* (2012), which measures discrimination according to age, gender, disability and origin; however, it does not combine these criteria.[1] Finally, we would like to mention the study by L'Horty *et al.* (2011), which combines the three criteria of ethnic origin, gender and place of residence. It assessed the effect of a person's place of residence (at the municipality level) for three localities in the Val-d'Oise department (Sarcelles, Villiers-le-Bel and Enghien-les-Bains), focusing specifically on young computer developers.

We therefore observe that the number of studies that combine multiple discrimination criteria is very small. While intersectionality is a hot topic in the public debate, since the seminal article by Crenshaw (1989), which centred around the situation of black and marginalised women in the United States, it has been all but absent in the empirical literature focusing on the experimental measurement of discrimination on the labour market. However, its quantitative translation refers to clear empirical content. For example, if α is the penalty suffered by a woman in a given field and β is the penalty suffered by a person of foreign origin, it is a question of determining whether women of foreign origin suffer

a penalty that differs from $\alpha + \beta$. The empirical literature also speaks of the interaction (or joint) effect and distinguishes between cases of strict additivity (the penalty suffered is exactly $\alpha + \beta$), over-additivity (the penalty exceeds $\alpha + \beta$) and sub-additivity (the penalty is less than $\alpha + \beta$). This is an essential challenge from the point of view of the targeting of public policies, since it is a question of precisely determining the characteristics of the populations who fall victim to discrimination and the scale of the prejudice they suffer.

In France, the only national public policy that explicitly incorporates the issue of combating discrimination is urban policy. Law No 2014-173 of 21 February 2014 on programming for the city and urban cohesion states that "urban policy forms part of a strategy that aims to restore equality between areas and ensure that residents have access to their rights". It "contributes to gender equality, integration policy and the fight against discrimination faced by people living in disadvantaged neighbourhoods, particularly on the grounds of place of residence and actual or presumed origin". The administration responsible for its implementation, the Agence nationale de la cohésion des territoires (National Agency for Territorial Cohesion, ANCT), focuses in particular on the actual or presumed origin of individuals and their address (due to the prevalence of those factors in the discrimination reported by the inhabitants of the neighbourhoods) and age and gender criteria (gender equality and youth are also cross-cutting issues in the urban contract).[2]

Regional anti-discrimination measures require the involvement of local stakeholders in one or more of the areas covered by the law (employment, housing, etc.) and covering one or more criteria (gender, origin, etc.). For the areas covered by urban policy, this commitment has taken the form of the signing of a *plan territorial*

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1. *In a correspondence test with two criteria, for example gender and place of residence (neutral neighbourhood vs priority neighbourhood), it is possible to measure discrimination using three fictitious applicants (reference/man living in a neutral neighbourhood, woman living in a neutral neighbourhood, man living in a priority neighbourhood); however, four applicants are required if the combined effects are to be measured (by adding a woman living in a priority neighbourhood). This type of experiment where all possible cases are tested is referred to as a "saturated protocol".*
2. *One of the specific features of the urban contract is the way in which it coordinates a wide range of national and local stakeholders around common local development objectives. This takes the form of contracts entered into between the Government and local stakeholders under names that have evolved over the years and covering content that has become broader over time. Initially limited to the living environment and social cohesion, the scope of the contracts has been expanded to include local economic development and, since the reform in 2014, neighbourhood associations, centred on a territory project, led by the inter-municipal authority and formalised in the "urban contract". Initially signed to cover the period from 2015 to 2022, these urban contracts are now being renewed.*

de lutte contre les discriminations (regional anti-discrimination plan, PTLCD). The *Emplois francs* scheme has been added to the actions set out in these plans: it involves the payment of a subsidy to any employer that recruits a job seeker living in a priority neighbourhood for urban policy (*Quartier prioritaire de la politique de la ville,* QPV). Piloted from April 2018 and fully rolled out in January 2020, the grant amounts to EUR 15,000 over a period of three years for a permanent contract and EUR 5,000 over two years for a fixed-term contract.[3] This scheme is described by the ANCT as "a robust and innovative response to recruitment discrimination in priority neighbourhoods".

Our study is original on three counts. First, it is based on a multi-criteria discrimination test that makes it possible to combine the effects of the gender, ethnic origin and place of residence of job applicants. The place of residence is defined at the neighbourhood level, so at more granular level than that chosen by L'Horty *et al.* (2011). The test is then performed on a defined geographical area: the 95 municipalities making up the Métropole européenne de Lille (MEL), which is home to more than a million people. We have therefore positioned ourselves within a public establishment for intermunicipal cooperation, the MEL, which has experience in the area of urban policy and anti-discrimination measures. This space is located within the *Nord* department, a pilot area for the *Emplois francs* scheme since April 2018, which was, at the time at which the data were collected in late 2021, the French department with the largest number of contracts under the *Emplois francs* scheme.[4] Finally, unlike the conventional tests, which are carried out in response to job advertisements and therefore involve an element of selection of job advertisements and recruiters, thereby inviting potential bias, the test is based on speculative requests for information sent to a representative sample of local recruiters. The sample is made up of 3,000 legal units drawn at random from across all entities (companies, government establishments, associations, etc.) present within the test area. In late October 2021, we sent 6,000 requests for information to these employers, which allowed us to measure discrimination on the basis of presumed North African origin and being resident in a priority neighbourhood, for both men and women.

The findings confirm and supplement those of the pilot study that we conducted with a similar protocol on the Communauté d'agglomération Maubeuge-Val de Sambre (Anne *et al.*, 2022). We highlight a number of patterns of conditional

discrimination. Without taking account of the combined effects, the data indicate that women are favoured when it comes to accessing management and secretarial assistant jobs, which are already dominated by women. The discrimination experienced by those of North African origin is substantial and on a scale that is comparable with findings previously obtained in France. When all genders are taken into account, the applicant of North African origin received around 27% fewer positive responses than the applicant of French origin. If we take account of combined effects, discrimination based on origin exists for men who live in priority neighbourhoods, but not for those living in other neighbourhoods. The fact of living in a priority neighbourhood provides an advantage for applicants of French origin, probably due to the recruitment bonus associated with *Emplois francs*. However, this bonus for recruiting residents of priority neighbourhoods does not offer any benefit for applicants of North African origin, who are the only group to be penalised for living in a priority neighbourhood.

The first section describes the experimental data protection protocol. The findings are presented in the following section, before then being discussed in Section 3, before our conclusion.

1. Data Collection Protocol

We use the same protocol that we tested during our pilot study (Anne *et al.*, 2022) with a small number of changes, indicated below. The correspondence test was not performed in response to job advertisements published by companies, but in the form of a request for information prior to the submission of application. The correspondence sent by fictitious applicants took the form of simple contact emails sent to an employer to request information regarding the selection procedure for applications or asking whether there are any positions available within the company. This variant does not require us to draw up CVs and therefore offers the advantage that we are able to test a far wider range of jobs without introducing selection bias in the choice of professions. This allows us to offer findings based on representative data. It goes without saying that, when we take such an approach, response rates are, on average, lower

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3. *Within the scope of the emergency measures and the "1 jeune, 1 solution" (1 young person, 1 solution) plan, between 15 October 2020 and 31 December 2021, these amounts were increased to EUR 17,000 and EUR 8,000, respectively, where the applicant being recruited was under the age of 26 ("emploi franc +" scheme).*
4. *At that time, there were 41,301 emplois francs contracts in metropolitan France as a whole, 4,984 of which were in the Nord department, 12.1% of the total (sources: DARES, POEM database).*

than the responses that would be received when responding to job advertisements; however, by basing our study on larger samples, it is still possible to detect differences in treatment, which are indicative of discrimination. Challe *et al.* (2020) use both speculative applications and responses to job advertisements. Their findings were the same for both approaches: discrimination against people whose surname indicates that they are of North African origin across a sample of 103 very large companies (a significant difference of nearly 30%). In addition, the recruitment of employees *via* speculative applications is not uncommon in France. Applicants often use this method (in 2017, 41% of companies employing more than 50 people received more than 100 speculative applications) and companies generally consider their applications (in 2017, 64% of employers declared that they had recruited staff *via* speculative applications).[5] In addition, 68% of such applications are submitted by email. Conversely, the request for information provides a partial picture of access to employment. A recruiter can respond to a request for information without discrimination, but may then discriminate at the CV selection stage or during the job interview. However, any difference in response between two requests for information that only differ on the basis of a prohibited criterion is considered discrimination. In law, discrimination is defined as unfavourable treatment that must generally meet two cumulative conditions: it must be based on a criterion defined by law (gender, age, disability, etc.) and a situation covered by law (access to employment, a service, housing, etc.).

1.1. Selection of a Cross-Cutting and In-Demand Field of Activity

We chose to study an in-demand field of activity: support functions in the administrative field. This field includes numerous professions with differing levels of qualification. Three of these are among the twenty most in-demand professions in France: administrative employee, secretary and accounting employee (according to data from the 2016 *enquête Emploi* – the French Labour Force survey). These are professions for which there are large numbers of both unemployed people and jobs available. Our decision to use a field of activity with a large number of job seekers allows us to limit the probability of detection when sending multiple speculative job applications simultaneously. Choosing an in-demand profession reduces the non-response rate among employers, independently of any discrimination. This methodological precaution is especially useful in the context of a sharp slowdown in economic growth. Nevertheless, the greater opportunities enjoyed by applicants seeking employment in an in-demand profession come with a trade-off from the point of view of discrimination: access to employment is less selective and it is therefore more difficult to observe discrimination in the recruitment process for this type of profession. We are therefore deliberately placing ourselves in a context that is expected to minimise discrimination in the recruitment process.

We selected this professional area because administrative support functions are present in the majority of companies. This is a cross-cutting field that will allow us to test all companies within a single region with the same requests for information, which avoids us having to select companies from particular sectors of activity. Furthermore, the professional field of management assistants is heavily female-dominated. This characteristic must be borne in mind, as it is likely to skew the test results. As indicated by the meta-analysis by Adamovic & Leibbrandt (2023), men have lower response rates in the most female-dominated professions.

1.2. Eight Fictitious Applicant Profiles

We created a total of eight fictitious applicant profiles, four men and four women (compared with just three in our pilot study). To avoid a source of detection associated with a possible search of the applicant's identity on social networks, the identities were constructed using the most common first names and surnames listed in the files of names and surnames published by INSEE on the basis of civil registry declarations.[6] The first applicant has a French-sounding first name and surname and does not provide any indication of their place of residence (reference applicant). The second applicant is distinguished from the first by their North African-sounding first name and surname. This second applicant of North African origin therefore also does not indicate their place of residence. The third applicant differs from the reference applicant in that they indicate that they live in a priority neighbourhood under urban policy. This third applicant living in a priority neighbourhood therefore still indicates that they are of French origin. A fourth applicant is distinguished from the reference candidate by both their North African origin and the fact

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5. See *Pôle emploi* (2017).
6. Examples of surnames indicating the origin of applicants: Petit, Roussel, Dumont, Morel, Saadi, Hassani, Slimani, Saidi. Examples of first names indicating the gender of applicants: Thomas, Alexandre, Stéphanie, Audrey, Rachid, Kassim, Khadija, Rachida.

that they live in a priority neighbourhood. When compared side-by-side, these profiles allow us to measure, for women on the one hand and for men on the other, the degree of discrimination on the basis of their origin that is conditional on their place of residence (depending on whether the applicant lives in a priority neighbourhood or not) and the degree of discrimination on the basis of their neighbourhood of residence that is conditional on their origin (French or North African) (Diagram 1).

When choosing the priority neighbourhood, we selected a large neighbourhood that is very well known within the MEL. An address within that neighbourhood unambiguously indicates that the applicant lives in a priority neighbourhood.

1.3. Two Requests for Information Sent to Each Employer

To avoid the risk of detection by the employers receiving requests for information, we chose to only send two requests to each potential recruiter. One request from the reference applicant, who does not mention their place of residence and whose first name and surname indicate that they are of French origin. The nature of the other applicant (North African origin, priority neighbourhood resident or both) is determined by the drawing of lots. The pair of applicants is either two men or two women. In addition, we spaced the two requests several days apart. The first request was sent on 19 October 2021 and the second on 26 October 2021. Finally, we made sure that there would not be any bias linked to the employer detecting that they are being tested: the order in which the two requests were sent was determined by drawing lots, which guarantees that the reference applicant and the applicant that may be discriminated against are the first to contact the recruiter a comparable number of times.

In total, four lots are drawn for each email address tested. The first lot is drawn to determine the gender to be indicated by the first name of the two applicants. The second selects which of the applicants that may be discriminated against will contact the recruiter (North African origin, priority neighbourhood resident or both) alongside the reference applicant, who contacts the recruiter in every case. The third lot is drawn to determine which of the two messages will be sent by each of the fictitious applicants. Finally, the fourth lot is drawn to determine the order in which the two applicants will send their message to the recruiter.

1.4. Similar and Interchangeable Requests for Information Between the Fictional Applicants

Below are the two messages sent by the two applicants, whether male or female. No curriculum vitae is attached to the request.
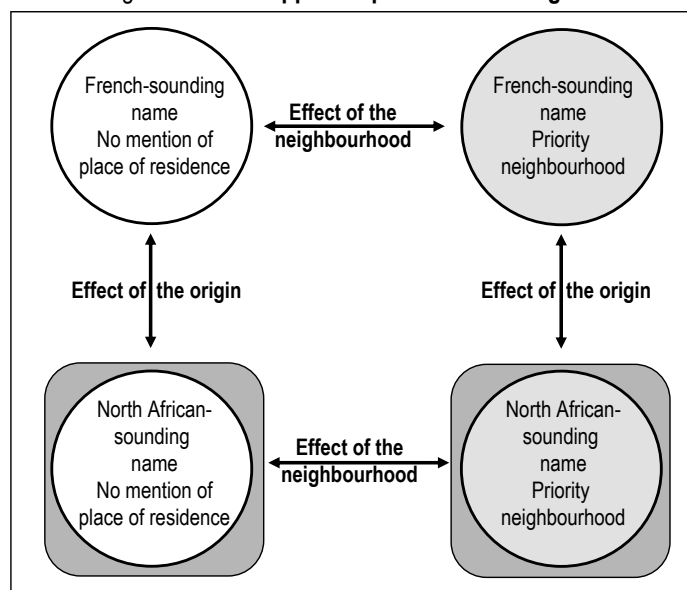
Message 1
Hello,
I would like to apply for a secretarial job within your company. Could you provide me with information regarding available opportunities and the person I need to contact? Many thanks in advance for any information you are able to provide.
Kind regards.

Diagram 1 – **Four applicant profiles for each gender**

Message 2

Hello,

I am looking for a job as a management assistant. I would like to know if there are any available opportunities within your company and, if so, who I can send my application to.

Many thanks in advance for your response.

Kind regards.

Each message is signed with the first name and surname of the fictitious candidate, indicating their ethnic origin. The applicant living in a priority neighbourhood includes their address under their signature, thereby indicating that they live in a priority neighbourhood.[7]

1.5. Selection of Employers Tested and Sending of Messages

We selected a random sample of 3,000 legal units with an address in one of the 95 municipalities within the Métropole européenne de Lille, drawing them at random from the SIRENE file published by INSEE. This is a simple random draw. The sample is therefore representative of the local productive fabric. The email addresses used are generic company addresses that they publish themselves as contact addresses on the Internet. We collected some of these manually and others in a semi-automated manner based on their SIRENE identifier and their company names. Information regarding the gender of the contact person is gathered using the first name indicated in the email address to which the message is sent. In some cases, the position and status of the contact person within the company were determined based on their responses. These employers were randomly separated into six groups of 500 companies to which the pairs of requests for information were sent. A sample of this type gives us a more than 80% chance of detecting discrimination in the event of a response rate of 10%, an absolute difference in response rate of two percentage points and a risk threshold of 10%.[8] It therefore offers an adequate probability of detecting discrimination against the candidate of North African origin in view of the results obtained in previous studies.

We consider the employer's response to be positive when they ask the applicant for their CV, when they ask for more information about their profile or even when they provide information regarding the procedure to follow in order to submit a formal application to the company. Conversely, the response is considered to be negative if the employer indicates that there is no suitable position available at the company.

A non-response is recorded if the employer had still not responded to the request for information by the time we ceased collecting data (5 November 2021).

By comparing the likelihood of receiving a positive response, we are able to test the existence of discrimination based on ethnic origin or the reputation of the place of residence at the time of requesting information regarding the existence of job opportunities within a company.

2. Test Results

2.1. Characteristics of the Companies Tested

Column 1 of Table 1 presents the characteristics of the 3,000 companies that were tested. As two requests for information are sent to each company, the number of observations is 6,000.

The sample is primarily composed of private-sector companies – *sociétés par actions simplifiée* – simplified joint-stock companies – and *sociétés à responsabilité limitée* – limited liability partnership. 18% of the companies employ between two and ten people. 16% employ one or zero people and 5% of the companies employ more than 50 people. The vast majority of contact persons are men. The second (or third) column of the table shows the differences in the response rates (or positive responses). The independence tests show that the response rates and positive responses correlate strongly with the type (p-value<0.001) and size of the company (p-value<0.001). As regards the positive responses, the differences are particularly marked between small and large companies: the positive response rate is 3% among companies with one or zero employees and 17% in companies with more than 50 employees. As a result, even though only 5% of the tests involved companies with more than 50 employees, these companies contribute 20% of the total positive responses obtained. However, due to their large number, small companies also make a significant contribution to the total number of responses

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7. We chose not to mention the applicant's address in all of the emails sent, as this is not usual practice for a simple request for information and would have brought too great a risk of the test being detected. The applicants living in priority neighbourhoods were therefore the only ones to mention their address in their requests for information. Strictly speaking, we are therefore evaluating the effect of an address in a priority neighbourhood relative to the fact of not mentioning an address upon their initial contact with a potential recruiter.

8. The 10% response rate corresponds to the approximate response rate obtained in the most recent study that uses a similar protocol involving speculative applications (Challe et al., 2020). The relative difference of 20% corresponds to the difference in the rate of positive responses received by the candidate of French origin and candidate of North African origin identified by this study.

received: 36% of all responses came from companies employing ten or fewer people.

The last three columns in Table 1 reveal the breakdown of applicant profiles applying to the companies based on their characteristics. The random drawing of the characteristics of the second applicant (North African origin and/or place of residence), together with the gender of the two applicants contacting a company, must ensure balanced representation of these characteristics across the various types of company. The average standardised differences[9] between the frequencies observed for each type of company and the theoretical probabilities are lower, in absolute terms, than the generally accepted threshold of 10, which confirms that the random drawing of the applicants' gender, ethnic origin and place of residence was carried out successfully.

2.2. Gross Positive Response Rates by Gender, Origin and Place of Residence

The 6,000 emails sent by the eight applicants received a total of 1,012 non-automated responses, giving a response rate of 17% (see Table 1). Of these responses, 256 were positive (invitation to submit a CV, encouragement to continue). When compared with the response rate, this gives a positive response rate of 25.3%. When compared with the number of emails sent, the positive response rate is 4.3%: on average, one positive response is received for every 23 messages sent (hereinafter, we will also use the term "success rate" to refer to this positive response rate in relation to the emails sent). These orders of magnitude are comparable to those of our pilot study, which was conducted in the Communauté d'agglomération Maubeuge-Val de Sambre (Anne *et al.*, 2022). Success rates are half of those obtained by Challe *et al.* (2020) in their test involving speculative applications sent to large companies. The difference is linked to small companies that are represented in this study and that are less likely to respond to requests.

Figure I shows the positive response rates obtained by the gender, origin and place of residence of the applicants. The highest positive response rate is obtained by the female applicant

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9. *The standardised difference is calculated as follows:*

$$d = 100 \times \frac{(p_e - p_p)}{\sqrt{\dfrac{p_e(1-p_e)+p_p(1-p_p)}{2}}} \text{ where, for each modality of a variable,}$$

p_e *is its prevalence within the sample and* p_p *is its theoretical prevalence. The average standardised difference is the average of the standardised differences for each modality. The advantage of the average standardised difference is that it is not influenced by the size of the sample, unlike equality of proportions tests (Austin, 2009). This approach has been used by several authors, for example in the clinical literature following on from the studies by Rosenbaum & Rubin (1985).*

Table 1 – **Characteristics of the companies tested**

	Average/%	% Responses	% Positives responses	% Female	% North African	% Priority n'hood
Response to email	17					
Female contact person	26					
Turnover (in thousands of euro)	6,022					
	[64,123]					
Legal form:						
Association	3	23	8	55	30	39
SARL [limited liability companies]	35	19	4	50	33	33
SAS [simplified joint-stock companies]	30	18	5	52	33	34
Other	32	12	3	48	34	32
Average standardised difference				4.5	2.1	4.2
Number of employees:						
0 or 1 employee	16	17	3	53	35	32
2 to 10 employees	18	18	6	50	33	34
11 to 50 employees	13	18	5	50	32	34
More than 50 employees	5	23	17	46	31	36
Not specified	48	15	2	49	34	33
Average standardised difference				3.2	2.5	2.5
Observations			6,000			

Notes: Standard deviation shown in square brackets. The last three columns of the table show the proportions observed for each type of application. The average standardised difference is an indicator of the difference between these observed proportions and the theoretical proportions. In view of the controlled experiment protocol, the theoretical proportion of a request for information being sent by a female applicant for each type of company is 50%. The theoretical proportions of the applicant being either of North African origin or living in a neighbourhood covered by urban policy is 33% for each type of company.
Reading note: The positive response rate within SARLs is 4%.
Source: MELODI-MEL test, TEPP-CNRS.

Figure I – **Positive response rates by origin, gender and place of residence**
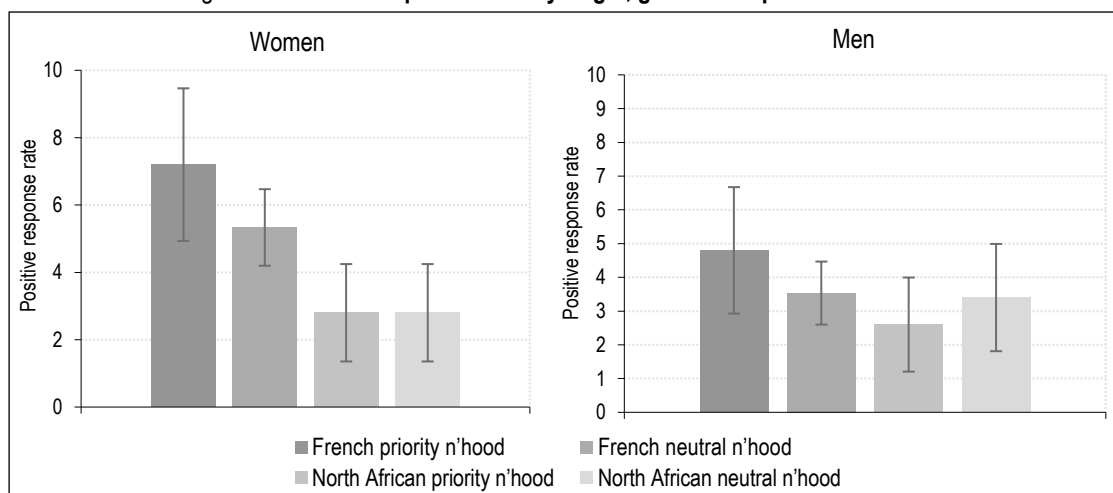
Note: Confidence intervals are set at the 95% risk threshold.
Source: MELODI-MEL test, TEPP-CNRS.

of French origin living in a priority neighbourhood, followed by the female applicant of French origin living in a neutral neighbourhood. It is important to remember that the test concerns the professional field of management assistants, which is very female-dominated. The differences in the response rates for the various profiles seem to be greater for women than for men and, in particular, the differences between the applicants of French origin and those of North African origin are more marked for women than for men. Similarly, applicants living in a priority neighbourhood had a higher response rate than applicants living in neutral neighbourhoods, with the exception of male applicants of North African origin.

Table 2 shows the gross success rates of the various applicants, separating them by gender. For men (Table 2-A), success rates are always higher for the applicants of French origin; but the overall difference is not statistically significant. However, there is a significant difference of 10% within the priority neighbourhood group depending on origin: applicants of French origin are twice as likely to receive a positive response to their request than applicants of North African origin. Their address does not have any significant effect.

For women (Table 2-B), success rates are higher than for men for applicants of French origin and around the same for applicants of North African origin (for secretarial positions, which are largely occupied by women). Women of French origin therefore present higher response rates than women of North African origin. The difference is significant. In relative terms, North African women only have half the

opportunities of women of French origin. The difference exceeds 60% in priority neighbourhoods. Depending on the type of neighbourhood, we observe that success rates are higher in priority neighbourhoods when compared with a neutral neighbourhood, but only for women of French origin. However, this difference in success rates for women of French origin living in priority neighbourhoods as opposed to a neutral neighbourhood is at the limit of significance (12%).

2.3. Econometric Confirmation

The gross success rates come from an experiment in which the characteristics of the applicants are perfectly controlled for, which makes it possible to neutralise all sources of heterogeneity among the applicants; however, we do not control for company characteristics. As the effects are measured across samples made up of different companies, it is important to check whether at least some of the findings can be explained by differences in the characteristics of the companies. In addition, it is important to check whether the differences in positive response rates can be explained by the permutations of the messages and the order in which they are sent by the applicants.

More specifically, since the origin and place of residence of the second applicant varies at random for each application, it is possible to rule out the "company" effect and therefore control for the effects of the non-observed characteristics of the company on positive response rates. Conversely, as the gender of the applicants was assigned to pairs of applicants contacting the same company, it is only possible to control for

Table 2 – **Gross success rates**
A – For men

Type of test	Positive response rate		Difference between the two applicants	
	Male applicant of French origin	Male applicant of North African origin	Difference (%)	P-value
Male	3.85%	3.00%	0.85	0.237
Neutral neighbourhood	3.53%	3.40%	0.13	0.888
Priority n'hood	4.80%	2.60%	2.20	0.065*
Difference (%)	−1.27	0.80		
P-value	0.202	0.459		

B – For women

Type of test	Positive response rate		Difference between the two applicants	
	Female applicant of French origin	Female applicant of North African origin	Difference (%)	P-value
Women	5.80%	2.80%	3.00	<0.001***
Neutral neighbourhood	5.33%	2.80%	2.53	0.020**
Priority n'hood	7.20%	2.80%	4.40	0.001*
Difference (%)	−1.87	0.00		
P-value	0.122	1.000		

Notes: *** p<0.01, ** p<0.05, * p<0.1. The final column and the bottom row of the table show the p-values of the equality of proportions tests.
Reading notes: The positive response rate for women is 3 percentage points higher than for women of North African origin.
Source: MELODI-MEL test, TEPP-CNRS.

the effect of observed company characteristics, such as its size and its legal status, in order to identify any possible gender-based discrimination. The different effects are therefore estimated in an unbiased manner if the characteristics are assigned randomly or if the selection is based on observable company characteristics (and on non-observable characteristics with regard to origin and place of residence). Conversely, where selection takes place based on non-observable characteristics, the estimated gender effect could be biased.

We estimate linear probability models using the ordinary least squares method based on the following specification:

$$REP_{ie} = \alpha + \beta\, Magh_i + \gamma\, QPV_i + \varphi\, Fem_e \\ + \tau\, E_{ie} + \delta\, O_e + \phi_e + \varepsilon_{ie} \quad (1)$$

where REP_{ie} is a dichotomous variable indicating whether the company e responds positively to applicant i. $Magh_i$ and QPV_i are the variables of interest indicating, respectively, whether the applicant is of North African origin and whether they live in a neighbourhood covered by urban policy. Fem_e is an indicator that equals 1 if the applicant to company e is a woman. E_{ie} is a set of control variables for sending characteristics (message used and sending group). O_e is a set of variables controlling for company characteristics (number of employees, legal form and gender of the contact person). Finally, ϕ_e are company fixed effects: these are introduced in just one

of the specifications and replace the company characteristics.

Table 3 shows the results of the estimate for equation (1), according to different specifications.[10]

We observe that the introduction of the sending characteristics into the estimate slightly changes the estimated coefficient for North African origin and has a slightly greater effect on the estimated coefficient for gender.[11] Conversely, the introduction of company characteristics does not have any notable influence on the findings. Where company fixed effects are introduced, the gender effect can no longer be estimated as it is the same for both applicants to each individual company. The effects of being of North African origin and of the applicant's place of residence, which are then estimated using only intra-company variations, remain unchanged.

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10. The results obtained from linear probability or probit models are similar, though they are slightly less significant with the probit model (see Table A2 in Appendix 2). In the estimates presented, all of the applications tested were retained. However, for a significant proportion of the applications, none of the applicants received a response. It could be considered that these tests do not provide any information on whether or not the behaviour by the company is discriminatory and that they should not be taken into account in the estimate. Estimates were made excluding these applications and provide similar results: the absolute differences are obviously larger, but the relative differences and significance remain the same (see Table A1 in the Appendix).
11. The message sending group is the control variable that has the greatest effect on the results. The sending group is allocated randomly, but there is a possibility that the positive response rate could vary between groups, which may affect the estimates, even though it is unlikely that there is any systematic bias.

We observe significant discrimination towards the applicant of North African origin. The initial difference of 2.1 percentage points between the applicant of French origin and the applicant of North African origin is reduced slightly when the control variables are added, but the difference remains significant at the threshold of 5%. Where the sending and company characteristics are controlled for, the difference between the two applicants is 1.3 percentage points, which corresponds to a difference of 27% in relative terms, in so far as the positive response rate for applicants of French origin is 4.8%.

The difference between male and female applicants is also significant; however, the difference between applicants living in neutral neighbourhoods and those living in priority neighbourhoods is not significant. Having controlled for the sending and company characteristics, gender appears to have a strong influence on the success rate, since being female more than doubles the positive response rate.

2.4. Identification of Combined Effects

We will now look at the combined effects of three discrimination criteria: gender (male/female), origin (French/North African) and place of residence (neutral/priority neighbourhood). More specifically, we analyse the effect of origin and place of residence and their combined effect separately for men and women.

Table 4 shows, separately for men and women, the results of the estimated equation (1) (columns 1 and 2) and the results of an estimate that includes the *North African origin × Priority Neighbourhood* combination (columns 3 and 4). This combination makes it possible to test whether the place of residence has a different influence on discrimination depending on an applicant's origin.

First of all, we observe that, in the case of men, the slightly significant average penalty for applicants of North African origin (obtained without taking account of combined effects, column 2) actually varies greatly depending on their place of residence. Applicants of North African origin living in a neutral neighbourhood are not or are only slightly discriminated against, while those living in a priority neighbourhood appear to be heavily discriminated against. The place of residence therefore has an inverted effect depending on the origin of the applicant: the applicant of French origin saw their probability of receiving a positive response increase if they were living in a priority neighbourhood, whereas it decreases for an applicant of North African origin.

For women, the high penalty suffered as a result of being of North African origin, which seems to appear graphically and in the estimates made without controls (column 1), disappears when it is based purely on intra-company variations (column 2). The *North African origin × Priority neighbourhood* interaction does not become any more significant once the company fixed effects and sending characteristics have been included, which is at odds with what is observed for men. However, it is not possible to state that women of North African origin are not discriminated against when compared with women of French origin, even though the estimated coefficient is not significant at the threshold of 10%. Indeed, the estimated effect of 1.1 percentage points for the *North African origin* variable (column 2) is similar to that for men (1.5) and corresponds to a Student's test p-value of 19%, which is not far from the threshold of 10%. In addition, the power of this test is relatively low: the probability of detecting a difference of 1 (or 1.5) percentage points between the two female applicants at a risk threshold of 5% if the female applicant of

Table 3 – **Effect of origin, gender and place of residence on the positive response rate**

	(1)	(2)	(3)	(4)
North African origin	−0.021*** (0.005)	−0.013** (0.006)	−0.014** (0.006)	−0.013** (0.006)
Priority n'hood	0.008　(0.005)	0.004　(0.006)	0.005　(0.007)	0.004　(0.006)
Female	0.012**　(0.006)	0.045**　(0.021)	0.043**　(0.022)	
Sending characteristics		X	X	X
Company characteristics			X	
Company fixed effects				X
Observations	6,000	6,000	5,722	6,000
R^2	0.003	0.012	0.039	0.008

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at the application level in parentheses.
The sending characteristics are: the sending group and the message used. The company characteristics are: the number of employees, the legal form and the gender of the contact person.
Reading note: By controlling for the sending characteristics and introducing company fixed effects, the probability that the applicant of North African origin will receive a positive response is 1.3 percentage points lower than for the applicant of French origin.
Source: MELODI-MEL test, TEPP-CNRS.

Table 4 – **Combined effect of origin and place of residence on the positive response rate, by gender**

	(1)		(2)		(3)		(4)	
				Men				
North African origin	−0.010	(0.007)	−0.015*	(0.008)	−0.001	(0.009)	−0.004	(0.010)
Priority n'hood	0.004	(0.007)	0.011	(0.008)	0.013	(0.010)	0.022**	(0.011)
North African origin × Priority n'hood					−0.021	(0.015)	−0.034**	(0.017)
				Women				
North African origin	−0.033***	(0.008)	−0.011	(0.009)	−0.025***	(0.009)	−0.014	(0.011)
Priority n'hood	0.011	(0.008)	−0.003	(0.009)	0.019*	(0.011)	−0.006	(0.012)
North African origin × Priority n'hood			−0.019	(0.016)	0.008	(0.019)	0.008	(0.019)
Sending characteristics			X				X	
Company fixed effects			X				X	

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at the application level in parentheses. The sending characteristics are: the sending group and the message used. The company characteristics are: the number of employees, the legal form and the gender of the contact person.
Reading note: The fact of living in a priority neighbourhood increases the probability of a positive response by 2.2 percentage points for applicants of French origin (column 4).
Source: MELODI-MEL test, TEPP-CNRS.

French origin has a positive response rate of 6% is 22% (or 45%).[12]

3. Discussion

The results that we obtain with regard to the level of discrimination against male applicants of North African origin, namely a difference of around 27% when compared with male applicants of French origin, are similar to those obtained by studies carried out previously in France, which revealed penalties in excess of 20% (Chareyron *et al.*, 2022 ; Acolin *et al.*, 2016).

Conversely, while several correspondence tests previously highlighted a negative effect associated with having an address in a priority neighbourhood in France in the early 2010s (Bunel *et al.*, 2016), our study reveals a zero or inverse effect. Men of French origin living in priority neighbourhoods benefit from a recruitment bonus that is not awarded for men of French origin living in neutral neighbourhoods. This finding must be compared with the development of the *Emplois francs* scheme, which was piloted in the Métropole européenne de Lille from April 2018 before being rolled out to all priority neighbourhoods in 2020, and for which the amount of assistance was increased under the "*1 jeune, 1 solution*" plan for job seekers under the age of 26. The pilot phase of this scheme had therefore already brought about a reduction in residential discrimination, albeit temporarily (Chareyron *et al.*, 2022). It is therefore likely that the positive effect of living in a priority neighbourhood, which is observed for applicants with certain profiles, is due to the subsidies that the companies receive for recruiting these applicants. Indeed, this test was performed within the *Nord* department, a pilot area for the *Emplois francs* scheme since April 2018, which was, at

the time at which the data were collected in late 2021, the French department with the largest number of contracts under the *Emplois francs* scheme. However, this positive effect brought about by *Emplois francs* does not seem to benefit all applicant profiles: the North African applicant living in a priority neighbourhood did not benefit from this favourable effect associated with their place of residence. Women of French origin also seem to benefit less than men of French origin.

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In this study, we relied on a correspondence test performed in late 2021 in the Métropole européenne de Lille, which comprises 95 communes and 1 million inhabitants, to analyse the combined effects of gender, origin and having an address in a priority neighbourhood for urban policy when it comes to discrimination in access to employment. The test is based on 6,000 requests for information sent to a representative sample of 3,000 companies in the area by eight fictitious applicants looking for work as management assistants.

The results show that living in a priority neighbourhood provides an advantage for applicants of French origin, probably due to the full roll-out and enhancement of *Emplois francs* in 2021. However, persons of North African origin do not gain any benefit from this bonus for access to employment for residents of priority neighbourhoods. Discrimination on the basis of origin exists for male applicants, but only for those living in a priority neighbourhood. The

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12. *This probability increases to 33% (or 58%) for a risk threshold of 10%.*

bonus for recruiting persons living in priority neighbourhoods, which is associated with the *Emplois francs* scheme, one of the main public policies introduced to combat discrimination, therefore does not benefit applicants of North African origin. These findings call for improved targeting of anti-discrimination measures to capture the populations discriminated against in disadvantaged areas.

To conclude, the limitations of this study are worth noting. The correspondence tests applied to the labour market measure discrimination by the answers given by recruiters to speculative requests for information; they do not measure discrimination that may affect subsequent stages of recruitment. The measurement is performed at a moment in time, in this case October 2021, across a partial set of professions, in this case assistance and secretarial roles, and in a given area, in this case the Métropole européenne de Lille. It would be worth extending all of these dimensions of the analysis.   □

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ROBUSTNESS CHECKS WITH DIFFERENT ESTIMATION METHODS

Table A1 – **Effect of origin, gender and place of residence on positive response rates**
(among the applications that received at least one response)

	(1)	(2)	(3)	(4)
North African origin	−0.074*** (0.020)	−0.057** (0.025)	−0.057** (0.025)	−0.057** (0.025)
Priority n'hood	0.021 (0.020)	0.017 (0.025)	0.022 (0.025)	0.017 (0.025)
Female	0.048** (0.022)	0.149** (0.075)	0.204*** (0.077)	
Sending characteristics		X	X	X
Company characteristics			X	
Company fixed effects				X
Observations	1,466	1,466	1,408	1,466
R^2	0.012	0.043	0.119	0.035

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at the application level in parentheses.
The sending characteristics are: the sending group and the message used. The company characteristics are: the number of employees, the legal form and the gender of the contact person.
Reading note: By controlling for the sending characteristics and introducing company fixed effects, the probability that the applicant of North African origin will receive a positive response is 5.7 percentage points lower than for the applicant of French origin.
Source: MELODI-MEL test, TEPP-CNRS.

Table A2 – **Effect of origin, gender and place of residence**
on positive response rates (probit model)

	(1)	(2)	(3)
North African origin	−0.022*** (0.006)	−0.012* (0.006)	−0.012* (0.007)
Priority n'hood	0.007 (0.005)	0.003 (0.006)	0.004 (0.006)
Female	0.012** (0.006)	0.058** (0.028)	0.061** (0.027)
Sending characteristics		X	X
Company characteristics			X
AIC	2072.412	2071.909	1894.491
Observations	6,000	6,000	5,722

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at the application level in parentheses. The average marginal effects of the probit models are shown. The sending characteristics are: the sending group and the message used.
The company characteristics are: the number of employees, the legal form and the gender of the contact person.
Reading note: After controlling for sending characteristics and company characteristics, the probability that the applicant of North African origin will receive a positive response is 1.2 percentage points lower than for the applicant of French origin.
Source: MELODI-MEL test, TEPP-CNRS.

Alcohol Price Regulation in France: Choosing a Reform Scenario to Achieve Public Health and Tax Fairness Objectives

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Abstract – Public health authorities advocate the introduction of alcohol pricing policies in the form of tax reform and/or a minimum unit price based on the pure alcohol content of products. We use Kantar WorldPanel household purchase data to describe the distortions in the current tax system, favouring wine and penalising low-income households. We assess the potential impact of reform scenarios that replace current taxes with a single excise tax (flat or progressive) on pure alcohol content and/or the introduction of a minimum price per gram of pure alcohol. Introducing a minimum price while leaving taxation unchanged would have the advantage of raising alcohol prices, especially for low-end wines, which are prized by abusive consumers. The impact would *a priori* be limited in terms of tax regressivity and for higher quality segments, which is important for the wine sector.

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Although alcohol consumption in France has fallen by 50% since the Second World War, it remains at the heart of French food culture and practices. France currently ranks sixth among OECD countries in terms of total alcohol consumption per capita (Richard *et al.*, 2015). Alcohol is a major cause of morbidity and mortality through disease, accidents and violence leading to premature death.[1] Price regulation is a key component of any public policy aimed at reducing consumption (OMS, 2010, Section 16, p. 14; OCDE, 2021; Inserm, 2021). Systematic reviews of the empirical literature show that price increases have a significant negative impact on alcohol consumption and related health outcomes, including in high-drinking populations.[2] In addition to the objective of protecting public health by changing the behaviour of economic agents (consumers, producers), these price increases can be justified by the need to preserve public finances. The social cost of alcohol consumption is estimated at 102 billion euros in 2019 by Kopp (2023). Ninety-six per cent of these costs are external (value of lives lost, loss of productivity and quality of life) and 4% are costs to public finances (equal to the difference between expenditure on prevention, control and care, on the one hand, and savings on unpaid pensions and revenue from alcohol taxes, on the other). This represents almost two-thirds of the annual expenditure of the health branch of the social security system, or more than twice the annual budget of the French education system. However, current alcohol tax revenues do not cover the costs to public finances, let alone the social costs: specific tax revenues, estimated at €4.0 billion (excluding VAT), are far lower than public expenditure (€7.3 billion). In this context, the legislator has two instruments to better regulate alcohol prices: a reform of alcohol-specific taxation; the imposition of a minimum price on the price of a standard drink of pure alcohol (following the example of Scotland or Ireland).

A tax reform should make it possible to differentially target those products for which consumption is associated with greater harm, i.e., those that are consumed relatively more by heavy drinkers (Diamond, 1973; Griffith *et al.*, 2019; Calcott, 2019). However, under the European Treaties, it is impossible to target specific product categories when the harm is associated with one molecule, ethanol. Article 110 of the Treaty on the Functioning of the European Union states that direct or indirect taxation must be the same for similar goods that

meet the requirements of the European Union legislation on the free movement of goods, and that taxation must not serve as indirect protection for other goods. While Article 110 does not affect any tax structure introduced in the past, it does severely limit the scope for reform, as several past cases have shown.[3] Only a reform motivated by a public health objective and proportionate to that objective (i.e. sufficiently effective) can be considered to comply with Article 110. It will therefore necessarily have to target the ethanol content of products. This raises the further question of whether ethanol should be taxed at a single rate (a flat tax) or whether it would be more effective to introduce rates that increase progressively with the alcohol content of the product. Indeed, if heavy drinkers tend to over-consume strong alcohols, a progressive tax could target these products more specifically and thus have a greater impact on externalities and internalities (Griffith *et al.*, 2019).

However, heavy drinkers also tend to switch to lower quality products when faced with price increases. It may then be worthwhile complementing or replacing fiscal measures with a minimum price if it can better target cheap products with high alcohol content. Indeed, the results of an *ex-post* evaluation of the minimum pricing policy implemented in Scotland and Wales show that it led to a substitution of high-alcohol beers and ciders for lower-alcohol products, and that its impact was concentrated in the 20% of households with the highest per capita alcohol consumption, regardless of income level (Llopis *et al.*, 2021).

To our knowledge, there are no studies based on detailed market data documenting the potential benefits for France of these alcohol price regulation policies. We propose to fill this gap with a descriptive analysis using scanner data from the 2014 Kantar WorldPanel (KWP) household panel. These data are used by private companies and certain public institutions (INRAE, France Agrimer) to monitor trends and determinants of food purchases made by French households for their home consumption. Compared with the data from the *Budget de famille* (Household budget)

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1. See in particular Bègue (2012) and Ren et al. (2021). Alcohol is second only to tobacco as a cause of preventable mortality in France, with a total of 41,000 deaths in 2015, 7% of total mortality (Bonaldi & Hill, 2019).
2. See for example, Gallet (2007), Nelson (2013; 2014), Sharma et al. (2016), Wagenaar et al. (2009).
3. In Case 243/84, John Walker (1986), whiskey and liqueur wines of the liqueur type were held not to be similar products. In Case 106/84, Commission vs Denmark (1986), wine made from grapes was judged to be similar to wine made from other fruits. In Case 170/78, Commission vs United Kingdom (1980), the introduction of a tax on wine that was five times higher than that on beer was rejected on grounds of the degree of substitution between the two product categories.

surveys, they offer the advantage of providing information on quantities, expenditure and the precise characteristics of the products purchased, in particular their alcohol content. This is crucial for the analysis of alcohol taxation, part of which consists of excise duties (i.e. based on the volume purchased, not the value), which can vary depending on the alcohol category and the alcohol content of products. However, these data do not provide information on consumption away from home, which is higher among younger and higher income consumers. Such consumption is not accurately reported in alternative sources, such as the *Budget de famille* surveys. We discuss the potential consequences of this in the conclusion.

Using these data, we describe the structure of the alcohol market to assess the relevance of current alcohol taxation in terms of public health and tax fairness. We identify the main characteristics of the French market by examining the distribution of purchases across alcohol categories (ciders, beers, aperitifs, spirits, still wines and sparkling wines). This allows us to document the tax distortions that exist in favour of wine and against spirits, given the public health objective of basing taxation on the pure alcohol content of products (ethanol). We also examine the distribution of purchase unit prices to understand the possible effects of introducing a minimum price. In particular, we show that wines, which account for almost 50% of pure alcohol purchases, are sold at very low prices, below 5 euros per litre for 80% of purchase volumes. Finally, we describe the regressivity of the current tax system. In addition to reducing the external costs of consumption, policymakers may wish to incorporate equity objectives into their policy design by minimising their potential redistributive effects. For a same level of consumption (and induced harms), the welfare of a low-income consumer should not be affected more by the tax than that of a high-income consumer. We show that the current tax system is regressive, due to the social inequality in alcohol-related risks – with the low-income consumers buying more pure alcohol overall – combined with a tax system that exempts wine.

Second, we provide simulations of the impact of various pricing policies These simulations are called accounting simulations in so far as the impact of policies on prices and expenditure is estimated (*i*) in the case where producers and retailers decide to pass them fully onto consumer prices, and (*ii*) for unchanged consumption choices. This approach relies on the assumption that the behaviours of economic agents do not change in response to the pricing policy. Our scenarios are based on the idea of replacing the various specific taxes on alcohol (mainly excise duties and social security contributions) with a single excise tax based on the pure alcohol content of drinks without discriminating between products, and/or with a minimum pricing policy. We calibrate our reforms to achieve either a tax neutrality objective (stability of tax revenues) or an objective of internalising alcohol-related health expenditure, assuming that there is no market reaction.

Our results show that a minimum price policy would offer certain advantages over tax reform scenarios. Indeed, the introduction of a minimum price would inevitably lead to an increase in the price of low-end alcoholic beverages (and wine in particular), which are prized by heavy drinkers, and thus to a reduction in their consumption; the impact on prices would *a priori* be limited or non-existent for the quality brands, which is important for the wine sector. Conversely, implementing a single ethanol-based excise tax would initially lead to an increase in the price of *all* wines and a massive reduction in the price of spirits, which could lead to an unexpected increase in the consumption of pure alcohol. Only a progressive and very high ethanol tax would allow an overall price increase. Finally, the tax burden would increase with a tax reform, to a greater or lesser extent depending on the objective set, and would decrease slightly with a minimum price policy. These effects vary little by standard of living, suggesting that none of these reforms would accentuate the regressivity of current taxation.

The remainder of this article is organised as follows. Section 1 presents our data and the structure of purchases by alcohol category. Section 2 describes the current taxation system, demonstrating the distortions between alcohol categories and characterizing its regressivity. In Section 3, we simulate our pricing policy reform scenarios and show the advantages of a minimum pricing policy over the replacement of current alcohol-specific taxes by a single ethanol-based excise tax. We discuss the scope and limitations of our simulations in the conclusion of the article.

1. Data and Structure of the French Alcohol Market

This section presents the data and a few stylised facts describing the structure of alcohol purchases by French households. This will provide a better understanding of the issues involved in a tax reform in terms of impacts on public health and redistributive effects.

1.1. Kantar WorldPanel Data

We use household scanner data collected by Kantar WorldPanel (KWP) for 2014. Each year, KWP monitors a sample of more than 20,000 households. Using a hand-held scanner, they record the quantity, expenditure, and barcode of their purchases, including online purchases, for home consumption.[4] A household remains in the sample for four years on average. In 2014, the KWP panel was made up of 24,177 households reporting at least one purchase. KWP considers a household to be inactive if the number of purchases reported is lower than expected based on its past purchases and its socio-demographic characteristics. In addition, only a sub-panel of households reports purchases of products without a barcode and therefore all purchases for home consumption. We use this sub-panel in order to better cover purchases of alcoholic beverages. Of these households, 6,565 have been declared active all year round, i.e. active during at least 10 of the 13 (four-week) periods. They make up what KWP calls the *constant panel*.

From this constant panel, we select the 6,353 households that purchased alcohol at least once in 2014 (96.7% of the constant panel). In doing so, we restrict the analysis to consumers of alcohol, under the reasonable assumption that a reform of alcohol price regulation will be justified by a public health objective and will not have the effect of encouraging households abstaining from alcohol to become consumers. Table S1-1 of Online Appendix S1 (link at the end of the article) provides descriptive statistics regarding some of the socio-demographic characteristics of the households of the constant panel that consume alcohol. The Box discusses the advantages and limitations of KWP scanner data as compared to the 2017 *Budget de famille* survey.

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4. *No information is provided on alcohol consumption away from home, which accounted for 42% of total individual intake of pure alcohol in 2014 according to the NutriNet 2014 survey (figures provided by Chantal Julia from the* Équipe de Recherche en Épidémiologie Nutritionnelle *(Nutritional Epidemiology Research Team), whom we would like to thank). For a complementary presentation of these data, see Caillavet et al. (2019).*

Box – **What Advantage Does the Use of Scanner Data Provide for This Study?**

Since the 2000s, economic studies analysing markets for fast-moving consumer goods and evaluating policies aimed at regulating the consumption of such goods have mainly relied on scanner data. The Kantar WorldPanel (KWP) data we use here have three advantages over data from INSEE's *Budget de famille* surveys (Household budget surveys, BDF). First, they provide information on quantity, quality and expenditure. In the 2017 BDF, information on quantities is only available for 36% of purchases in the consumption diaries given to households, and the categories are too aggregated to allow a precise study of the potential fiscal impact of reform scenarios targeting the alcohol content of beverages. Second, these panel scanner data follow purchases by the same households throughout the year, which limits the observation of zero consumption due to infrequent purchases (Dubois *et al.*, 2022). Thirdly, they allow for very precise measurements of prices (Ruhm *et al.*, 2012). Purchase scanner data are also less likely to be affected by bias due to under-reporting of alcohol quantities than are health data: as the survey does not specifically focus on the risks posed by alcohol, it does no make salient the stigma associated with excessive drinking. However, reporting requires more effort on the part of respondents, which raises questions about the quality of the data in terms of their representativeness and coverage of the population.

All our analyses use the socio-demographic sample weights provided by KWP. These weights are determined using a margin calibration procedure that takes into account the socio-professional and age categories of the reference person, the number of persons in the household combined with the age category of the reference person, the region of residence and the household standard of living. The actual representativeness of the household panel and the quality of the scanner data collected can be questioned, especially in comparison with the BDF surveys. We compared the distribution of the sampling characteristics of households in the Kantar constant panel with that of households included in the 2017 BDF survey (see Table S1-3 in the Online Appendix S1). This comparison shows that the KWP sample under-represents households where the reference person is aged between 50 and 64, as well as managers, intermediate occupations and white-collar workers, and over-represents blue-collar workers and pensioners. Some of the differences between the two data sources can be explained by differences in the way the samples were built-up (Zhen *et al.*, 2009). Young, affluent and dual-income households are less well represented in the scanner data because the survey requires a degree of diligence. Conversely, working-class retired households are over-represented, possibly because they have more free time and because active participation in the survey is rewarded with points that can be converted into vouchers.

However, a comparison of the two sources of aggregated expenditure volumes for categories of alcoholic beverages in the Classification of Individual Consumption by Purpose (COICOP) of the 2017 BDF survey shows that the structure of expenditure observed in our working sample is very similar to that calculated on the basis of the 2017 BDF survey, with, for example, a total expenditure volume of 10.38 billion according to the 2014 KWP data compared to 11.37 billion according to the 2017 BDF survey (see Table S1-4 in Online Appendix S1), with the difference attributed to higher expenditure in unit value among higher income households. Finally, we should note a limitation common to both surveys. They do not allow a precise identification of alcohol consumption away from home. This information is not available in the KWP data we have and is included in the aggregated group 'meals' outside the home in the 2017 BDF survey.

Each line in the database corresponds to a purchase, i.e. the purchase of one or more identical products at the same time and in the same store (e.g. two identical six-packs of beer, three identical bottles of wine, etc.). We observe a total of 216,987 purchases of alcoholic beverages. KWP does not provide the barcode of the product, but several characteristics, including the type of beverage, the alcohol content, the brand and/or producer, and the name of the retailer where the purchase was made. Information on the packaging (number of units and unit volume) can be used to calculate the total quantity purchased, taking into account bulk promotions.

As many products are purchased infrequently, we have chosen to group the products offered to consumers by defining homogeneous varieties. To do this, we reduce the range of characteristics that differentiate the products to a few key elements mapping differences in consumer preferences over quality, retailer/producer strategies and alcohol content. We start by grouping products into six categories: ciders, beers, aperitifs, spirits, still wines and sparkling wines. Each category is then subdivided according to the type of beverage (e.g. champagne vs other sparkling wines, for sparkling wines), the producer, the brand and the retailer. By crossing category, type, producer, retailer and brand, we obtain 1,662 different varieties.[5] For each variety and 4-week period, we calculate the quantity purchased and the expenditure at national level (adjusting them for sampling weights), and finally the average unit value of one litre (in €/litre). The annual values are then obtained by averaging the 13 four-week periods. Each period is given the same weight.

1.2. Structure of the Alcohol Market

Table 1 provides a breakdown of purchases by alcohol category, as well as the quartiles of unit values of these purchases and the average percentage of alcohol. Still wines are the most popular, accounting for over 41% of purchases, well ahead of beers (23% of purchases) and spirits (17% of purchases). Spirits are also the most expensive alcoholic beverages, ahead of sparkling wines and aperitifs. The wide price range for sparkling wines is explained by the price difference between champagne and the other sparkling wines. Except for wine, the variation in median unit prices between categories is positively correlated with the median alcohol content of the categories. Unit prices for wine also show little price difference with beer, contrary to what is observed in countries that traditionally brew beer rather than make wine.

Table 2 shows the distribution of purchases across the main alcohol categories in terms of volume, in litres and in pure alcohol (standard drink).[6] Still and sparkling wines account for 51.3% of the volume in litres and 52.6% in pure alcohol content. The second most popular category, beer, accounts for 32.8% by volume and 13.6% by pure alcohol. These figures are 8.3% and 27.4% respectively for spirits. The rankings of the categories in terms of volume in litres and purchases are similar, but the proportions are slightly different. Beers account for 22% of purchases and 32% of volume, while aperitifs and spirits account for 25% of purchases and 15% of volume. This is explained by variations in container sizes (e.g. cartons for beer, cubitainers for wine).

Given the economic and cultural concerns regarding the still wine market, it is important to clarify its market segmentation. Table 3 shows the volume and frequency of purchases of still wine by quality.

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5. See Online Appendix S2 for more details.
6. As the alcohol content is the quantity of pure alcohol (or ethanol) in millilitres (ml) contained within 100 ml and since the density of alcohol is 0.8 g/ml, the quantity of pure alcohol in grams can be calculated using the following formula: 0.8 x alcohol content x quantity in ml / 100. For example, 100 ml of wine with an alcohol content of 12% contains 12 ml of pure alcohol, so 120 ml per litre, and therefore 120 x 0.8 = 96 g of pure alcohol.

Table 1 – **Distribution of purchases by alcohol category**

	Purchases		UV (in €/l), quartiles			% Alcohol		
	N	%	Q(25)	Q(50)	Q(75)	Min.	Q(50)	Max.
Ciders	7,520	3.47	2.25	2.79	3.39	2.0	4.4	4.6
Beers	48,349	22.28	2.01	2.85	3.48	0.5	5.8	12.2
Aperitifs	21,112	9.73	4.23	6.25	9.10	0.0	15.0	25.0
Spirits	35,391	16.31	14.36	16.87	19.86	0.0	40.0	47.0
Still wines	90,944	41.91	2.42	3.23	4.24	11.9	12.0	13.0
Sparkling wines	13,671	6.30	6.00	8.11	22.76	0.0	12.0	12.5

Notes: Unit values (UV) obtained by dividing the total spent by the quantity purchased for each variety, adjusted for the household and purchase sampling weights provided by Kantar WorldPanel.
Source and coverage: Kantar WorldPanel 2014; non-abstinent households from the constant panel (N = 6,353).

Table 2 – Quantities purchased and share (%) by alcohol category, per household per year

	Litres	% (vol. in l)	Standard drinks	% (vol. in p.a.)
Ciders	1.69	2.29	4.87	0.71
Beers	24.17	32.77	94.05	13.63
Aperitifs	3.94	5.34	39.38	5.71
Spirits	6.15	8.33	189.00	27.39
Still wines	34.01	46.12	327.06	47.40
Sparkling wines	3.79	5.14	35.70	5.17
Total	73.75	100.00	690.06	100.00

Notes: 1 standard drink = 10 g of pure alcohol (p.a.); values adjusted for the household and purchase sampling weights provided by Kantar WorldPanel.
Source and coverage: Kantar WorldPanel 2014; non-abstinent households from the constant panel (*N* = 6,353).

Table 3 – Quantities purchased and share (%) of wine purchases by segment, per household per year

	Litres	Proportion of volumes	Proportion of purchases (%)
Vins de table	7.75	22.80	18.29
Vins de pays	11.10	32.63	23.16
Appellations	15.16	44.57	58.54
Price ≤ 3 €/l	16.60	48.80	34.51
3 €/l < Price ≤ 5 €/l	11.04	32.46	41.18
Price > 5 €/l	6.38	18.74	24.32
Total	34.01	100.00	100.00

Notes: Averages (share as a %); values adjusted for the household and purchase sampling weights provided by Kantar WorldPanel.
Source and coverage: Kantar WorldPanel 2014; non-abstinent households from the constant panel (*N* = 6,353).

In our data, the majority of still wine purchases are made in the *vins de table* (table wines) and *vins de pays* (country wines) label segments (55% of total volumes), and fall in the price range that define the low-end quality level according to market professionals (Cubertafond, 2015): more than 80% of wine volumes are purchased at less than 5 euros per litre.[7] The *vins de table* and *vins de pays* account for 41% of the volumes purchased and 75% of the purchases made at less than 5 euros per litre. Wines purchased at less than 3 euros per litre account for 35% of purchases and almost 50% of volume, which is explained by the fall in unit prices for wines in bag-in-box packaging, which is used largely for low-end products. These descriptive statistics highlight a fact that has been overlooked in the public debate on alcohol regulation: a significant proportion of the volume of wine placed on the market is of poor quality.[8]

Since the social cost of alcohol consumption depends on the total amount of pure alcohol consumed, we can finally ask about the population heterogeneity of pure alcohol consumption in quantity and price. The left-hand side of the Figure shows the distribution of purchases in terms of pure alcohol per adult in 2014.

Half of the non-abstinent population consume 90% of volumes of pure alcohol, 70% of volumes are consumed by only a quarter of the same population, and almost half (45%) consume only 10% (see the horizontal dotted lines, from bottom to top). The right-hand side of the figure shows the average price paid per standard drink (i.e. 10 g of pure alcohol, left-hand vertical axis) and for a standard bottle of wine with an alcohol content of 12% (75 cl, i.e. 72 g of pure alcohol, right-hand vertical axis) as a function of the household position in the distribution of total consumption of pure alcohol. The average price per standard drink of pure alcohol decreases with total consumption when all alcohols are considered. However, the relationship for wine is concave: the average price initially increases with quantity, reaching a maximum of over 3 €/bottle around the median point of the total consumption of pure alcohol, and then falls again to a minimum of 2.5 €/bottle.

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7. Like Cubertafond (2015, pp. 71–74), we distinguish between 5 segments on the wine market: basic (less than €3/litre), popular premium (between €3 and €5/litre), premium (between €5 and €7/litre), super-premium (between €7 and €15/litre), ultra-premium and iconic (above more than €15/litre). As the super-premium and ultra-premium segments are poorly represented in our data (0.13% of volumes and 0.23% of purchases), we have grouped them together with the premium segment. The vins de pays and vins de table categories have become increasingly heterogeneous in quality over the last two decades, with many independent winemakers distancing from the constraints of the appellations in order to regain freedom of style in the production process.
8. Our data likely overestimate this market characteristic due to the aforementioned biases in terms of representativeness. We have a better coverage of purchases by lower class and retired consumers, whose income limits access to quality wines, than we do of purchases by upper class and employed consumers. However, this does not present a limitation for our study, as we are specifically interested in the potential health impacts and redistributive effects of alcohol price policy reforms.

Figure – **Normal consumption in terms of pure alcohol and average purchase prices in 2014**
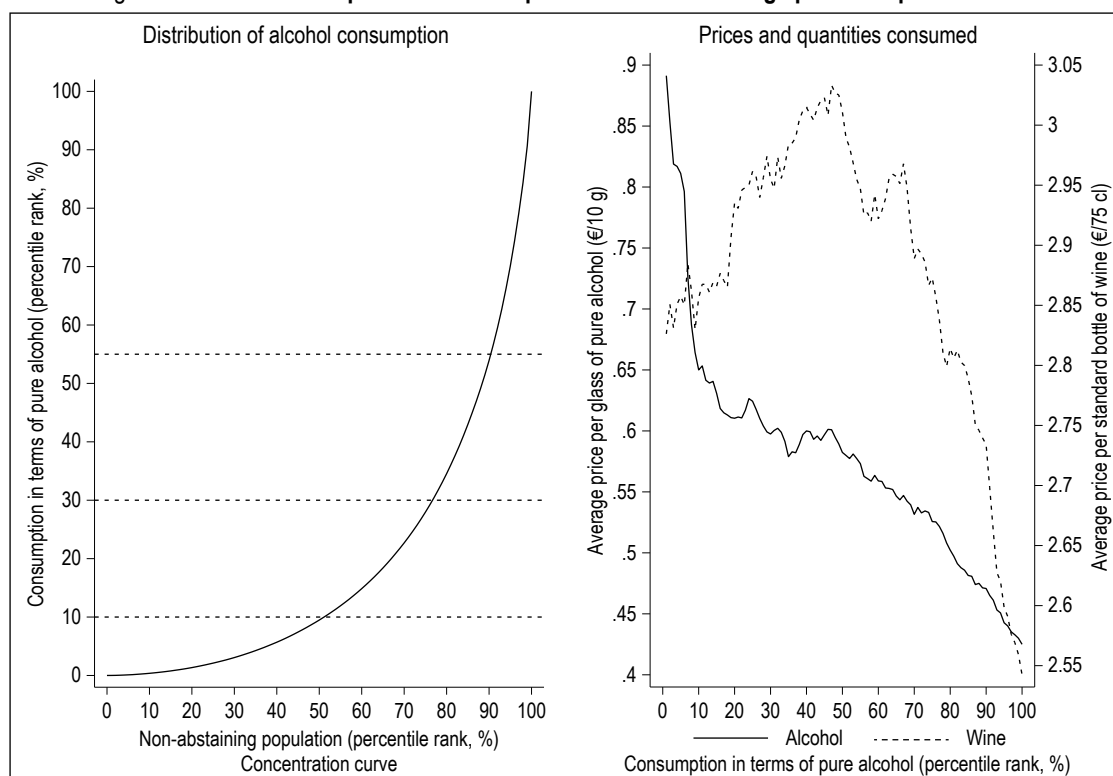
Notes: The graph on the left shows the concentration curve of the usual consumption of households in terms of pure alcohol (in g/adult); the graph on the right shows the average unit price paid per standard glass (€/10 g of pure alcohol – solid line using the axis on the left) and the average unit price per bottle of wine (€/75 cl – dotted line using the axis on the right), according to their position in the distribution of normal consumption in terms of pure alcohol.
Source and coverage: Kantar WorldPanel 2014; non-abstinent households from the constant panel (*N* = 6,353).

These curves illustrate the link between average habitual consumption and price, especially for heavy drinking households. This relationship reflects both how prices affect consumption and how heavy drinkers seek low prices. A pricing policy targeted at low-end products would have a relatively greater impact on heavy drinkers, with potentially greater health benefits. A minimum price or a volumetric excise tax, as opposed to an *ad valorem* tax, makes this targeting possible.[9]

2. Effectiveness and Regressivity of the Current Tax System

2.1. Excise Taxes on Alcoholic Beverages

Alcoholic beverages are subject to a number of specific and volumetric excise taxes and duties, as shown in Table 4.[10] Excise duties are subdivided into transportation duties, consumption duties and specific duties for beer, vary according to the product category (wine, beer, spirits, cider, etc.), their physical characteristics (still wines, sparkling wines, etc.), their alcohol content (beers with an alcohol content of less or more than 2.8%, etc.) and their production conditions (small or large brewery for beers, etc.). In addition to excise duties, consumers pay

social security contributions indexed to the pure alcohol content. Finally, the «premix» tax applies to mixtures of alcoholic and non-alcoholic beverages marketed to adolescents and young adults, in addition to other taxes. It is reduced from €11 to €3 per decilitre of pure alcohol for wine-based premixes (e.g. grapefruit wine).

Alcohol taxation, which has changed little between 2022 and 2014, has three salient features. First, the excise duty on wine does not depend on the alcohol content, in contrast to the excise taxes on other alcoholic beverages. This represents a disconnect between taxation and health issues, as the health risks of consumption depend essentially on the amount of pure alcohol in the beverage. Secondly, excise duties on wine are set at a much lower level than those on other alcoholic beverages particularly spirits. However, as the excise duty on wine is calculated on volumes in litres, while excise duties

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9. Volumetric taxes are expressed in units of goods (hectolitre, for example) and are added to the unit price, while ad valorem taxes are proportional to the market value of the goods (VAT is an example of this). As a result, with identical tax revenue, the burden of volumetric taxes is heavier on low-end products.
10. VAT is charged on the gross price plus these taxes. It is charged at a rate of 20% for takeaway beverages and 10% for those to be consumed on premises (restaurants, cafés, bars, nightclubs).

Table 4 – **Specific taxation of alcoholic beverages in 2022 and 2014**

	2022	2014
Excise duties		
Transportation duties		
Still wines (€/hl)	3.92	3.72
Sparkling wines (€/hl)	9.70	9.23
Apple and pear ciders/meads (€/hl)	1.37	1.31
Specific duties		
Beers ≤ 2.8% vol. (€/hl/%)	3.85	3.66
Beers > 2.8% vol. + small brewery (€/hl/%)	3.85	3.66
Beers > 2.8% vol. + large brewery (€/hl/%)	7.70	7.33
Consumption duties		
Rum from overseas departments (€/hlpa)	903.64	859.79
Distilled spirits (€/hlpa)	903.14	859.31
Other spirits (€/hlpa)	1,806.28	1,718.61
Natural sweet wines/liqueur wines (€/hl)	48.97	46.59
Other intermediate products (€/hl)	195.86	186.36
Social security contribution (> 18% vol.)		
Spirits (excl. overseas departments) (€/hlpa)	579.96	551.82
Natural sweet wines/liqueur wines (€/hlpa)	19.60	18.64
Other intermediate products (€/hlpa)	48.97	46.59
Beers, small brewery (2022 = €/hl, 2014 = €/hl/%)	19.60	1.47
Beers, large brewery (2022 = €/hl, 2014 = €/hl/%)	48.97	2.93

Notes: hl = hectolitre, hlpa = hectolitre of pure alcohol; small brewery = production ≤ 200,000 hl/year; for more details regarding 2022, see https://www.douane.gouv.fr/fiche/droits-des-alcools-et-boissons-alcooliques.
The page https://entreprendre.service-public.fr/vosdroits/F32101?lang=en provides a list of the majority of the reference texts addressing the taxation of alcoholic beverages to date. The "other intermediate products" category includes alcohols with an alcohol content of less than 22% that are neither beers nor wines, for example Vermouths and Gentiane liqueurs.
Source: The 2014 data are taken from the Order of 29 December 2013 setting the 2014 excise duty tariff for the alcoholic beverages set out in Articles 317, 402 bis, 403, 438 and 520 A of the French General Tax Code, the tariff for the contributions set out in Articles 1613 ter and 1613 quater of the French General Tax Code, as well as the tariff for the contribution set out in Article L. 245-9 of the French Social Security Code.

on other beverages are calculated in volumes of pure alcohol, the comparison is difficult. Finally, taxation is «riddled» with exemptions which, in addition to those for wine, also apply to traditional spirits (rum from the French overseas departments, liqueur wines) and beers produced by small breweries. We will not discuss the economic and cultural reasons for these exemptions here (lobbying by the industry, protecting small producers, historical legacy, barriers to international trade, etc.).[11] These three factors therefore justify examining the possibility of reviewing the specific taxation of alcohol in order to bring it in line, at least partially, with public health objectives.

2.2. A Taxation System That Is "Distortionary" With Respect to Public Health

Three public policy objectives can be assigned to the taxation of alcoholic beverages: raising revenue for the State, in particular to cover the social costs of alcohol abuse; protecting public health; and creating price barriers to protect domestic production. With regard to the first two objectives, taxation can be considered effective if the tax burden on pure alcohol is the same for all products.

Kantar WorldPanel data provides information on the alcohol content of products and therefore the level of taxation they are subject to. Using the information in Table 4, we can calculate the tax burden on each purchase, which, when subtracted from the average unit price, gives us a gross price. This allows us to precisely define the differences in the tax burden of the different varieties and categories of beverages.

The upper part of Table 5 provides an estimate, based on our data, of the tax revenue associated with the various taxes, both overall and by alcohol category. Out of 9.5 billion euros of household expenditure (or sales for home consumption), 1.9 billion euros is accounted for by indirect taxes (excluding VAT): 77.3% from spirits, 12.8% from beer, 7.4% from aperitifs, 2.4% from still and sparkling wines. The apparent tax burden, i.e. the share of taxes (duties and VAT) in household expenditure, on alcoholic beverages, is on average 36%, with large differences between groups: 17% for cider and wine (still and sparkling), 33% for beer, 38% for aperitifs, 68% for spirits. There is therefore a

11. On the role of barriers to international trade, see for example Arnaud et al (2002).

discrepancy between the distribution of purchase volumes and the distribution of the tax burden. Wines (still and sparkling) account for 51.3% of purchases and 23.0% of tax revenue, while spirits account for 8.3% of purchases and 55.7% of tax revenues.

The lower part of Table 5 shows the share of taxes in the average purchase price of the different categories, expressed in euro per litre and in euro per standard drink (10 g of pure alcohol). Whatever the unit of measurement, excise taxes account for more than half (62%) of the pre-VAT price of spirits, compared with around 1% for ciders, still wines and sparkling wines, and between 20% and 27% for beer and aperitifs. The price (including VAT) of a standard drink of pure alcohol is much lower for still wines (€0.36). It is very similar for beers, aperitifs and spirits (around €0.54).

These findings confirm the conclusions of a Senate information report:[12] the taxes currently levied in France favour neither a tax revenue objective nor public health considerations. If their objective were to maximise tax revenues, they would be applied primarily to the most heavily consumed beverages (or those generating the most revenues). However, wine accounts for more than half of the alcohol purchased in terms of quantity, but only contributes 2.4% of total indirect taxes. If the objective were to minimise health risks, the taxes would be linked to the

alcohol content. Yet, (still and sparkling) wines are less heavily taxed in terms of their alcohol content and in comparison with beers.

2.3. Regressivity and Fairness of the Current Taxation System

Current taxation particularly favours wines over spirits. In order to understand the potential redistributive impacts of alcohol price policy reforms, it is therefore important to consider how the share of the different alcohol categories in purchases change with household living standard. To do this, we classify households into four classes of living standards – low-income (15.7%), lower middle income (30.6%), upper middle income (41.3%) and high-income (12.3%) – provided by Kantar WorldPanel.[13] The analysis of consumption patterns shows that high-income households tend to consume relatively more wine and less beer and spirits at home than low-income households

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12. Fiscalité et santé publique : état des lieux des taxes comportementales *(Taxation and public health: overview of behavioural taxes), Senate Report, 2014, https://www.senat.fr/notice-rapport/2013/r13-399-notice.html. For information regarding the disconnect between taxation and health issues, see the recent contributions by Spach (2016) or Mété (2017), as well as Nourrisson (1990) for a historical study.*
13. *Kantar calculates household standards of living (adult equivalent income) from the household composition and the self-declared monthly income. See Table S1-2 in Online Appendix S1 for the definition. The partition into four classes is designed to capture the segmentation of the FMCG market according to standard of living (e.g. choice of brands, retailer, etc.). It should be noted, however, that the methodology used for this segmentation is not documented by Kantar WorldPanel. The results in this section are robust to the use of an alternative measure of gross disposable income constructed from self-declared income and the distribution of tax incomes provided by the Institut des politiques publiques (IPP).*

Table 5 – **Tax revenue and price breakdown (€/l and €/10 g of pure alcohol) by alcoholic beverage category**

	Ciders	Beers	Aperitifs	Spirits	Still wines	Sparkling wines	Total
Tax revenue							
Quantity (in million l)	48.27	689.31	112.42	175.31	969.94	108.05	2,103.29
Revenue (in million €)	115.64	1,433.75	628.52	2,825.70	3,382.25	1,151.55	9,537.40
Tax revenue excluding VAT (duties)	0.63	244.11	141.27	1,471.81	36.08	9.72	1,903.63
VAT revenue	19.28	236.33	101.24	469.26	563.71	191.25	1,581.07
Total tax revenue	19.91	480.44	242.51	1,941.07	599.79	200.97	3,484.69
Apparent tax burden (%)	17.21	33.51	38.58	68.69	17.73	17.45	36.54
Breakdown of price							
Price incl. tax (€/l)	2.40	2.08	5.59	16.12	3.49	10.66	
Price incl. tax (€/10 g)	0.83	0.53	0.56	0.52	0.36	1.13	
VAT (%)	16.67	16.48	16.11	16.61	16.67	16.61	
Price excl. VAT (€/l)	2.00	1.74	4.69	13.44	2.91	8.89	
Price excl. VAT (€/10 g)	0.69	0.45	0.47	0.44	0.30	0.94	
Taxes excl. VAT (€/10 g)	0.005	0.09	0.13	0.27	0.004	0.009	
Taxes excl. VAT (%)	0.66	20.39	26.79	62.46	1.28	1.01	
Gross price (€/l)	1.98	1.39	3.67	5.00	2.87	8.80	
Gross price (€/10 g)	0.69	0.36	0.37	0.16	0.30	0.93	

Notes: Quantities adjusted for the household and purchase sampling weights provided by Kantar WorldPanel, and scaled up to the French population; apparent tax burden = 100 x tax revenue/revenue; prices adjusted for purchase quantities and for household and purchase sampling weights provided by Kantar WorldPanel; VAT expressed as a percentage of the price including tax, and taxes excluding VAT expressed as a percentage of the price excluding VAT.
Source and coverage: Kantar WorldPanel 2014; non-abstinent households from the constant panel (*N* = 6,353)

(see Table S3-1 in Online Appendix S3). As a result, the current tax system is expected to be regressive, i.e., low-income households pay a relatively larger proportion of their income in specific taxes on alcohol.

The regressivity of current taxation is revealed by the differences in household tax effort rates, defined as the ratio of taxes paid to disposable income (see Ruiz & Trannoy, 2008, and Online Appendix S3). Table 6 compares the average tax effort rates of low-income and high-income households, without and with the inclusion of VAT, and without and with adjustment for the socio-demographic characteristics of the households and their habitual consumption of pure alcohol.[14]

The average tax effort rate is 0.26 per cent excluding VAT and 0.48 per cent when VAT is included. These statistics are robust to adjustment for differences in socio-demographic characteristics between households. Moreover, tax effort is higher for low-income households, at around 0.45% excluding VAT, compared to 0.11% for high-income households. By way of comparison, the tax effort rates calculated by Ruiz & Trannoy (2008) from the 2001 Household budget survey were 0.40-0.47% for the first three deciles of living standards, compared with 0.16-0.26% for the top three deciles. Our statistics therefore suggest that the regressivity of alcohol taxation has increased between 2001 and 2014. Table 6 also shows the implicit tax rate for each household class, i.e., the ratio of the tax burden to pre-tax expenditure. The implicit tax rate, adjusted for socio-demographic differences, is 65.27% for low-income households compared to 53.71% for high-income households, which raises the question of horizontal equity, since a euro spent on alcohol is not taxed in the same way depending on the household's standard of living.

The regressivity of taxes can be mechanically explained by differences in income (in the denominator of the effort rate), but also by a higher tax burden borne by low-income households (in the numerator). Low-income households have a higher tax burden in absolute terms (+18.65 €/year before adjustment). In additional analyses presented in Online Appendix S3, we decompose the tax burden differential between low-income and high-income households into the sum of several effects: (1) a quantity effect due to differences in the quantities purchased in each of the six alcohol categories; (2) a quality effect corresponding to differences in the quality of products within a category as reflected in the pre-tax prices; (3) an effect reflecting differences in the implicit tax rates applied to the category of products purchased; and (4) a residual effect produced by the correlations between pre-tax prices and quantities, and taxes and pre-tax expenditure. The difference in the tax burden is largely explained by the quantity effect, as low-income households consume larger quantities of spirits, which are more heavily taxed.

However, the differential becomes negative (−10.28 €/year) if we adjust for the socio-demographic characteristics of the households and, in particular, for their average habitual consumption of pure alcohol (in standard drinks per capita per day). This can be explained by an attenuation of the differences in consumption structure between income classes after these adjustments (see Table S3-4 in the Online Appendix S3). The tax burden borne by low-income households is therefore lower than that borne by high-income households, mainly due

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14. We adjusted for the following variables: habitual consumption level (less than one standard drink/adult/day, between one and two drinks, two or more drinks), age and age squared of the reference person, region (ZEAT) and type of place of residence (size of urban unit), household structure (single vs couple, with or without children).

Table 6 – **Tax effort and implicit tax rate by household category (%)**

	Total	Class		No. of standard drinks per cap. per day		
		High-income	Low-income	≤ 1	[1; 2]	>2
Tax effort, excl. VAT						
Not adjusted	0.26	0.45	0.11	0.08	0.31	0.93
Adjusted	0.26	0.46	0.11	0.08	0.30	0.92
Tax effort, incl. VAT						
Not adjusted	0.48	0.77	0.22	0.16	0.58	1.62
Adjusted	0.48	0.78	0.21	0.17	0.57	1.59
Implicit tax rate						
Not adjusted	59.61	67.77	51.31	55.52	63.05	72.36
Adjusted	59.61	65.27	53.76	55.58	62.67	72.48

Notes: Values adjusted by the sampling weights; rates are calculated in relation to the household's self-declared income provided by KWP.
Source and coverage: Kantar WorldPanel 2014; non-abstinent households from the constant panel (N = 6,353).

to a quality effect: they buy cheaper products within each alcohol category. A comparison of the adjusted and unadjusted results therefore shows that the tax difference between high- and low-income households can be explained by the combination of a tax system that favours wines over spirits and social differences in the total quantities of pure alcohol habitually consumed, leading to differences in the structure of alcohol purchases.

Finally, the regressivity in effort rates is explained on the one hand by inequalities in taxpaying capacity and a tax system biased in favour of wine and on the other hand by the combination of socio-economic inequalities in alcohol risks as measured by the average habitual consumption of pure alcohol. So, can we conclude from the current regressivity of alcohol taxation that it is unfair? Asking this question is tantamount to questioning and documenting the role of socio-economic determinants in the total amount of pure alcohol that is purchased by households.[15] Beyond this question of vertical equity, it can at least be said that, from a public health perspective, current taxation poses a problem of horizontal equity, since the taxes paid per gram of pure alcohol vary greatly depending on the category of beverage.

3. Potential of Pricing Policies

A reform of the alcohol price regulation policy can use two instruments: (1) a revision of the specific taxation of alcohol; (2) the introduction of a minimum retail price per unit of pure alcohol. In the case of a tax reform, we have considered replacing all current excise duties and taxes with a single excise tax. This policy option, like the minimum unit price, is in line with international recommendations (e.g. World Health Organisation – WHO) and the public health literature. Volumetric excise taxes have a greater impact on the lower end of the price distribution than taxes on the value of products: since at-risk or dependent consumers tend to buy low-end products, taxing the latter could *a priori* be a means of better targeting the at-risk population.

3.1. Definition of Scenarios

Apart from the case of the minimum unit price considered in isolation, i.e. without any new tax, all the scenarios consider the introduction of a tax that replace current taxes (excise duties and social security contributions, excluding VAT). Formally, let $p_1 = p_0 + \tau$ with p_1 the simulated unit price (per litre) (excluding VAT), p_0 the

gross unit price and τ the unit tax, the latter being defined as $\tau = t \times d$, where d is the degree of alcohol and t is the unit tax per degree of alcohol. In the case of a flat tax, t is the same for all drinks, regardless of their alcohol content (let's note $t = x$), and the unit tax τ increases with the alcohol content.

In the case of a progressive tax, t increases with the alcohol degree of the product. Let us consider the following 6 intervals of alcohol content: [0; 5[, [5; 10[, [10; 15[, [15; 25[, [25; 45[and [45; 100]. The value of t is different for each interval. We have assumed that it is twice as high in the second interval as in the first, three times as high in the third, etc., and marginally increasing. With progressive taxation, the tax t varies for each degree of alcohol in a drink: a wine with $d = 13\%$ will have a tax $t = x$ on the first 5 degrees, a tax $t = 2 \times x$ on the next 5, and another $t = 3 \times x$ on the last 3, giving a total of $\tau = (1 \times 5 + 2 \times 5 + 3 \times 3) \times x = (3 \times d - 15) \times x$ euros per litre. Table S4-1 in Online Appendix S4 summarises these elements.

For each of these two taxes, flat and progressive, we calibrate two values of x, a low value and a high value, based on the assumption consumer and produce behaviour do not change. The low value is calibrated so that total tax revenue is unchanged from the existing situation, to achieve tax neutrality.[16] The high value is calibrated on the hypothesis that the reform should generate non-VAT tax revenues that *a priori* cover the public finance expenditure generated by alcohol. For the latter, we have used the figures provided by Kopp (2015) and applied a coefficient of 58% corresponding to the share of home consumption in total consumption.[17] The second objective is therefore neutrality for public finances. After calibration, the four scenarios under assessment (S1–S4) are described in Table 7.

Finally, with regard to the minimum unit price, we considered firstly that the current taxation remains unchanged (scenario S5), and then that it is replaced by a progressive tax similar to S3

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15. A recent literature in health economics proposes breaking down inequalities in health status into one part related to circumstances (income, parental health behaviour, etc.) and another part related to efforts (e.g. smoking), see Jusot et al. (2013). To our knowledge, such a decomposition exercise has never been carried out for inequalities in health behaviours.

16. The tax revenue is calculated as shown in Table 5, using the household sampling weights to extrapolate to the national population.

17. We would like to thank Chantal Julia and Mathilde Touvier from the Nutritional Epidemiology Research Team at Paris 13 University for estimating these figures based on the 2014 consumption data of the NutriNet-Santé study cohort (24h dietary records). It can be noted that the total revenue for specific taxes on alcohol was assessed at 3.2 billion euros in 2011. Based on our data, we calculate the specific tax revenue from home consumption at 1.9 billion euros (cf. Table 5), a ratio of 59.5%, which is in line with the NutriNet data.

Table 7 – **Scenarios**

	Flat tax	Progressive tax
Low rate (tax neutrality)	S1: x = 7.24 euro cents	S3: x = 3.68 euro cents
High rate (neutrality for public finances)	S2: x = 14.57 euro cents	S4: x = 6.74 euro cents

(scenario S6=S3+S5). The minimum price is set at 50 euro cents per standard unit (10 g), which is slightly lower than the price introduced in Scotland (50 pence).[18]

3.2. Expected Impacts With no Reaction from Economic Agents

Taking a purely accounting perspective, we can simulate the likely impact of these scenarios on prices and tax revenues by assuming that (*i*) producers and retailers adjust their prices to fully reflect the effects of the reform on consumer prices and (*ii*) consumption choices within and between categories remain unchanged.

Table 8 shows that the average price of wines (still and sparkling) would increase from 0.8 to 2 euros per litre depending on the scenario, while the average price of spirits would fall from 3 to 0.7 euros per litre in the first three scenarios (S1–S3) and rise from 0.3 to 1.3 euros per litre in the three remaining scenarios (S4–S6). In addition to wines, the flat tax is also unfavourable to cider and beer. This is not the case with progressive taxes, which favour beer, penalise wines to a lesser extent and are less favourable to spirits.

Table 9 replicates this analysis by examining the impact on the price of a standard drink by alcohol category. As expected, the different tax reforms tend to significantly increase the price of a standard drink of wine and to reduce the price differential between categories. Only a high progressive tax (S4) or the introduction of a minimum price (S5) would prevent the price of spirits and aperitifs from falling. In all cases,

the relative price of wine would rise sharply, suggesting substitution to other alcohols that become relatively cheaper. Only by modelling the substitution behaviour of households can we make accurate predictions about the extent of these substitutions and their impact on pure alcohol consumption.

The simulated total tax revenue is about the same for the scenarios based on the objective of tax neutrality beyond approximation and rounding errors, the revenue does not vary. On the other hand, Table S4-2 in Online Appendix S4 shows that the breakdown of revenue between alcohol groups varies considerably. The contribution of wine rises sharply, offsetting the fall in the contribution of spirits and increasing total revenue in the minimum price scenarios S5 and S6. The adoption of high rates (S2 and S4) further increases the impact on tax revenue from wine, while reducing the impact on tax revenue from spirits. As the quantities are fixed, these variations only reflect differences in the tax burden between the alcohol categories.

Table S4-3 in Online Appendix S4 gives a more detailed breakdown of the expected impact on the wine industry. The impact of the different scenarios decreases sharply with quality, measured by label or unit price: for example, the flat tax would imply an average price increase of almost 45% for the less expensive wines, compared to

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18. We calculate the price per gram of pure alcohol for each beverage by dividing its unit price (including taxes, but excluding VAT), p_1, by its content in terms of grams of pure alcohol. We replace this with the minimum price if it is lower. This is the case for 521 varieties: 116 beers, 78 aperitifs, 117 spirits, 182 still wines and 28 sparkling wines. We then recalculate p_1.

Table 8 – **Average unit prices before and after reform in €/l (relative change in %)**

	Current taxation	Uniform tax		Progressive tax		Minimum price	
		Low rate (S1)	High rate (S2)	Low rate (S3)	High rate (S4)	Current duties (S5)	Progressive tax (S6)
Ciders	2.40	2.69 (+12.1)	3.01 (+25.4)	2.54 (+5.8)	2.67 (+11.2)	2.40 (0.0)	2.54 (+5.8)
Beers	2.08	2.08 (0.0)	2.51 (+20.7)	1.90 (−8.7)	2.10 (+1.0)	2.26 (+8.7)	2.19 (+5.3)
Aperitifs	5.59	5.45 (−2.5)	6.55 (+17.2)	5.46 (−2.3)	6.37 (+14.0)	6.13 (+9.7)	6.05 (+8.2)
Spirits	16.12	9.33 (−42.1)	12.71 (−21.2)	12.15 (−24.6)	17.27 (+7.1)	17.38 (+7.8)	16.40 (+1.7)
Still wines	3.49	4.49 (+28.7)	5.54 (+58.7)	4.37 (+25.2)	5.15 (+47.6)	4.95 (+41.8)	5.23 (+49.9)
Sparkling wines	10.66	11.57 (+8.5)	12.61 (+18.3)	11.46 (+7.5)	12.21 (+14.5)	10.91 (+2.3)	11.53 (+8.2)

Notes: Prices adjusted for purchase quantities and for the household and purchase sampling weights provided by Kantar WorldPanel.
Source and coverage: Kantar WorldPanel 2014; non-abstinent households from the constant panel (*N* = 6,353).

Table 9 – **Average unit prices before and after reform in €/standard drink (relative change in %)**

	Current taxation	Uniform tax		Progressive tax		Minimum price	
		Low rate (S1)	High rate (S2)	Low rate (S3)	High rate (S4)	Current duties (S5)	Progressive tax (S6)
Ciders	0.83	0.94 (+13.3)	1.05 (+26.5)	0.88 (+6.0)	0.93 (+12.0)	0.83 (0.0)	0.88 (+6.0)
Beers	0.53	0.54 (+1.9)	0.65 (+22.6)	0.49 (−7.5)	0.54 (+1.9)	0.58 (+9.4)	0.56 (+5.7)
Aperitifs	0.56	0.55 (−1.8)	0.66 (+17.9)	0.55 (−1.8)	0.64 (+14.3)	0.61 (+8.9)	0.61 (+8.9)
Spirits	0.52	0.30 (−42.3)	0.41 (−21.2)	0.40 (−23.1)	0.56 (+7.7)	0.57 (+9.6)	0.53 (+1.9)
Still wines	0.36	0.47 (+30.6)	0.57 (+58.3)	0.45 (+25.0)	0.54 (+50.0)	0.52 (+44.4)	0.54 (+50.0)
Sparkling wines	1.13	1.23 (+8.8)	1.34 (+18.6)	1.22 (+8.0)	1.30 (+15.0)	1.16 (+2.7)	1.22 (+8.0)

Notes: Prices adjusted for purchase quantities and for the household and purchase sampling weights provided by Kantar WorldPanel.
Source and coverage: Kantar WorldPanel 2014; non-abstinent households from the constant panel (N = 6,353).

less than 18% for the more expensive wines.[19] The minimum price, on the other hand, would only affect wines priced below €3.20 per litre.

Lastly, when we compare the expected redistributive impacts, detailed in Table S4-4 in Online Appendix S4, the implicit tax rate increases sharply in scenarios S2 and S4 and only slightly in scenarios S1 and S3. These impacts are similar regardless of the income and normal consumption levels of households, which suggests that the proposed tax reforms would have little redistributive effect. Conversely, in the minimum price scenario, the implicit tax rate decreases slightly, as taxation remains unchanged while the price of low-end products increases sharply.

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An analysis of the current taxation of alcoholic beverages in France shows, on the one hand, that it is insufficient to cover the public expenditure associated with their consumption and, on the other hand, that it is geared more towards protecting (a large part of) domestic production than towards public health objectives. There are significant distortions between product categories, mainly in favour of wines, and in particular low-end wines produced by large industrial groups, which are the most consumed and least taxed category given their alcohol content. The economic and cultural importance of wines is not specific to France: most wine-producing countries in Europe have tax rates close to zero for this category of alcoholic beverages; this is not the case for countries that do not produce wine.[20]

However, a revision of alcohol taxation could bring it into line with public health objectives. We have therefore simulated the potential impact on prices of several reform scenarios consisting of replacing the specific taxes on alcohol with a single excise tax proportional to the alcohol content – either flat or progressive (more penalising for stronger alcohols) – or introducing (separately or in combination) a minimum price per gram of pure alcohol contained in the product. These two options are the subject of a relative consensus within the scientific community (public health/epidemiology and economics). They are primarily aimed at the high-risk population of heavy drinkers: a quarter of alcohol drinkers consume almost three quarters of the quantities that are purchased, and often opt for poorer quality products (less than 50 cents for a standard drink).

For the most part, our results highlight the superiority of a minimum pricing policy over the other scenarios. Such a policy would allow an increase in the price of low-end alcoholic beverages, i.e. those priced below 3.20 euros per litre and most likely to be consumed by heavy drinkers. Wines would be particularly hard hit, with an average price increase of more than 40%, but this would be almost exclusively at the low end of the market (those costing less than 3 euros per litre), where wine prices would double.

Compared to other alcohol sectors, particularly the spirits sector, the wine sector includes many small producers (e.g. small cooperatives, independent winemakers). In our data, which probably under-represents small producers due to the over-representation of mass retail

19. In the first four scenarios, the impact on prices is more or less the same, regardless of the unit value (around +1.00, +2.06, +0.89 and +1.66 euros per litre, respectively).
20. For information regarding the organisation of the sector and its economic weight, see Cubertafond (2015) and Palle (2013), as well as the various data provided by France Agrimer. The wine trade employs more than 500,000 people directly or indirectly and boasts 85,000 vineyards and export revenue of 13 billion euros.

purchases, large companies and retailers account for only 50% of still wine purchases (and 45% of the market value), compared with 75% for sparkling wine purchases and 90% for spirits and beer purchases. The acceptability of an alcohol tax reform will therefore depend crucially on its potential impact on the wine sector.

A flat or progressive tax would affect all operators in the wine sector in a fairly similar way. The introduction of a minimum price would have the advantage of affecting only large companies and large retailers (the majority of which produce lower-priced wines, which would be subject to significant price increases), while the profits of other operators would increase significantly, despite a reduction in the quantities purchased in this market. Conversely, if a progressive tax were added to the minimum price (instead of the current excises), these operators would again be affected: the additional margin automatically generated by the introduction of the minimum price would then be cancelled out by the tax.

Our analyses of the potential impact of price reform assume that there is no significant reaction by economic agents. The *health* effectiveness of a price regulation measure will depend in particular on two key factors that we have not taken into account: (*i*) the impact of the policy on prices, which is not simply a matter of accounting, but also depends on the reactions of consumers, producers and retailers, based on the willingness of consumers to substitute products (or abstain from consumption), the product portfolio of each company, the nature of the contracts between producers and retailers, and the competitive structure of the market; (*ii*) the variation in pure alcohol consumption resulting from price variations.

Ex-post evaluations of tax reforms show that taxes are largely passed through onto consumer prices, which reflect the behavioural responses of economic agents. These evaluations also provide evidence that points to two important conclusions. First, the pass-through of excise taxes to consumer prices is generally higher than the pass-through of *ad valorem* taxes (Carbonnier, 2013; Shrestha & Markowitz, 2016; Ardalan & Kessing, 2021). Second, there is some heterogeneity in the pass-through rate of taxes, depending on the positioning of products in terms of quality on the one hand, and on market characteristics (consumer segments, competitive structure; cf. Shang *et al.*, 2020; Hindriks & Serse, 2019) on the other. In particular, a number of increases

(excise duties as well as *ad valorem* taxes) were undertransmitted to the prices of low-quality products and overtransmitted to the prices of higher-quality products, although pass-through rates remained close to 100% (Ally *et al.*, 2014; Wilson *et al.*, 2021). This under-transmission may slightly weaken the effectiveness of tax reforms, as at-risk groups may prefer to buy cheaper alcohol.

What could be the eventual impact on the consumption of pure alcohol? A pricing policy would lead to quality and quantity substitutions in consumer purchases. Such substitutions could reduce the expected impact of the policy by changing the structure of consumption, for example by encouraging the consumption of spirits over wine. Our approach needs to be complemented by modelling and econometric identification of the likely responses of agents to obtain more accurate predictions of the likely impact on alcoholic beverage markets and public health. In this article, we have identified the scenario that offers the best potential for a public health-oriented alcohol pricing policy. The introduction of a minimum price for a standard drink of pure alcohol has the advantage of raising average prices across all categories of alcoholic beverages, thereby limiting the opportunities for undesirable substitution between different categories of alcoholic beverages.

It would also be interesting to complement this work with an analysis of potential substitution towards cross-border shopping (for border residents) and away-from-home drinking, which is very poorly documented for France due to a lack of data. Studies from Scandinavian countries have shown that cross-border shopping is a significant margin of adjustment for border households in the presence of strict purchase regulations (Asplund *et al.*, 2007; Beatty *et al.*, 2009). Out-of-home consumption is more likely to involve young households and young adults. It is often characterized by binge drinking that differ from the usual pattern of consumption observed in adults. While price increases are effective in reducing even high levels of chronic consumption, they are less effective in reducing episodes of binge drinking (Nelson, 2015; Xuan *et al.*, 2016; Sharma *et al.*, 2016; Byrnes *et al.*, 2016; Shrestha, 2015; Pryce *et al.*, 2019). They need to be complemented by more specific measures, such as regulating the availability of the product (sales hours in bars, night sales in grocery stores, banning happy hours, etc.). □

Link to the Online Appendix:
www.insee.fr/en/statistiques/fichier/7761832/ES541_Lecocq-et-al_OnlineAppendix.pdf

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Gender Stereotypes in Europe

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Abstract – Gender stereotypes are most often represented in the form of a one-dimensional scale, ranging from a traditional view to an egalitarian view, which does not adequately reflect the complexity of the corpus of representations on gender. Using the 2017 European Values Study, which has a breadth of indicators describing countries in terms of equality between women and men, the contribution of this article is twofold. First of all, it shows that gender stereotypes relating to the separation between the private and professional spheres can be represented in two dimensions, one corresponding to an overall adherence to these stereotypes and therefore pertaining to the dominant approach in the literature, and the other corresponding to an adherence to stereotypes relating to the role of the mother in particular. Then, the article estimates the individual and national factors that determine adherence to those two dimensions and shows that the differences between countries are smaller in the second dimension.

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Gender stereotypes play a central role in inequalities between women and men. In particular, stereotypes influence the behaviour of individuals in relation to their work (Carrère *et al.*, 2006), the importance that women and men attach to work and the professional sphere (Gaunt & Benjamin, 2007), and also the way in which such behaviour is perceived within organisations (Pigeyre & Vernazobres, 2013).

The primary focus here is on the gender stereotypes associated with the "male breadwinner" model. The manner in which these stereotypes are to be measured and represented is a central issue (Davis & Greenstein, 2009), but has received little attention in the existing research. This is because most of the research into the role of gender stereotypes represents them in the form of a one-dimensional scale, ranging from, on the one hand, what is referred to as the "traditional" view of gender, in which the behaviour expected of women and men respectively is highly differentiated, with women being confined to the domestic and family sphere and men to the public and professional sphere, to, on the other hand, an egalitarian view of gender, in which behaviour is not differentiated according to sex (Vespa, 2009). However, a recent article showed that this one-dimensional representation masks the fact that gender stereotypes do not form a homogeneous corpus of beliefs, and that an individual's adherence to one of these beliefs or representations does not automatically go hand-in-hand with adherence to all the stereotyped representations that make up the ideology underlying the "male breadwinner" model (Grunow *et al.*, 2018). This article therefore seeks first of all to propose a different representation of gender stereotypes, taking a possible multidimensionality into account.

The prevalence of gender stereotypes varies according to a large number of determining factors, which are linked to the individual (Braun & Scott, 2009; Depoilly, 2017), to her or his parents (Donnelly *et al.*, 2016), but also to national cultures and the situation of countries in terms of equality between women and men (Beblo & Görges, 2018). However, to our knowledge, no study has sought to measure the weight of the national level in terms of the variation of adherence to gender stereotypes, or to identify jointly the individual and national factors that determine adherence to gender stereotypes.

This article therefore aims to propose a new representation of gender stereotypes, in the form of several dimensions. It also seeks to identify the individual and national factors that determine

gender stereotypes. To this end, it uses data from the European Values Study, which provides a representative sample of individuals. Proceeding on the basis of a principal component analysis, we show that gender stereotypes linked to the "male breadwinner" model can be broken down into two dimensions, one relating to overall adherence to stereotypes, which is the dominant approach in the literature, and the other relating to the role of the mother. Then, the use of multilevel models allows us, among other things, to establish that the weight of the national level in terms of the variance in adherence to stereotypes is much lower in the second dimension than in the first.

The rest of the article is structured as follows. Section 1 presents the existing literature on the manner in which gender stereotypes and the factors that determine them are measured. Section 2 presents the data and methodology used. Section 3 sets out the main findings, firstly concerning the manner in which gender stereotypes are represented and measured (findings of the principal components analysis), and secondly concerning the factors that determine stereotypes (findings of the multilevel econometric models). Lastly, Section 4 discusses the findings in relation to the existing literature.

1. Review of the Literature

This first section takes stock of what is currently known about gender stereotypes and the factors that determine them.

1.1. Gender Stereotypes: What Does That Mean?

Gender stereotypes pertain to representations and beliefs about the differences between women and men, both in terms of aspirations, behaviour and skills (Lefkofridi *et al.*, 2019). They are both descriptive (with regard to what women and men are assumed to be) and prescriptive (with regard to what women and men should be) (Heilman, 2012). Individuals internalise them very early on, from childhood onwards, through socialisation and other means (Duru-Bellat, 2008; 2017; Glaude, 2006). Such stereotypes do not concern only the professional sphere: they may relate, for example, to the way in which women and men are assumed to spend their money or time (Champagne *et al.*, 2015), or to the aptitudes that girls and boys, and then women and men, are assumed to have (Cvencek *et al.*, 2011).

This article focuses more specifically on the definition and operationalisation in the research of the gender stereotypes underlying the "male

breadwinner" model, in which a family is assumed to be dependent on the income of the father of the family. This model developed in the middle classes before spreading to the working classes in the mid-20th century (Creighton, 1996), and has long served as justification for pay inequalities (Downs, 2006; Meron & Silvera, 2006). Even though the traditional model of the family with the mother at home and the father as the main income provider has become a minority in most European countries, the idea that the man's salary is the main income is still widespread (Coron & Schmidt, 2022) and domestic tasks are still distributed very unevenly. This may explain, or be explained by, the persistence of the stereotypes that make up this model (Brousse, 2015; Charles & James, 2005). These stereotypes (referred to in the rest of this text as "gender stereotypes") generally pertain to the idea that women are better placed and more competent to manage aspects of family and domestic life, and men to manage professional life and careers (Gaunt & Benjamin, 2007; Lee, 2006). They are therefore descriptive and prescriptive stereotypes, which relate to women's and men's respective desires (women's desires are assumed to be oriented towards the domestic sphere, men's towards the professional sphere); their behaviour (priority given to family or professional life, for example); and their skills (home management and childcare skills on the part of women versus professional skills on the part of men) (Cha & Thébaud, 2009).

Shannon Davis and Theodore Greenstein (2009) have studied the various attempts made in the English-language research to measure these gender stereotypes. Their article emphasises, first of all, that most of these stereotypes are based primarily on a distinction between the sphere of paid work and the domestic sphere (the sphere of unpaid work). More specifically, it identifies several categories of representations that can give rise to gender stereotypes, including, for example, the idea that women have intrinsically different aspirations from men, or that women and men have different skills. However, it also acknowledges the fact that, more often than not, gender stereotypes are ultimately represented and operationalised in the form of a one-dimensional scale, or a continuum, ranging from a traditional view to an egalitarian view, which is in fact widely adopted in the research – in particular the English-language research – into gender stereotypes (Carriero & Todesco, 2018; Gaunt & Benjamin, 2007).

However, the stereotypes underlying the "male breadwinner" model form a corpus that appears to be more complex, with potential instances of ambivalence (Glick & Fiske, 1997). For example, adherence to a principle of equality in the sharing of childcare does not necessarily always go hand-in-hand with being in favour of income equality. Similarly, the gender-based division of paid work (Giraud & Rémy, 2013) and the gender-based sharing of domestic tasks among heterosexual couples (Champagne *et al*., 2015; Champeaux & Marchetta, 2022) persist, even within dual-career couples.

Thus, a recent article, which draws on the European Values Study from 2008 and is confined to eight countries, proposed a modelling of gender stereotypes in the form of "classes", corresponding to different gender stereotype profiles: egalitarian, egalitarian essentialism, intensive parenting, moderate traditional and traditional (Grunow *et al*., 2018).

Another way of representing gender stereotypes consists in identifying the "dimensions" underlying these stereotypes, each of these dimensions giving rise to a scale on which individuals can be placed. This is what our article seeks to propose, drawing on more recent data (2017) from the same survey (European Values Study).

1.2. Individual and National Factors That Determine Gender Stereotypes

The internalisation of gender stereotypes is influenced by different levels, in particular the individual's immediate environment (her or his personal characteristics but also those of her or his parents), but also the national context (Dhar *et al*., 2019).

Studies have shown that women generally have a more egalitarian view of gender than men (Braun & Scott, 2009; Papuchon, 2017). Research has shown a slow but steady decline in the prevalence of gender stereotypes over time, thereby indicating that, in addition to an age effect (younger people agreeing less with a stereotypical view of gender), there may be a generational effect (Braun & Scott, 2009; Donnelly *et al*., 2016). The level of education also plays a role, with more educated people having on average a less stereotyped view of gender in many countries (Braun & Scott, 2009; Papuchon, 2017), and less acceptance of gender inequalities (Parodi, 2010). These differences manifest themselves according to socio-professional categories, with gender stereotypes and the gender-based division of labour and tasks often being more pronounced in working-class environments (Pasquier, 2021).

Determining factors linked to parents have also been highlighted, and concern both their representations of gender and their behaviour (Halpern & Perry-Jenkins, 2016; Platt & Polavieja, 2016). Dhar *et al.* (2019), for example, have shown that gender stereotypes are passed on from generation to generation within families, which can be linked to the fact that gender stereotypes are disseminated *inter alia* through socialisation, a process in which parents play a key role. This also includes family behaviour – and in particular whether it is has an egalitarian or, on the contrary, traditional dimension (in terms of the division of domestic tasks and paid work between parents, in particular) – which influences adherence to gender stereotypes. In particular, children of working mothers generally have a more egalitarian view than children of stay-at-home mothers (Donnelly *et al.*, 2016). More generally, since adherence to gender stereotypes varies according to socio-economic characteristics, and parents' gender stereotypes are passed on at least in part to their children, parents' socio-economic characteristics can also influence an individual's adherence to gender stereotypes (Davis & Greenstein, 2009).

International comparisons of gender stereotypes have generally shown wide variations between countries (Braun & Scott, 2009). This is because the national level plays an important role: culture and institutions partly shape women's and men's relationship to gender, but also to the personal, family and professional spheres (Beblo & Görges, 2018). Gwenaëlle Perrier and Isabelle Engeli (2015) show, for example, that representations of what constitutes a "good mother" vary greatly from one country to another, depending in particular on childcare policies. Family policies that implement effective childcare systems for young children contribute to reducing stereotypes in which it is assumed that being a good mother is incompatible with engagement in the professional sphere. The situation of countries in terms of gender equality can also contribute to people's representations of gender. In addition to public policies and the situation of countries in terms of equality, it is also important to take the national dimension into account because national cultures disseminate more or less gender stereotypes, and not necessarily all the same stereotypes (Ashwin & Isupova, 2018; Beblo & Görges, 2018).

2. Methodology

This article is essentially based on data from the European Values Study (EVS) from 2017 (Section 2.1), and uses a principal component analysis to determine the main dimensions of gender stereotypes, and then multilevel econometric models to describe variations in gender stereotypes according to individual and national characteristics (Section 2.2).

2.1. Data Used

The European Values Study has been carried out in European countries on a regular basis since 1981 and provides a large sample of individuals (aged 18 and over). Four countries (Armenia, Azerbaijan, Georgia and Russia) in the sample from the 2017 survey have not been included in our analysis due to their geographical position in relation to Europe's borders. The data is provided with weightings that allow the results to be extrapolated to the population as a whole, at both national and European level (Box 1).

The EVS questionnaire includes several questions relating to gender stereotypes. In particular, individuals are asked to state how strongly they agree with each of the following eight statements:
- "When a mother works for pay, the children suffer."
- "All in all, family life suffers when the woman has a full-time job."
- "A job is alright but what most women really want is a home and children."
- "A man's job is to earn money; a woman's job is to look after the home and family."
- "On the whole, men make better political leaders than women do."
- "On the whole, men make better business executives than women do."
- "A university education is more important for a boy than for a girl."
- "When jobs are scarce, men have more right to a job than women."

These statements represent common gender stereotypes, and are the ones that researchers use most often (sometimes with a slightly different wording) to measure the gender stereotypes underlying the "male breadwinner" model in the form of a one-dimensional scale (Davis & Greenstein, 2009; Grunow *et al.*, 2018). The average degree of adherence to each of these stereotypes in the 30 countries included in the analysis is shown in Tables 1a and 1b.[1]

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1. Some of these statements relate solely to women (for example, "When a mother works for pay, the children suffer"), others to both women and men (for example, "On the whole, men make better political leaders than women do"). This may limit comparisons of the prevalence of different stereotypes and between different countries. However, it should be pointed out that, in the EVS protocol, all the statements in Table 2a are shown to respondents in a single block (in the form of a "card"), so they can therefore understand all these questions as a block on gender and gender differences.

The statement with which the most people agree is "All in all, family life suffers when the woman has a full-time job" (43.5% of Europeans agree or agree strongly), followed by "A job is alright, but what most women really want is a home and children" (42.1% agree or agree strongly). Conversely, the statement with which the fewest people agree is "A university education is more important for a boy than for a girl." (only 8.0% agree or agree strongly), followed by "When

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Box 1 – **The 2017 European Values Study**

The European Values Study is a large-scale European survey of the behaviour, opinions and values of Europeans. It has been carried out approximately every nine years since 1981 among Europeans aged 18 and over living in one of the countries covered by the survey. The most recent wave of the study (EVS 2017) was conducted in 2017–2018.

The questionnaire of the survey is delivered face-to-face and covers a wide range of topics: family, work, politics, morality, beliefs and gender representations.

Each country must provide a sample of at least 1,000 individuals (1,200 for the largest countries). The database is supplied with weightings that enable the data to be processed and representative results to be obtained at national and/or international level. Thus, the database is supplied with calibration weights, which take account of age, gender, region (according to the Nomenclature of Territorial Units for Statistics, NUTS) and level of education, as well as population weights, which aim to extrapolate the calibration weights according to the population of the countries. To analyse differences between countries and draw conclusions at international level, the calibration weights must be multiplied by the population weights.

Table A shows the breakdown of the 49,172 individuals surveyed by country.

Table A – **Sample of the European Values Study**

Country	Number of individuals
Albania	1,435
Germany	2,170
Austria	1,644
Belarus	1,548
Bosnia and Herzegovina	1,724
Bulgaria	1,558
Croatia	1,487
Denmark	3,362
Spain	1,209
Estonia	1,304
Finland	1,199
France	1,870
Great Britain	1,788
Hungary	1,514
Iceland	1,624
Italy	2,277
Lithuania	1,448
North Macedonia	1,117
Montenegro	1,003
Netherlands	2,404
Norway	1,122
Poland	1,352
Portugal	1,215
Czech Republic	1,811
Romania	1,613
Serbia	1,499
Slovakia	1,432
Slovenia	1,075
Sweden	1,194
Switzerland	3,174

Sources and coverage: EVS 2017. Persons aged 18 and over.

jobs are scarce, men have more right to a job than women." (15.5% agree or agree strongly, it being borne in mind that this statement has a five-point scale while the other statements have a four-point scale). In other words, the most widespread stereotypes concern the idea that full-time employment is difficult for women to reconcile with family life, and the idea that women intrinsically have different desires from men, with women's desires being oriented more towards the home and domestic life and less towards the professional sphere. Conversely, the least widespread stereotypes concern the justification of inequalities (in terms of access to education and access to employment), which is in line with the conclusions of previous studies showing that inequalities between women and men are increasingly considered to be unjustified (Parodi, 2010).

In terms of individual determining factors, we have selected the socio-demographic characteristics that the literature has shown to be correlated with adherence to gender stereotypes (cf. Section 1.2), in particular gender, age, level of education and socio-professional category. In the EVS survey, gender is coded into two categories (female/male), and age into six categories (15–24, 25–34, 35–44,

45–54, 55–64, 65 and over). The survey distinguishes between eight levels of education (less than primary, primary, lower secondary, upper secondary, post-secondary non-tertiary, short-cycle tertiary, bachelor level, master level and higher). The socio-professional category (coded by the interviewer on the basis of the respondent's description of her or his job) is described according to ten categories taken from the European socio-economic classification (large employers, higher managers; lower managers, higher technicians; intermediate; small employers self-employed; agriculture; lower technicians; lower technical; lower sales and service; routine; retired, homemaker not otherwise employed, student, unemployed, disabled, who have never had a job – it being borne in mind that, for the French-language version of this article, we had to interpret the nomenclature used and translate it into French categories; see Table A1-1 in Appendix 1 for correspondence).

We also included certain characteristics of parents. Even though the existing literature has focused mainly on the mother's employment status (Donnelly *et al.*, 2016), we took into account the father's level of education, the mother's level of education, the father's employment

Table 1a – **Average adherence to each gender stereotype**

	Disagree strongly (%)	Disagree (%)	Agree (%)	Agree strongly (%)
"When a mother works for pay, the children suffer."	20.7	43.7	27.4	8.2
"All in all, family life suffers when the woman has a full-time job."	18.6	37.9	32.4	11.1
"A job is alright but what most women really want is a home and children."	19.2	38.7	32.1	10.0
"A man's job is to earn money; a woman's job is to look after the home and family."	34.9	39.1	17.9	8.0
"On the whole, men make better political leaders than women do."	38.5	42.7	14.4	4.4
"On the whole, men make better business executives than women do."	41.9	42.2	12.9	3.1
"A university education is more important for a boy than for a girl."	51.6	40.4	6.0	2.0

Sources and coverage: EVS 2017. People aged 18 and over who are resident in one of the 30 European countries selected for the analysis (cf. Box 1).

Table 1b – **Average adherence to the stereotype relating to jobs**

	Disagree strongly (%)	Disagree (%)	Neither agree nor disagree (%)	Agree (%)	Agree strongly (%)
"When jobs are scarce, men have more right to a job than women."	35.6	34.7	14.2	10.1	5.4

Sources and coverage: EVS 2017. People aged 18 and over who are resident in one of the 30 European countries selected for the analysis (cf. Box 1).

status and the mother's employment status when the respondent was 14 (employee, self-employed, not employed), and the socio-professional category of the parent who earned the most money when the respondent was 14 (distinguishing between ten categories: prof technical; higher admin; clerical; sales; service; skilled worker; semi-skilled worker; unskilled worker; farm worker; farm manager). For this last variable, it is the respondent who chooses the category from a list proposed by the interviewer, so we used the categories from this list (see Table A1-2 in Appendix 1 for the correspondence between the terms in the English version and in the French version of the questionnaire). We considered that it would be of interest to measure the effect of the father's characteristics. This is because the literature has shown, for example, that male unemployment may partly contribute to a questioning of the "male breadwinner" model and thus of certain associated gender stereotypes (Charles & James, 2005).

We supplemented our analysis by using national variables relating to the situation of different countries in terms of equality between women and men; these variables may have effects on gender representations (Perugini & Vladisavljević, 2019), but also on public policies in that area, the importance of which is highlighted by other works (Hook, 2006; Orloff, 1993).

The "Gender, Institutions and Development Database" produced by the OECD in 2014[2] was used to retrieve the following information: ratio of time spent by women on domestic work to time spent by men and existence of laws on women's economic rights (2 options, according to the degree of constraint of these laws). We also used the Gender Inequality Index proposed by the UNDP (United Nations Development Programme), which aims to measure gender inequalities in development and progress, and incorporates in particular the maternal mortality rate, adolescent fertility rate, parliamentary representation rate, gender differences in school enrolment and economic activity rates. The data for this source dates from 2015. Lastly, we used variables relating to public policies on parenting, taken from the OECD Family Database, selecting the years for which data was available for the largest number of countries, and proceeding on the assumption that these figures have a certain degree of inertia. We have thus included public spending on childcare systems for children aged 0 to 5 (as a percentage of GDP in 2014), but also, following Hook (2006), the percentage of children aged 0 to 2 enrolled in early childhood education and care in 2017, the number of weeks of maternity leave in 2014 and the number of weeks of paternity leave in 2014. For non-OECD countries, data was collected manually, from official websites (UNICEF, UNDP, etc.).

2.2. Methodology

First of all, in order to propose a representation of gender stereotypes in the form of several dimensions, we opted for a principal component analysis (PCA), due to the ordered nature of the variables selected. The answers to the eight questions on gender stereotypes were linearised from 1 for "Strongly disagree" to 4 for "Strongly agree" (or 5 for the question with 5 response options), such that a higher number corresponds to greater adherence to the stereotype. The eight numerical variables thus obtained were then centred and reduced.

The PCA made it possible to highlight two orthogonal principal dimensions, linear combinations of the eight initial variables.

For each of the two dimensions, the score for the individual i was calculated as follows:

$$SCORE_i = CoordS1 \times S1_i + CoordS2 \times S2_i + CoordS3 \times S3_i$$
$$+ CoordS4 \times S4_i + CoordS5 \times S5 + CoordS6 \times S6$$
$$+ CoordS7 \times S7 + CoordS8 \times S8,$$

where $CoordS1$ represents the coordinate of stereotype 1 in the dimension concerned, and $S1_i$ is the response of individual i for stereotype $S1$. The exact formulae for each dimension are given in Appendix 3.

Then, in order to 1) identify the individual and national factors that determine adherence to each of the dimensions and 2) estimate the importance of the national dimension in adherence variance, we use multilevel random effects models. Multilevel models are suitable for nested data (in this case, the individual level is nested within the national level). They make it possible to take account of the fact that certain phenomena can be explained at different levels (in this case, the individual level and the national level) and to estimate the weight of the higher level in the variations observed (Givord & Guillerm, 2016; Moullet & Salibekyan, 2019) (Box 2).[3]

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2. No such database existed in 2017. We considered that 2014 was a sufficiently recent date for there to be little change between the different data sources.
3. The results of multilevel models with individual and national covariates and random country effects are close to those obtained by estimating regression models in which the country effects are fixed effects.

3. Findings

3.1. Stereotypes Can Be Broken Down into Two Dimensions

The principal component analysis shows that the gender stereotypes are broken down primarily into two dimensions (in accordance with the elbow rule and the Kaiser rule), which capture 67.7% of the information (52.2% and 15.4% respectively, for eigenvalues of 4.18 and 1.23). Appendix 2 shows the contributions and coordinates of the variables with regard to each of these two dimensions and some additional methodological details.

The first dimension is characterised by a virtually equal weight of each of the eight gender stereotypes: their contributions are all between 11% and 15%, and their coordinates are all positive on the axis. In other words, this first dimension corresponds to a global and virtually undifferentiated adherence to gender stereotypes, which is to say a representation that is fairly close to a linear representation of stereotypes. Thus, this dimension corresponds more or less to the dominant representation in the literature, which contrasts, on the one hand, a traditional vision – in which men must specialise in the professional sphere, in particular because they are more competent there, and women must specialise in the domestic sphere – with, on the other hand, an egalitarian vision. More specifically, however, this dimension attaches a little more importance to stereotypes linked to a form of rational specialisation of women and men in distinct spheres, on the basis of supposedly different skills but also of desires regarded as intrinsically gender-based. For

example, the statement with the highest contribution in dimension 1 ("A man's job is to earn money; a woman's job is to look after the home and family") equates paid work with domestic work – considering in particular that "looking after the home and family" constitutes "work" – but expresses the belief that paid work should remain the preserve of men and unpaid domestic work that of women. This statement pertains directly to the "male breadwinner" ideology (Creighton, 1996).

The two statements with the next lowest contribution ("On the whole, men make better political leaders than women do" and "On the whole, men make better business executives than women do") relate to skills commonly considered to be important in the professional sphere (political skills and leadership skills) and pertain to a potential gender difference in the possession or exercise of those skills. These statements are reflected in the "think manager – think male" paradigm, whereby the qualities deemed necessary for taking on responsibility are associated with men (Eagly & Karau, 2002).

This first dimension, which we refer to as the specialisation dimension in the rest of the text, therefore focuses on the gender-based specialisation of tasks between the domestic sphere and the professional or public sphere, and pertains to an overall adherence to gender stereotypes on this subject. It therefore corresponds to the dominant representation in the existing literature.

The second dimension consists primarily of the following statements, in the order of their contribution to the dimension: "When a mother works for pay, the children suffer", and "All in

all, family life suffers when the woman has a full-time job". These two statements correspond to a moralistic vision, in which the exercise of a professional activity is perceived as having negative repercussions on her children or family. These stereotypes therefore pertain, on the one hand, to the suffering that children could potentially experience if their mother works and, on the other hand, to a supposed incompatibility between family life and professional life (Acker, 1990), this applying only to mothers (Wynn, 2017). Furthermore, it should be noted that, in this dimension, stereotypes about differences in professional skills between women and men ("On the whole, men make better political leaders than women do", "On the whole, men make better business executives than women do", "A university education is more important for a boy than for a girl" and "When jobs are scarce, men have more right to a job than women") are projected on the negative side of the axis, while the other stereotypes are projected on the positive side. This axis therefore shows that adherence to gender stereotypes is not necessarily general: it is possible to adhere to certain stereotypes (in this case, relating to the role of the mother), but not to others (in this case, relating to differences in skills).

This second dimension therefore focuses on the role of the mother and will be referred to as such in the remainder of the text: it focuses on the way in which women should perform their role as mothers, and on an apparent incompatibility between playing the role of mother well and engaging in the professional sphere, which pertains to the "intensive motherhood" ideology (Preisner *et al.*, 2020).

3.2. Individual and National Determining Factors Differ According to the Dimension

We will now look into the factors that determine adherence to each of these two dimensions. To that end, we have restricted the sample to individuals for whom the most important individual characteristics (type of occupation, parents' occupation and socio-professional category, in particular) are known, giving a sample of 37,627 individuals, comprising 20,977 women and 16,650 men (i.e. 76.5% of the initial sample).

We build two variables (centred and reduced) corresponding to each of the two dimensions (see Appendix 3). These two dimensions are, by construction, orthogonal. Appendix 3 gives the distributions of the two scores in each of the two dimensions. Table 2 shows the average scores and standard deviations for each of the individual characteristics, and Figures I and II show the average scores per country in these two dimensions.

The results are consistent with the literature (cf. Section 1.2): women, people with higher levels of education, young people and members of skilled socio-professional categories adhere less to gender stereotypes overall (lower scores in the first dimension). As regards the characteristics of parents, people whose mothers worked have a less stereotyped view, as do those whose parents belong to high-income socio-professional categories (prof technical, for example). The differences between countries are the greatest, with average overall adherence to stereotypes ranging from +0.83 for the highest (Lithuania) to −0.96 for the lowest (Norway).

Table 2 – **Average score (and standard deviation) in the two dimensions by individual characteristic**

	"Specialisation" dimension	"Role of the mother" dimension
All	0.0 (1.0)	0.0 (1.0)
Gender		
Female	−0.13 (0.95)	0.13 (0.97)
Male	0.14 (1.05)	−0.13 (1.02)
Age		
15–24 years	−0.28 (0.96)	−0.18 (0.98)
25–34 years	−0.19 (1.05)	−0.14 (1.03)
35–44 years	−0.21 (0.97)	0.01 (1.01)
45–54 years	−0.13 (1.01)	−0.01 (0.99)
55–64 years	0.09 (0.91)	0.06 (0.95)
65 years and over	0.46 (0.93)	0.17 (1.00)
Level of education		
No formal or less than primary education	0.66 (1.49)	0.15 (1.66)
Primary education	0.42 (1.44)	0.16 (1.41)
Lower secondary [(a)]	0.35 (1.22)	0.18 (1.26)
Upper secondary without higher education	0.14 (0.90)	−0.00 (0.95)
Upper secondary with access to higher education	−0.03 (0.84)	0.02 (0.92)
Post-secondary/advanced vocational education below bach	−0.32 (0.85)	−0.12 (0.86)
Bachelor's level	−0.52 (0.76)	−0.21 (0.78)
Master's and higher level	−0.47 (0.86)	−0.23 (0.84) →

Table 2 – *(contd.)*

Socio-professional category		
Large employers, higher managers	−0.38 (0.81)	−0.18 (0.83)
Lower managers, higher technicians	−0.35 (0.87)	−0.08 (0.90)
Intermediate	−0.27 (0.92)	0.04 (0.99)
Small employers self-employed	0.25 (1.04)	0.16 (1.05)
Agriculture	0.59 (0.99)	0.16 (1.09)
Lower technicians	−0.03 (0.98)	0.09 (1.08)
Lower technical	0.47 (1.02)	0.01 (1.10)
Lower sales and service	−0.04 (0.96)	0.06 (1.01)
Routine	0.47 (1.05)	0.13 (1.14)
Have never had a job	0.29 (1.12)	0.03 (1.07)
Father's level of education		
No formal or less than primary education	0.22 (1.35)	0.07 (1.37)
Primary education	0.21 (1.13)	0.12 (1.11)
Lower secondary [a]	0.16 (0.97)	0.04 (0.98)
Upper secondary without higher education	−0.08 (0.88)	−0.09 (0.89)
Upper secondary with access to higher education	−0.15 (0.83)	0.01 (0.88)
Post-secondary/advanced vocational education below bach	−0.33 (0.84)	−0.15 (0.94)
Bachelor's level	−0.54 (0.78)	−0.23 (0.81)
Master's and higher level	−0.53 (0.89)	−0.24 (0.93)
Mother's level of education		
No formal or less than primary education	0.24 (1.30)	0.08 (1.32)
Primary education	0.19 (1.10)	0.16 (1.10)
Lower secondary [a]	0.09 (0.93)	0.02 (0.94)
Upper secondary without higher education	−0.12 (0.93)	−0.06 (0.98)
Upper secondary with access to higher education	−0.19 (0.84)	−0.04 (0.89)
Post-secondary/advanced vocational education below bach	−0.41 (0.91)	−0.42 (0.81)
Bachelor's level	−0.59 (0.69)	−0.26 (0.75)
Master's and higher level	−0.49 (0.93)	−0.25 (0.93)
Father's employment status		
Employee	−0.02 (0.99)	−0.03 (0.99)
Self-employed	−0.02 (1.03)	0.11 (1.01)
Not employed	0.27 (0.96)	−0.05 (0.96)
Mother's employment status		
Employee	−0.13 (0.93)	−0.11 (0.94)
Self-employed	0.01 (1.01)	0.08 (1.00)
Not employed	0.15 (1.08)	0.13 (1.07)
Parents' socio-professional category		
Prof technical	−0.49 (0.85)	−0.22 (0.85)
Higher admin	−0.59 (0.84)	−0.17 (0.88)
Clerical	−0.27 (0.94)	0.00 (1.00)
Sales	−0.23 (0.96)	−0.02 (0.97)
Service	−0.14 (0.93)	−0.05 (0.94)
Skilled worker	−0.05 (0.95)	0.04 (1.02)
Semi-skilled worker	0.11 (1.00)	−0.01 (1.03)
Unskilled worker	0.30 (1.03)	0.10 (1.08)
Farm worker	0.65 (0.92)	0.09 (0.98)
Farm manager	0.29 (0.93)	0.18 (0.95)

[a] Including vocational training that is not considered as completion of upper secondary education.
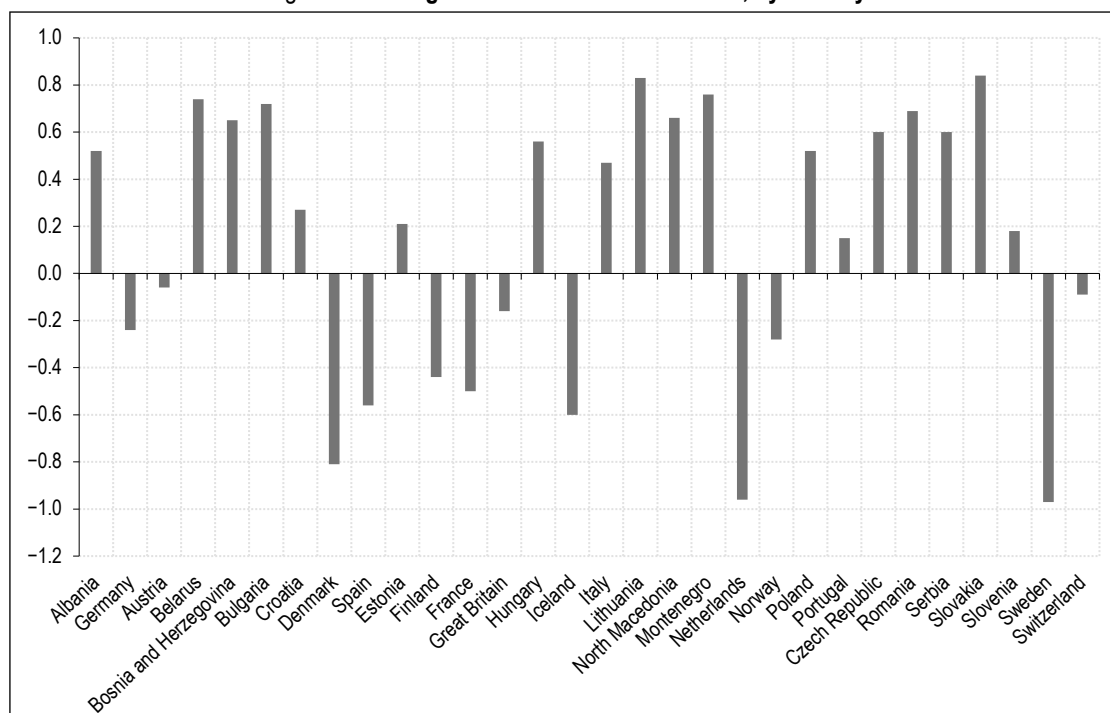Sources and coverage: EVS 2017. People aged 18 and over who are resident in one of the 30 European countries selected for the analysis (cf. Box 1).

Interpretation of the scores in the second dimension is more complex, since this dimension pertains both to adherence to stereotypes relating to the role of the mother and to non-adherence to stereotypes linked to differences in professional skills. Women have a higher score than men; the score is higher for older people, and lower for people with a higher level of qualifications or whose parents have a higher level of qualifications. People whose mothers worked have a lower score. In this dimension, too, the differences between countries are the greatest, with the lowest average score being − 0.77 (Belarus) and the highest +0.73 (Albania).

In order to investigate these results further, we use multilevel random effects models explaining adherence to stereotypes in dimension 1 ("Specialisation") and dimension 2 ("Role of the mother"), respectively, by way of individual characteristics and the characteristics of the countries of residence.

The results are consistent with the literature regarding most of the individual variables for the dimension of overall adherence to stereotypes linked to the "male breadwinner" model (Table 3). In particular, all things being equal, women adhere less to stereotypes overall than

Figure I – **Average score in the first dimension, by country**

Figure II – **Average score in the second dimension, by country**
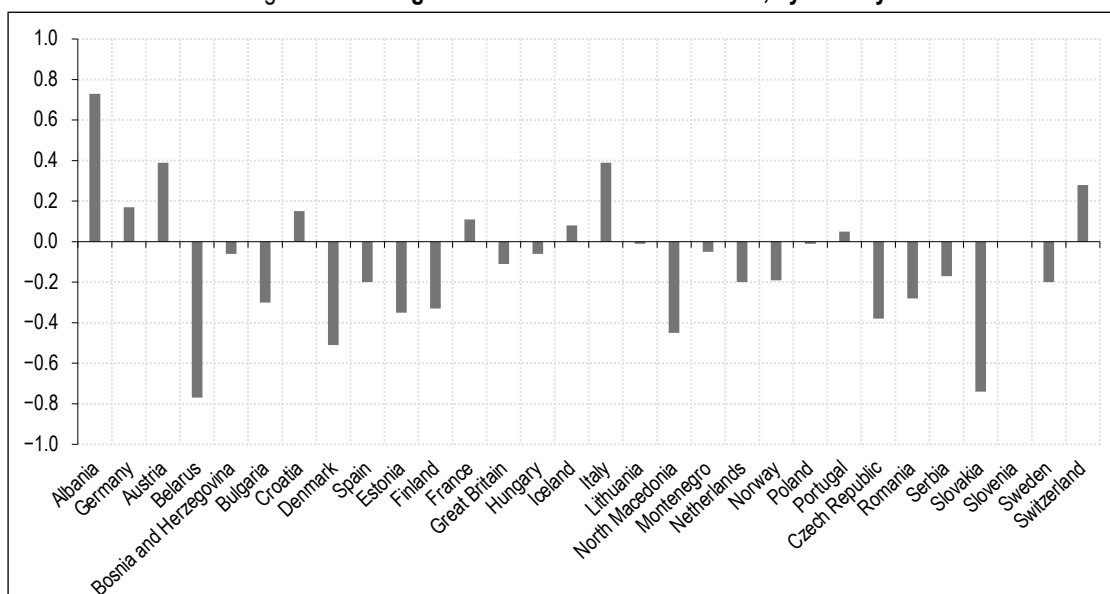
men (Braun & Scott, 2009; Papuchon, 2017). Adherence to stereotypes increases with age, but reaches a plateau of some sort between the ages of 25 and 54, which may correspond to the parenthood situation. Thus, individuals who are parents could revert to a stereotyped vision, a phenomenon that has also been studied in the literature (Vespa, 2009). Qualifications also play a role, with the degree of adherence to stereotypes (dimension 1) decreasing with the level of qualification, as already highlighted by

Papuchon (2017). As regards socio-professional categories, unskilled workers and people who have never had a job adhere to stereotypes the most. In terms of family-related determining factors, having a father with less than an upper secondary education is associated with a more stereotypical view, and having a mother who did not work is associated with a more stereotypical view. Lastly, people whose parents worked in intellectual professions with high qualification levels or in government have a more egalitarian

Table 3 – **Results of the models**

	Model 1 « Specialisation »	Model 2 « Role of the mother »
Constant	0.37 (0.13)*	0.04 (0.11)
Gender (*ref.:* Male)		
Female	−0.30 (0.01)***	0.26 (0.01)***
Age (*ref.:* 65 years and over)		
15–24 years	−0.57 (0.02)***	−0.20 (0.03)***
25–34 years	−0.34 (0.02)***	−0.15 (0.02)***
35–44 years	−0.39 (0.02)***	−0.06 (0.02)**
45–54 years	−0.37 (0.02)***	−0.10 (0.02)***
55–64 years	−0.27 (0.02)***	−0.05 (0.02)**
Level of education (*ref.:* Upper secondary with access to higher education)		
No formal or less than primary education	0.57 (0.05)***	0.08 (0.05)
Primary education	0.32 (0.02)***	0.09 (0.02)***
Lower secondary [a]	0.18 (0.01)***	0.13 (0.02)***
Upper secondary without higher education	0.13 (0.02)***	0.04 (0.02)
Post-secondary/advanced vocational education below bach	−0.05 (0.02)*	0.01 (0.02)
Bachelor's level	−0.16 (0.02)***	−0.09 (0.02)***
Master's and higher level	−0.19 (0.02)***	−0.10 (0.02)***
Socio-professional category (*ref.:* Lower technical)		
Large employers, higher managers	−0.28 (0.02)***	−0.13 (0.02)***
Lower managers, higher technicians	−0.25 (0.02)***	−0.09 (0.02)***
Intermediate	−0.19 (0.02)***	−0.09 (0.02)**
Small employers self-employed	−0.06 (0.03)*	0.03 (0.03)
Agriculture	0.03 (0.04)	−0.00 (0.05)
Lower technicians	−0.16 (0.02)***	0.03 (0.03)
Lower sales and service	−0.10 (0.02)***	−0.03 (0.02)
Routine	0.10 (0.02)***	0.03 (0.02)
Have never had a job	0.10 (0.02)**	−0.13 (0.03)***
Father's level of education (*ref.:* Upper secondary with access to higher education)		
No formal or less than primary education	0.10 (0.03)***	−0.00 (0.03)
Primary education	0.09 (0.02)***	−0.09 (0.03)***
Lower secondary [a]	0.05 (0.02)**	0.02 (0.02)
Upper secondary without access to higher education	−0.01 (0.02)	−0.01 (0.03)
Post-secondary/advanced vocational education below bach	−0.02 (0.02)	−0.01 (0.03)
Bachelor's level	−0.01 (0.03)	−0.03 (0.03)
Master's and higher level	0.01 (0.02)	−0.04 (0.03)
Mother's level of education (*ref.:* Upper secondary with access to higher education)		
No formal or less than primary education	0.04 (0.03)	0.09 (0.03)**
Primary education	0.04 (0.02)*	0.13 (0.02)***
Lower secondary [a]	0.06 (0.02)**	0.02 (0.02)
Upper secondary without access to higher education	0.07 (0.03)***	0.08 (0.03)**
Post-secondary/advanced vocational education below bach	−0.03 (0.03)	−0.10 (0.03)**
Bachelor's level	0.02 (0.03)	0.02 (0.04)
Master's and higher level	−0.04 (0.03)	0.01 (0.03)
Father's employment status (*ref.:* Employee)		
Self-employed	−0.00 (0.01)	0.06 (0.02)***
Not employed	−0.07 (0.03)*	−0.05 (0.03)
Mother's employment status (*ref.:* Employee)		
Self-employed	0.02 (0.02)	0.04 (0.02)
Not employed	0.14 (0.01)***	0.08 (0.01)***
Parents' socio-professional category (*ref.:* Skilled worker)		
Prof technical	−0.11 (0.02)***	−0.10 (0.03)***
Higher admin	−0.13 (0.02)***	−0.09 (0.03)**
Clerical	−0.04 (0.02)*	−0.00 (0.02)
Sales	−0.03 (0.02)	−0.07 (0.03)*
Service	0.02 (0.02)	−0.06 (0.03)*
Semi-skilled worker	−0.00 (0.02)	−0.06 (0.02)**
Unskilled worker	0.06 (0.02)***	−0.07 (0.02)**
Farm worker	0.14 (0.02)***	−0.10 (0.02)***
Farm manager	0.12 (0.03)***	−0.02 (0.03) ➔

Table 3 – *(contd.)*

Ratio of domestic work	−0.06 (0.05)	0.11 (0.04)**
Laws on women's economic rights (*ref.:* Rights guaranteed by law)		
Rights partly guaranteed	0.16 (0.17)	−0.24 (0.14)
Gender Inequality Index	0.07 (0.08)	−0.04 (0.07)
Public spending on childcare	−0.10 (0.06)	0.03 (0.05)
Enrolment rate of children in early childhood education and care	−0.18 (0.09)*	−0.04 (0.08)
Duration of maternity leave	0.01 (0.04)	−0.03 (0.03)
Duration of paternity leave	−0.00 (0.07)	0.02 (0.06)
ICC	0.15	0.08
-2 loglikelihood	119,997	130,992
AIC	120,001	130,996

[a] Including vocational training that is not considered as completion of upper secondary education.
Note: Dependent variables as well as national variables are centred and reduced.
Model 1: A positive coefficient corresponds to a higher score in the dimension, and therefore to a more stereotyped view.
Model 2: A positive coefficient corresponds to a higher score in the dimension, and therefore to a more stereotyped view of the role of the mother or a less stereotyped view of the differences in skills between women and men.
Sources and coverage: EVS 2017. People aged 18 and over who are resident in one of the 30 European countries selected for the analysis (cf. Box 1). *** : p-value<0.001; ** : p-value<0.01; * : p-value<0.05.

view than those whose parents worked in agriculture or had unskilled jobs, who have a more traditional and stereotyped view. As far as national variables are concerned, a higher rate of enrolment of children in early childhood education and care corresponds to less adherence to stereotypes. This underlines the fact that childcare systems are closely linked to the prevalence of certain stereotypes (Perrier & Engeli, 2015).

As regards the dimension of both adherence to stereotypes relating to the role of the mother and non-adherence to stereotypes relating to differences in skills between women and men (dimension 2), women in fact score higher. This may have as much to do with greater adherence to stereotypes relating to the role of the mother as with less adherence to stereotypes relating to skills. The score in this dimension generally increases with age, which may be linked to the strong influence of the intensive motherhood ideology among older people (Cotter *et al.*, 2011), but tends to decrease with educational level. Executives, managers and intermediate professions have the lowest scores. There are no significant differences according to the father's level of education, with the exception of the primary level, which is associated with lower adherence, but the scores are higher for people whose mothers have a low level of education and for those whose mothers did not work, which may be explained by the fact that the children of

mothers who did not work have internalised the idea that a mother's priority should be to look after her children, whatever her professional skills. This highlights how important women's work is in the spreading of a more egalitarian vision (Donnelly *et al.*, 2016). Lastly, as regards the differences between countries, no variables are significant.[4]

To assess the extent of national differences in adherence to gender stereotypes, we compare the intraclass correlation coefficients (ICC) of several models (Table 4): the ICC of a multi-level model without any covariates, the ICC of a model with only individual covariates, and the ICC of a model with both individual and national covariates (the one in Table 3).

First of all, 27% of the variance in adherence to stereotypes in relation to specialisation is attributable to differences between countries, compared with 10% of the variance in adherence to stereotypes in relation to the role of the mother. The addition of individual covariates does not reduce the ICCs (29% and 9% respectively): the national differences are therefore not explained by differences in the individual characteristics of the national populations. If national covariates are added to the individual covariates, the ICC

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4. It should be noted that the variables "Public spending on childcare" and "Rate of enrolment in early childhood education and care" are positively correlated (0.50 on a country basis, 0.56 on an individual basis).

Table 4 – **ICC of different models**

	Models with no covariates (%)	Models with individual covariates (%)	Models with individual and national covariates (%)
Dimension 1 (Specialisation)	27	29	15
Dimension 2 (Role of the mother)	10	9	8

becomes much lower, at 15% (dimension 1) and 8% (dimension 2). This drop could be due to the simple fact that a large number of national variables have been added (7), it being borne in mind that there are relatively few countries (30). To verify that this is not the only mechanism at work, we calculated the ICC of the models including the individual covariates and only one national variable (the significant variable: the enrolment rate in early childhood education and care). The ICCs are then 14% and 10% respectively, which shows that, in dimension 1 at least, it is indeed the addition of this variable (and not the simple fact of adding numerous national variables) that lowers the ICC.

4. Discussion

This study has therefore shown that the gender stereotypes underlying the "male breadwinner" model could be represented by two dimensions, one relating to overall adherence to these stereotypes, with the idea of specialisation based on skills and desires regarded as intrinsically gender-based, and the other relating to the role of the mother and its incompatibility with the exercise of a professional activity (combined with non-adherence to stereotypes relating to differences in skills between women and men). It has then shown that the factors that determine adherence (or non-adherence) to these two dimensions differ in part. In particular, the weight of the national level in the variance of adherence is lower for dimension 2 relating to the role of the mother. Moreover, variations according to gender and parental characteristics also differ. This discussion pertains to these four points.

As we have already mentioned, the gender stereotypes underlying the "male breadwinner" model are most often represented and operationalised in the form of a one-dimensional scale, ranging from a traditional vision to an egalitarian vision (Davis & Greenstein, 2009; Gaunt & Benjamin, 2007). However, in the light of our results, this representation may seem reductive, and may lack some of the complexity of this phenomenon (Grunow *et al.*, 2018). Some studies opt for a multidimensional analysis, defining these dimensions *ex ante*, for example "opinions on the abilities and skills of women and men", "opinions on the gender-based division of labour" (Donnelly *et al.*, 2016; Papuchon, 2017). However, these distinctions are made *ex ante*, and are not based on a direct analysis of the data in order to identify them. In this respect, our study shows that gender stereotypes can empirically be broken down into two dimensions (overall adherence on the one hand, and a focus on the role of the mother versus stereotypes relating to skills on the other). An interesting point in relation to this second dimension is that it corresponds both to adherence to stereotypes relating to the role of the mother and to non-adherence to stereotypes relating to differences in professional skills.

The other central results of this study concern the factors that determine the level of adherence to stereotypes in these two dimensions. Whereas the existing literature has focused either on individual determining factors (Papuchon, 2017) or in national factors that determine gender stereotype adherence (Grunow *et al.*, 2018), one of the contributions of this study is to examine these two levels jointly. We also show that the determining factors are not exactly the same for the two dimensions. Thus, the weight of the national level in the variance of adherence is much greater for the first dimension than for the second (27% compared with 10%). At the same time, only the variable relating to the rate of enrolment in early childhood education and care is significant in dimension 1 ("Specialisation"), with higher enrolment rate unsurprisingly corresponding to less adherence to stereotypes. This would appear to suggest that other, unobserved national characteristics, such as culture for example, play a role in overall adherence to gender stereotypes and more particularly in adherence to a stereotyped vision in relation to gender-based specialisation between the domestic and professional spheres. This therefore calls for closer investigation of the institutions and policies that can enable national cultures to evolve, and therefore, for example, of the role of an institution such as the school (Duru-Bellat, 2008). Moreover, the fact that the national level has a lower weight in the variance of dimension 2 ("Role of the mother") than in that of dimension 1 ("Specialisation") puts into perspective the work that emphasises the variability of the role of the mother according to national cultures (Perrier & Engeli, 2015). Our results show that differences between countries in terms of adherence to stereotypes relating to the role of the mother are explained more by differences in (potentially unobservable) individual characteristics than by differences linked to culture or national institutions. This could call into question the importance, highlighted in other works (Lin, 2018), of national institutions and policies in gender stereotypes.

As regards the differences between women and men, while women have a more egalitarian view

than men in terms of overall adherence to stereotypes (first dimension), their score is higher than that of men in the second dimension, which may reflect both greater adherence to gender stereotypes relating to the role of the mother and less adherence to stereotypes relating to gender-based differences in professional skills. To test this, we measured adherence to each stereotype separately, for women and men. We have found that, when it comes to stereotypes relating to the role of the mother, the averages for women are very close to the averages for men, whereas, when it comes to stereotypes relating to gender-based differences in professional skills, the averages for women are much lower than the averages for men. This would appear to indicate that women still subscribe to the intensive motherhood ideology and the image of a mother totally devoted to her children, to the point of not being able to devote themselves to a professional activity, even though they call the idea that women are less competent than men in the professional sphere into question more than men do. This result links back to previous studies on the weight of the of intensive motherhood ideology for women (Cotter *et al.*, 2011). It also stresses the importance of taking gender differences into account when implementing policies and practices aimed at reducing gender stereotypes.

Differences according to parental characteristics also vary between the two dimensions. In particular, the father's level of education seems to play a greater role in the first dimension, and the mother's in the second. This can be explained by the fact that the second dimension concerns the role of the mother, and we can therefore assume that the role of the mother is more important overall in an individual's adherence to a traditional or, on the contrary, egalitarian view on this subject. Differences according to the mother's employment status and to the father's employment status are significant in both dimensions. These results enrich the literature on the parental factors that determine adherence to gender stereotypes, which generally considers the latter to be a one-dimensional corpus and therefore stops at what corresponds to our first dimension (Davis & Greenstein, 2009; Dhar *et al.*, 2019; Platt & Polavieja, 2016).

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Lastly, these results prompt discussion on the basis of the two central theories on adherence to gender stereotypes, the "interest-based" theory (pertaining to the idea that individuals adhere or do not adhere to stereotypes according to their own interests), and the "exposure-based" theory (pertaining to the idea that individuals adhere or do not adhere to stereotypes according to their degree of exposure to egalitarian configurations) (Davis & Greenstein, 2009). In this respect, our results show that these two theories are complementary: for example, women adhere less to stereotypes overall (interest-based), as do individuals whose mothers worked (exposure-based).

Despite its contributions, this study has a number of limitations that give reason to open up new avenues of research. First of all, it is primarily the gender stereotypes underlying the "male breadwinner" model that have been studied, although gender stereotypes also relate to other subjects (for example, the supposed inferiority of women in the field of mathematics). It would therefore be of interest to extend this study, and in particular the multidimensional representation, to a more general corpus of stereotypes. Secondly, the individual factors that determine gender stereotypes that we have taken into account are limited by the information available in the EVS survey used. It might have been of interest to take other determining factors into account, such as the type of education received. In the same way, other national characteristics could be taken into account, for example those describing the social context. In addition, we studied stereotypes as declared by individuals. However, the literature has shown that there are cases where individuals subconsciously adhere to stereotypes while declaring completely egalitarian beliefs (Kahneman, 2015; Madsen & Andrade, 2018); it would also be of interest to investigate this. Lastly, as regards national characteristics, it is impossible to establish the direction of causality: gender stereotypes can undoubtedly also contribute to a country's situation in terms of equality between women and men. Establishing this causality would require longitudinal data, for example. □

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APPENDIX 1

Table A1-1 – **English-French correspondence for respondent's socio-professional category**

Termilogy in EVS database (« *European Socio-economic Classification* »)	Translation into French categories
Large employers, higher managers	Cadres de direction
Lower managers, higher technicians	Managers intermédiaires
Intermediate	Professions intermédiaires
Small employers self-employed	Indépendants / Chefs de petites entreprises
Agriculture	Agriculteurs
Lower technicians	Contremaîtres
Lower technical	Ouvriers qualifiés
Lower sales and service	Employés
Routine	Ouvriers non qualifiés
Retired, Homemaker not otherwise employed, Student, Unemployed, Disabled, who have never had a job	N'a jamais eu d'emploi

Table A1-2 – **English-French correspondence of parents' socio-professional category**

Terminology in EVS database and in the English version of the EVS questionnaire	Terminology in the French version of the EVS questionnaire
Prof technical	Professions intellectuelles supérieures
Higher admin	Métiers de direction
Clerical	Employés de bureau
Sales	Métiers de la vente
Service	Métiers des services
Skilled worker	Contremaîtres et ouvriers qualifiés
Semi-skilled worker	Ouvriers semi-qualifiés
Unskilled worker	Ouvriers non qualifiés
Farm worker	Ouvriers agricoles
Farm manager	Agriculteurs exploitants

METHODOLOGICAL DETAILS ON THE PCA

The analysis led us to select the first two axes, either by applying the Kaiser rule (the first two axes are the only ones with eigenvalues greater than 1) or by applying the elbow rule, as set out in the following graphic showing the explained inertia proportions.

Table A2-1 – **Eigenvalues**

No.	Eigenvalue	Difference	Percentage	Cumulative percentage	
1	4.1787	.	52.23	52.23	**
2	1.2345	2.9442	15.43	67.67	**********************
3	0.6030	0.6315	7.54	75.20	**********
4	0.5256	0.0774	6.57	81.77	*********
5	0.4497	0.0759	5.62	87.40	********
6	0.3892	0.0605	4.87	92.26	*******
7	0.3288	0.0604	4.11	96.37	*****
8	0.2903	0.0385	3.63	100.00	*****

Sources and coverage: EVS 2017. People aged 18 and over who are resident in one of the 30 European countries selected for the analysis (cf. Box 1).

Table A2-2 – **Contributions and coordinates of variables on axes 1 and 2**

Variable	Contribution axe 1	Coordinate axe 1	Contribution axe 2	Coordinate axe 2
S1	11.1	0.68	21.0	0.51
S2	12.2	0.71	9.3	0.34
S3	11.6	0.70	22.8	0.53
S4	15.5	0.80	0.9	0.10
S5	13.4	0.75	13.9	−0.41
S6	12.9	0.73	18.2	−0.47
S7	12.1	0.71	12.1	−0.39
S8	11.3	0.69	2.0	−0.16

Sources and coverage: EVS 2017. People aged 18 and over who are resident in one of the 30 European countries selected for the analysis (cf. Box 1).

S1: "When a mother works for pay, the children suffer."

S2: "A job is alright but what most women really want is a home and children."

S3: "All in all, family life suffers when the woman has a full-time job."

S4: "A man's job is to earn money; a woman's job is to look after the home and family."

S5: "On the whole, men make better political leaders than women do."

S6: "On the whole, men make better business executives than women do."

S7: "A university education is more important for a boy than for a girl."

S8: "When jobs are scarce, men have more right to a job than women."

FORMULAE USED TO CALCULATE THE SCORES FROM THE TWO PCA DIMENSIONS

The formulae below were used to calculate the individual scores from the two PCA dimensions. The numerical parameters correspond to the coordinates of the variables on the axes.

$$DIM1_i = 0.68 \times S1_i + 0.71 \times S2_i + 0.70 \times S3_i + 0.80 \times S4_i + 0.75 \times S5_i + 0.73 \times S6_i + 0.71 \times S7_i + 0.69 \times S8_i$$

$$DIM2_i = 0.51 \times S1_i + 0.34 \times S2_i + 0.53 \times S3_i + 0.1 \times S4_i - 0.41 \times S5_i - 0.47 \times S6_i - 0.39 \times S7_i - 0.16 \times S8_i$$

where $DIM1_i$ represents the way in which the score of the individual i is calculated in dimension 1 ("Specialisation"), and $S1_i$ corresponds to the response of the individual i in the first stereotype (see above for the list of different stereotypes).

The two dimensions were then centred and reduced.

Figure A3-I – **Distribution of scores in the first dimension**
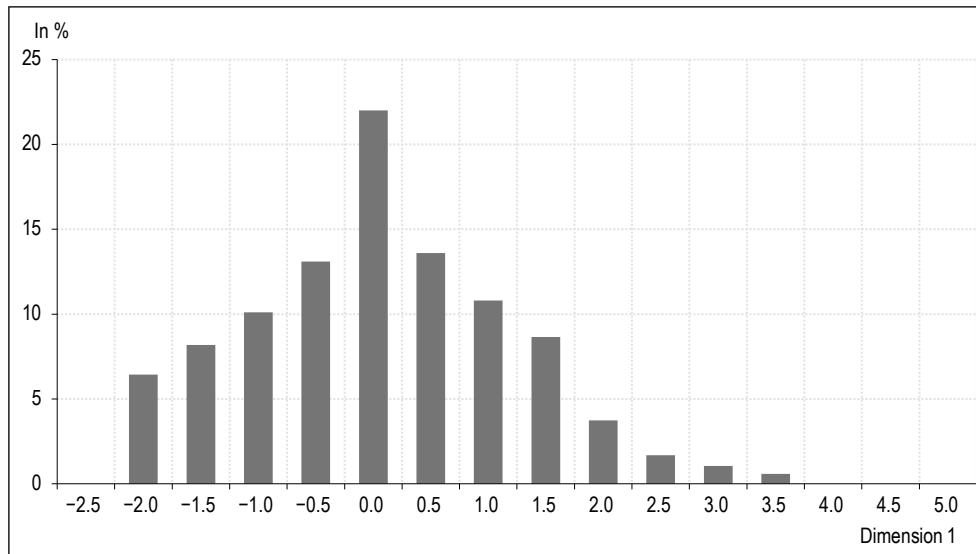
Sources and coverage: EVS 2017. People aged 18 and over who are resident in one of the 30 European countries selected for the analysis (cf. Box 1).

Figure A3-II – **Distribution of scores in the second dimension**
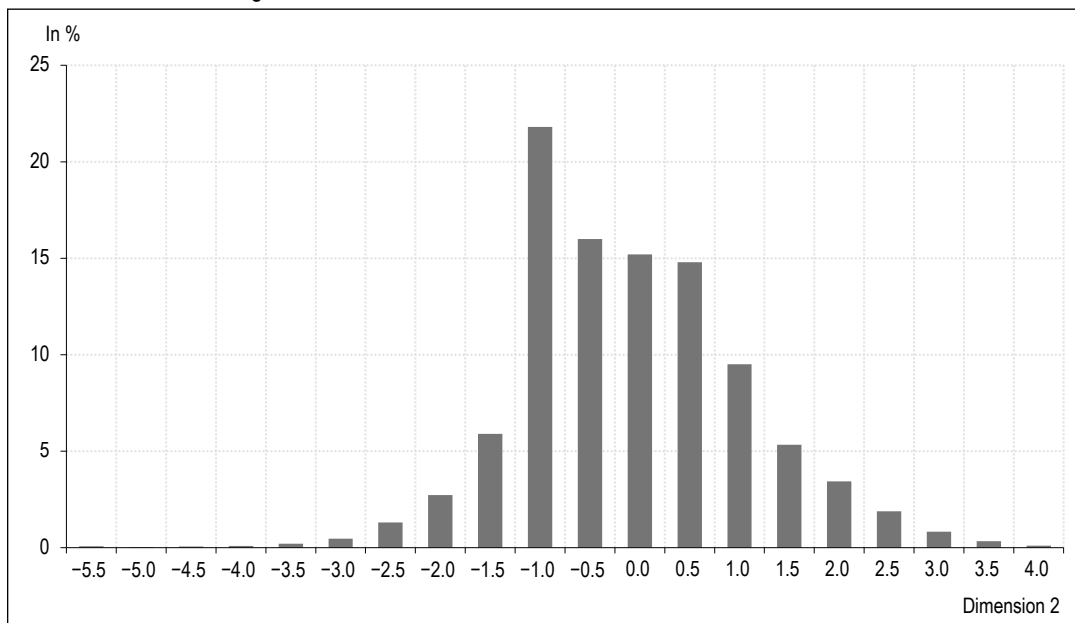
Sources and coverage: EVS 2017. People aged 18 and over who are resident in one of the 30 European countries selected for the analysis (cf. Box 1).

Non-Taxation of Imputed Rent: A Gift to Scrooge? Evidence from France

Montserrat Botey* and Guillaume Chapelle**

Abstract – The dramatic rise in wealth inequalities has generated debates on the opportunity to tax wealth. Increasing housing prices are, to a great extent, driving these widening wealth disparities. This paper examines the potential redistributive impact of taxing imputed rents, which usually are exempt from income taxation. We estimate tax savings and their distribution between households in France by using a fiscal simulator that Landais *et al.* (2011) developed. We find that while net imputed rents represent 7% of national net income, their non-taxation amounts to hidden fiscal spending (i.e. tax expenditures) totaling up to 11 billion euros annually. This indicates that non-taxation is the largest public spending directed at homeowners, benefiting mostly the oldest and wealthiest households.

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Imputed rents are defined as rents that home-owners would need to pay if they were tenants of their property. They represent 7% of net national income and hold major implications when gauging income inequalities (Driant & Jacquot, 2005). Since 1914, French authorities, like most developed countries between 1910 and 1980, had included them in the income tax base, but they were removed in 1965 in France to facilitate better access to homeownership − a period associated with the emergence of a middle class of homeowners. However, some Organisation for Economic Co-operation and Development (OECD) countries − e.g., Iceland, Luxembourg, the Netherlands, Slovenia and Switzerland − still include them in their fiscal base and treat imputed rents like any other capital income.

The recent surge in housing prices that started in the early 2000s, combined with the dramatic drop in the homeownership rate in the lowest income decile (Laferrère et al., 2017), brought capital taxation and housing wealth back to the forefront of discourse (Piketty, 2014; Bonnet et al., 2021). According to Piketty (2014), despite world wars having decreased wealth concentration in Europe significantly, the top 1% in France currently owns 25% of total wealth. Within this context, including imputed rents in the tax base of the income tax could be a redistribution tool (Landais et al., 2011). Not only do we present empirical evidence supporting this view, but we also present intergenerational and demographic dimensions in our analysis.

In this paper, we argue that the end of imputed rent taxation should be treated as a subsidy. We partially extend Figari et al. (2017) work to the French context using the TAXIPP micro-simulation model that Landais et al. (2011) developed, in which we assess the amount of income tax that homeowners would save and analyze who benefits from this fiscal incentive. Answering such questions is important to the debate on the prospect of reestablishing imputed rent taxation. Our work also is related closely to Poterba & Sinai (2008), who assess how the user cost of housing would be affected by the end of mortgage interest deduction in the US or the reintroduction of imputed rent taxation. We present three main conclusions. First, non-taxation of imputed rents represents fiscal spending ranging between 9 and 11 billion euros annually, which broadly corresponds to tax receipts from homeowners' property tax. It is also the major fiscal spending directed to homeowners. Second, provided that homeownership rates rise dramatically with age, non-taxation of

imputed rents is an important transfer from the young to the elderly. Third, this subsidy mainly benefits the richest fiscal households who are full right owners. Indeed, the average subsidy is relatively small, but is very unevenly distributed. The tax scheme mostly is captured by the top income decile, in which 90% of households own their homes. However, among homeowners with a mortgage, this phenomenon is less striking, as interest repayments steeply reduce these differences, on average withdrawing 70% of rental value from these taxpayers' residences. Considering that the wealthiest homeowners benefit the most from this subsidy casts some serious doubts on its capacity to promote home-ownership within the lowest income deciles. As an alternative policy, considering that the property tax is based on outdated rental value (Chapelle et al., 2020), we propose replacing it with imputed rent taxation. This switch would generate 4 billion additional euros annually, which could be used to decrease other taxation, as suggested in Trannoy & Wasmer (2022). This could make homeownership more affordable for younger and poorer households with extremely low homeownership rates while increasing the cost of homeownership for the top income decile. Such a reform could constitute a first step toward more global housing and land taxation reform, as proposed in several recent works (Bérard & Trannoy, 2019; Trannoy & Wasmer, 2022).

The rest of this paper proceeds as follows: section 1 discusses how housing is taxed in France and the particular role of income tax. We then discuss homeowner bias in section 2, arguing that non-taxation of imputed rents should be treated as a subsidy that supports homeowners. We then present our methodology to assess the distribution of the subsidy thanks to TAXIPP in section 3. Our results are presented in section 4, then we conclude.

1. Housing Property Taxation in France

As housing represents almost 50% of total wealth in France, interest has been growing concerning its taxation, particularly for redistributive purposes. This seems relevant, considering that housing supply remains inelastic in France. Indeed, it would seem more efficient to tax housing rather than any other type of capital, as Bonnet et al. (2021) illustrated.

However, fiscal pressure on housing property currently remains relatively limited. From national housing accounts data, one can estimate

that taxes on the housing sector represent about 4.67% of French gross domestic product (GDP).

Income/wealth generated by housing ownership is taxed mostly through the following three schemes. First, most owners of properties that are occupied, rented, or empty must pay local property tax, which mostly benefits municipalities and their intermunicipal agencies that set tax rates. Developed property tax represents about 34 billion euros in terms of tax receipts in 2018 (of which owner-occupiers pay slightly over 10 billion). However, this old tax presents several pitfalls, as it is based on cadastral values from 1970, which have almost no connection to current market values (Chapelle *et al.*, 2020). Moreover, tax rates that local authorities set also depend on other resources. Consequently, this tax tends to be regressive (Carbonnier, 2019; André & Meslin, 2021). Tax bases currently are being updated, which could reduce its regressive profile, at least within municipalities (Chapelle *et al.*, 2020).

The second scheme is the real estate property wealth tax (*Impôt sur la fortune immobilière –* IFI), which replaced the wealth tax in 2017. This tax is a progressive tax on the value of real estate wealth when the tax base exceeds 1.3 million euros. The tax base is total net real estate wealth that includes 70% of the estimated market value of the homeowner's main residence and all other real estate assets, including the share of societies owning real estate. In practice, these taxes only cover a relatively limited number of households and generate relatively modest tax receipts (about 2 billion euros in 2018).

Third, property income might be subject to income tax in which the lowest marginal tax rate was 0% and the highest was 41% in 2010, which then was raised to 45% in 2013. Starting in 1914, all properties' revenues were subject to this tax, including imputed rent. In 1965, imputed rents were removed from the tax base as a way to better facilitate homeownership. This logic was pushed even further during the 1990s, and between 2007 and 2011, when the new *Travail Emploi Pouvoir d'Achat* (TEPA) law allowed homeowners with a mortgage for their main residence to deduct their interest from their income tax: the gap between homeowners and tenants widened further. Nowadays, if interest payments are not deductible anymore, imputed rents remain untaxed, and only rental income is subject to income taxation and a 17.2% flat tax

on social contributions.[1] In our view, tax policy initiated in 1965 subsidizes homeownership in a way that is not accounted for by national accounts. The next section discusses why. This paper's purpose is to estimate the fiscal loss that this 1965 policy has generated.

Finally, housing also is taxed through several subsidiary tax schemes, of which a significant amount is accounted for through transaction taxes, e.g., stamp duties or consumption taxes, e.g., the value added tax on new construction/renovations or the housing tax. The latter progressively has been phased out for the poorest households and will be phased out for all households by the end of 2023.

2. Non-Taxation of Imputed Rents Creates a Bias Toward Homeownership

2.1. Definition of the Homeownership Bias: The Case Without Property Tax

This section illustrates why non-taxation of imputed rent was implemented as a subsidy designed to support homeownership. In practice, it is a tax expenditure favouring homeowners with high marginal income tax rates. Consider a household currently renting receiving a wage w paying the average income tax rate $\tau(I)$ in which $\frac{\partial \tau(I)}{\partial I} > 0$ and I denotes the household's fiscal income. This household owns a capital K it can either fully invest in an alternate asset (A) and get a return $r \times A$ or buy a house for a price P where he can live and save a net Rent R.[2] Without loss of generality, we assume that there are no capital gains $g_P = 0$. The variation of its net wealth will depend on its tenure choice. In case of homeownership, it will be:

$$\Delta W^0 = [1 - \tau(w)] \times w. \qquad (1)$$

In this equation, we account for the current situation, in which imputed rent is not taxed. The owner's sole expenditure is their income tax based on their wage $\tau(w) \times w$. However, if they rent while investing in an alternative asset, they will get:

$$\Delta W^T = [1 - \tau(w + rA)] \times [w + rA] - R. \qquad (2)$$

Non-taxation of imputed rent generates an important difference between owners and tenants. One can illustrate this subsidy by assuming that the net return on housing and the alternative investment are the same, i.e.

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1. We examine these social contributions' implications for our results in additional robustness checks.
2. When a loan is contracted, one can assume that R is the net of interest payment, which would be treated as a cost neglecting the leverage effect

$rA = rK = R$. In such a case, the subsidy provided to homeowners would be as follows:

$$subsidy = \Delta W^0 - \Delta W^T = \tau(w + R) \times R + [\tau(w + R) - \tau(w)] \times w \quad (3)$$

or assuming that the impact of non-taxation of imputed rent on the average tax rate for the wage is negligible (i.e $[\tau(w + R) - \tau(w)] \times w = 0$):

$$subsidy = \tau(w + R) \times R. \quad (4)$$

This simple definition is relatively close to the situation in which the alternative investment is another house that is bought to be rented. Indeed, Goode (1960) argues that homeowners could choose to rent their homes, while owner occupation reveals that the returns from this status are higher than renting on the market. Moreover, when receiving the same wage, a homeowner will be better off than a tenant. Thus, the inclusion of imputed rent is in line with Haig (1921) and Simons (1938)'s tax base definition.[3] For Figari *et al.* (2017), its exclusion violates the principle of horizontal equity and results in a "homeownership bias".

We can formulate several remarks from this first definition of the subsidy. First, the subsidy's magnitude increases with the net rent, which will favor homeowners living in expensive homes, e.g., those living in large urban areas where prices are high or those living in large houses. It also will favor households with the highest net equity. Consequently, Modigliani & Miller (1958)'s life cycle theory can lead us to believe that non-taxation of imputed rent will favor the oldest age groups. Second, the subsidy's magnitude increases with the marginal tax rate and, thus, with the owners' income when the income tax is progressive. Goode (1960) finds that non-taxation of imputed rents and interest rate exemptions deepen existing inequalities because homeownership becomes more profitable for households with higher marginal tax rates. This intuition is confirmed by Bourassa & Hendershott (1994), who analyze taxes paid over the life cycle in Australia and find that reestablishing imputed rent taxation could potentially reduce the inequalities of consumption. Similar studies have been conducted in England (Yates, 1994) and Finland (Saarimaa, 2011), indicating that imputed rent taxation would lower the Gini coefficient. Finally, focusing on richer households, one can suppose that non-taxation of imputed rent might make a similar impact on homeownership rates through mortgage interest deduction (MID), which works in a very similar way as they also benefit to homeowners with the highest marginal tax rates (Glaeser & Shapiro,

2003; Chambers *et al.*, 2009; Hanson, 2012a, b). In this respect, Hilber & Turner (2014) and Gruber *et al.* (2021) find that mortgage interest deduction fails to stimulate homeownership rates and tends to lead to higher housing prices, particularly when the supply is inelastic.

2.2. The Homeownership Bias with the Property Tax

One might argue that homeowners still are taxed because they must pay a property tax, but even accounting for property tax, the bias toward owner occupation persists. For example, we can compare a homeowner receiving ΔW^o with a tenant who decides to become a landlord and invest in housing.[4] The tenant-landlord will have to pay a rent R while receiving only $(1 - \tau(w + R - \tau_p)) \times R - \tau_p$ where τ_p is the property tax. Thus, in such a situation, both would pay the property tax, and the resulting subsidy would be:

$$subsidy = \tau(w + R - \tau_p) \times [R - \tau_p] + [\tau(w + R - \tau_p) - \tau(w)] \times w. \quad (5)$$

This is the definition of the subsidy that we will use in this paper's main scenarios (scenarios 1–3). If the alternative investment is another asset that is only subject to the income tax, assuming that the impact of the wage's average tax rate is negligible, then the subsidy would equal:

$$subsidy = \tau(w + R - \tau_p) \times [R - \tau_p] - \tau_p. \quad (6)$$

Several comments arise from this alternative definition. First, in France, local property taxes are based on outdated rental values, which generate important subsidies for homeowner-occupiers and landlords who own undervalued expensive homes. Second, local property tax is not progressive in France (Carbonnier, 2019; André & Meslin, 2021), resulting in a subsidy that still is increasing with income and might even be negative for low-income owners. Moreover, the property tax is paid regardless of debt level. Furthermore, local property taxes are designed to finance local public goods, which are essential for developing residential areas where houses keep acquiring real estate capital gains, and income tax represents the main redistributive tool at the national level. This alternative definition of the subsidy is relatively close to the redistributive effect of a reform in which imputed rent taxation would replace the property tax (scenario 4).[5]

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3. *Any type of income that increases individuals' ability to consume should be included in the income tax base (Haig, 1921; Simons, 1938)*
4. *Alternatively, this might also be equivalent to a situation where the alternate investment has a return is $rA = R - \tau_p$.*
5. *The change in taxation would be $\Delta \text{Taxation} = \tau(w + R) \times [R] - \tau(w) \times [w] - \tau_p$.*

To summarize, a homeowner will receive a positive subsidy if he is in a relatively high-income tax bracket and if the property tax is lower than the tax treatment of an alternative investment. The resulting bias for a medium/high-income household should be significant if one considers that returns on housing and other investments are similar (Jordà *et al.*, 2019), while the property tax represents 8% of imputed rents when the average tax rate of income from productive capital is around 30%.[6]

In this paper, we consider whether non-taxation of imputed rent should be treated as a tax credit, as defined by equation 5, and as such, whether it can be accounted for as public spending in the same spirit as other favorable tax treatments that were put into place to promote homeownership in France. For example, the option offered between 2007 and 2009 to deduct interest paid on a loan for a primary residence is viewed as public spending and still represented fiscal spending of 7 billion euros in 2010. In this standard framework as defined in Goode, (1960) or Figari *et al.* (2017), the reference situation from which the fiscal spending should be assessed corresponds to a situation in which the tax treatment does not vary with occupation status. We illustrate such a situation in Table 1, accounting for the two main policies generally used to promote homeownership.[7]

France's tax policy is favorable to homeowners and was briefly very favorable (in the 1990's and after the aforementioned TEPA law). However, many other countries also provide favorable or very favorable tax treatment of homeowners (Kholodilin *et al.*, 2023), particularly the United States (Sommer *et al.*, 2013) and United Kingdom (see Figari *et al.* (2017), for an analysis of several European countries). One can wonder whether a neutral environment should be a climate in which interest payments cannot be deducted and imputed rents are taxed. However, considering that a landlord also can deduct interest payments from declared rent, we consider that interest payments should be deductible.[8] In a competitive market, price increases could suppress the subsidy; however, these adjustments might be limited by frictions in housing markets (Wheaton, 1990; Desgranges & Wasmer, 2000) and large transaction costs (Bérard & Trannoy,

2018). Finally, in our main scenarios, we assume that imputed rents will not be subject to social contributions, considering that, contrary to the income tax, social contributions never included imputed rents in the tax base.[9]

3. Assessing the Subsidy Provided to Homeowners with TAXIPP

3.1. TAXIPP Model

Most previous academic work simulates and analyzes imputed rent taxation's potential redistributive impact. However, our approach is slightly different, as our main goal is not to assess imputed rent taxation's potential impact, but first assess transfers between households due to this fiscal exemption and compare them with other types of housing subsidies in France. In a nutshell, we view the non-taxation of imputed rent as a subsidy that should be computed in government spending as housing allowances or tax credits, and we analyze the extent to which this subsidy differently affects households by income level and age.

For this reason, we create a counterfactual situation by reproducing a neutral fiscal treatment of imputed rents using Landais *et al.* (2011) fiscal simulator, TAXIPP. This fiscal simulator is a micro-simulation model of mandatory social contributions that, unlike the standard micro-simulation approach, places special emphasis on imputation of high revenues and on calibrating the model based on national accounts. It combines both a Stata code that allows for computing households' fiscal contribution from their income information and a data set that is representative of the French population. The code is a translation of the 2010 French tax code. The data set comprises more than 800,000 observations of fiscal households and was constructed thanks to a random lottery that reconstructs population

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6. *Productive capital tax rate was around 58% in 2013 (Artus* et al.*, 2013) while imputed rent taxation was around 8%. A reform in 2017 created a flat tax of 30% for most capital income.*
7. *Here, we neglect other subsidies that affect tenure choice as social housing, housing allowances, or subsidized loans, as they are accounted for in public expenditures. We will return to this issue later.*
8. *In a dynamic setting, the capacity to deduct interest payments raises other issues, as discussed in Section 4.5.*
9. *When accounting for social contributions, the subsidy would be* subsidy $= \tau(w + R - \tau_p) \times [R - \tau_p] + [\tau(w + 0.932 \times R - \tau_p) - \tau(w)] \times w + 0.172 \times (R - \tau_p)$

Table 1 – **Definition of the neutral environment**

	Interest payments deduction for housing loans	Non-deduction of interest payments for housing loans
Imputed rent taxation	Neutral environment	Not favourable to owner-occupiers
Non-taxation of imputed rent	Very favourable to owner-occupiers	Favourable to owner-occupiers

patterns.[10] TAXIPP signals when two fiscal households belong to the same household. Moreover, it provides information on income using Fiscal Revenue Survey (*Fichier échantillonné de l'impôt sur le revenu*) data, as well as national housing, labour force and wealth surveys that match these observations with similar households. These two elements allow for simulating fiscal reforms and estimating additional tax revenues and their redistributive consequences in a flexible way, including dimensions that are taxed initially (e.g., labor income) and other dimensions that are not (e.g., imputed rent).

This latter dimension is a key strength of TAXIPP. Conversely, other fiscal simulators (e.g. INES) do not cover imputed rents or property taxes, which are our main study variables. Moreover, TAXIPP's sample size is larger. It must be noted that one limitation of TAXIPP is that all owners repay loan interest. To circumvent this issue, we compute the distribution of loan interest.[11]

3.2. Computing the Net Imputed Rent

Imputed rents correspond to the value that homeowners derive from living in their own dwellings. Goode (1960) defines net imputed rent as the rental value of a dwelling at market prices from which property taxes, depreciation, reparation costs, maintenance, and loan interest payments are deducted. Based on French housing accounts, gross imputed rents comprise up to 7% of net national income and 70% of rental income in the private sector. Landais *et al.* (2011) computed the gross imputed rent for each household using hedonic regression models following standard procedures that French national accounts use. These hedonic regression models estimate rent as a function of dwellings' characteristics (location [departments and types of urban units], surface, number of rooms, and dwellings' overall quality). We then use several scenarios described

in Table 2 to compute net imputed rent using varying parameters, e.g., capital depreciation rate, mortgage interest payments, and property tax. In the first scenario, we use the baseline parameters of Landais *et al.* (2011). However, we change their approach slightly, estimating mortgage interest payments following the principles of distributional national accounts to add accuracy. Thus, we distinguish between homeowners with mortgage repayments on their main residence and full right owners (i.e, these who finished repaying their mortgage). We rely on the 2010 Household Wealth Survey to focus on homeowners with mortgage repayments and define groups based on two dimensions: age groups and financial income. Second, for each group, we compute the share of total interest repaid by the group. We then identify the same groups in TAXIPP and use the average amount repaid by the group to infer interest payment amounts for each household. Finally, we assign these interest payments between each household's tax units. We also use the imputed property taxes (IPT) provided by Landais *et al.* (2011) for physical households that we attribute to each fiscal household. When depreciation and interest payments are greater than imputed rents (4.5% of the sample), the tax base will be set at 0. One limitation to our study is that little information is available on the hedonic regressions performed. In particular, the selection between rented homes and occupied dwellings by their owners might lead to some bias, and our results might be affected if regressions introduce some systematic bias between age or income groups. In Figures I and II, we perform the same exercise with aggregate data to compare the fiscal base from the simulator with national accounts.

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10. *Member of one physical household (living in the same dwelling) can belong to several fiscal households: for example when people are not civically engaged or married.*
11. *Payments were determined by decile and age group using the Wealth Survey, allowing for a more precise distribution of the tax credit and accounting for loan repayments' life cycle dimension. More details are provided below*

Table 2 – **Scenarios to calculate the net imputed rent**

|	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Nat. accounts base	2005	2010	2010	2005
Depreciation rate (% of rent)	18	28	28	18
Mortage interest payments (%)	imputed	imputed	70	imputed
Property tax – PT (%)	declared	declared	8	suppressed
Net/Gross imputed rent – full owner (%)	82 - IPT	72 - IPT	64	82
Net/Gross imputed rent – owner with loan (%)	12 - IPT	5.4 - IPT	0	12
Total net imputed rent (Billions of euros)	70.60	59.07	55.19	83.31

Source: Authors' computations from TAXIPP (Landais *et al.*, 2011) and 2010 *Patrimoine* survey, INSEE.

Reassuringly, aggregate net rents are very close to the sum of the fiscal base in the micro-data set. Total net imputed rent remains between 53 and 73 billion euros, which represents about 4% of net national income, as in the aggregate data.

The other scenarios are used for robustness checks. In scenario 2, we account for the change in national accounts that occurred and the particular role of the hypothesis on capital depreciation when switching from base 2005 to base 2010. Indeed, base 2010 adopted a much higher depreciation rate for housing capital, which increased by 10 percentage points between 2000 and 2010. Thus, comparing the difference between scenarios 1 and 2 allows for accounting for the influence of different hypotheses on capital depreciation. In the third scenario, we replaced the declared property tax and the imputed mortgage interest payment with constant shares of the gross rent, instead of using those imputed in the initial data set. In our view, this allows us to gauge our results' robustness when not relying on our imputations for interest payments, nor on the declared property tax that is currently between updates while remaining coherent with aggregate national accounts, as reported in Figures I and II. All these scenarios elicit relatively similar results, with the major change in the tax base coming from capital

Figure I – **Gross, net imputed rents and property tax for owner occupiers with a loan**
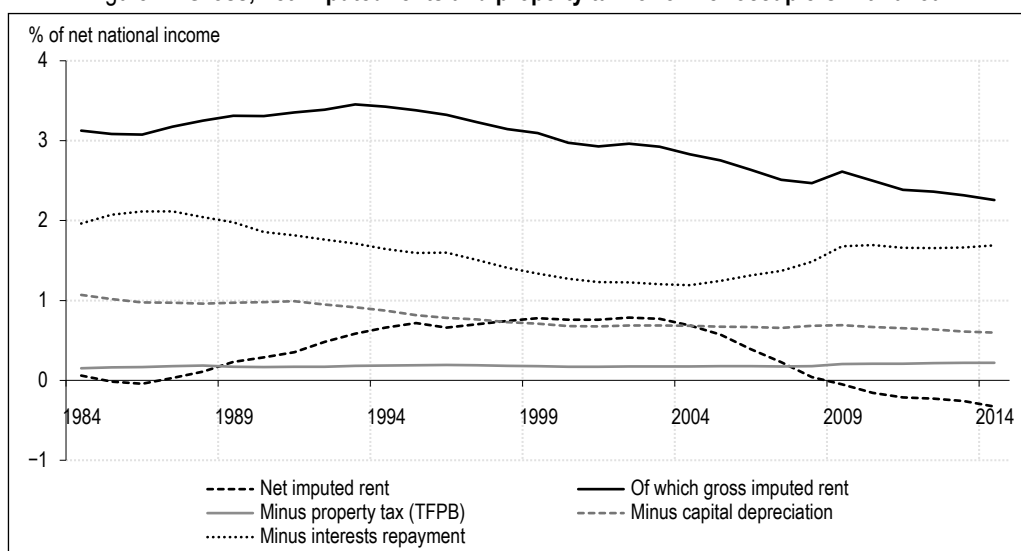
Source: Authors' computations from the French housing account 2014 (*Comptes du logement* 2014). Decomposition of the net imputed rent of homeowners with a mortgage (black dash line) into its four main components: the gross imputed rent, the capital depreciation, the interests repayment and the property tax.

Figure II – **Gross, net imputed rents and property tax for owner occupiers without a loan**
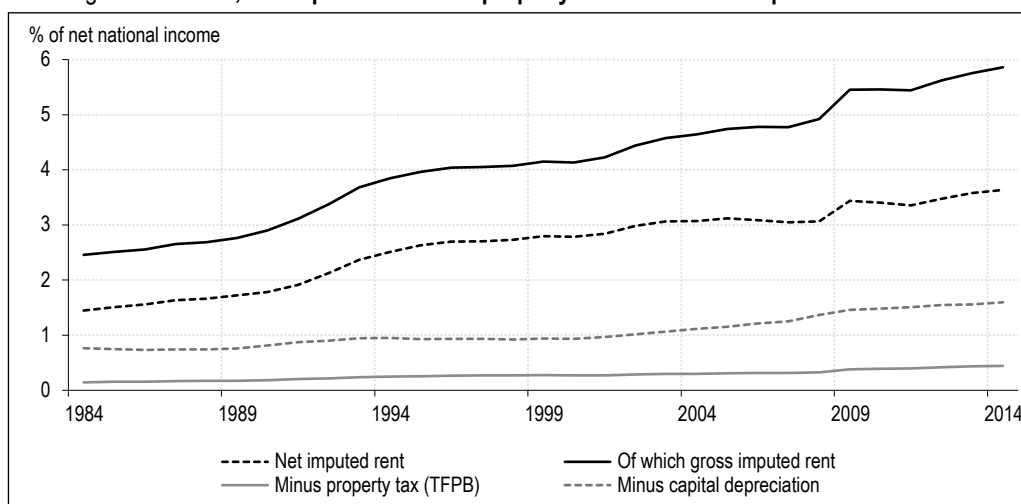
Source: Author's computation from the French housing account 2014 (*Comptes du logement* 2014). Decomposition of the net imputed rent of homeowners with no loan (black dash line) into its three main components: the gross imputed rent, the capital depreciation and the property tax.

depreciation hypotheses, creating a discrepancy of about 10 billion euros between the two extreme scenarios (scenarios 1 and 3).

Finally, the fourth scenario takes a different approach and tries to assess what would be fiscal income under the hypothesis that taxation of imputed rents for homeowner-occupiers can replace the current local property tax. With the property tax based on outdated rental value (Chapelle *et al.*, 2020), and to limit the potential increase in taxation, we propose replacing it with imputed rent taxation. Thus, we use the same parameters as in scenario 1, but assume that the local property tax is suppressed for homeowners. We also assume that the property tax is maintained for rental properties and vacant and secondary homes, ensuring some stable revenue for local governments. Furthermore, property tax losses could be offset by granting a share of receipts from income taxation to local authorities. This scenario allows for assessing whether replacing one tax for another for homeowners would translate into a net fiscal gain or loss for the state without considering households' behavioral responses.

In Figure III, we represent the distribution of average net imputed rents per decile of taxable income for all households, owners with a mortgage, and full right owners. When examining households overall, one can observe that the taxable base dramatically increases with income, which is explained easily by two phenomena. The share of homeowners is higher in the upper deciles. Richer households have a higher housing consumption and, thus, higher imputed rents. Panel C indicates that individuals in the 10th richest decile, who are full right owners, receive the highest net imputed rents. For these households, the average net imputed rent is between 7,000 and 9,000 euros per year. However, it steeply declines as income decreases: The ninth decile only receives between 5,000 and 6,000 euros on average, and the first decile only receives between 2,000 and 3,000 euros on average. The difference between owners with mortgages and full right owners is striking when comparing panels C and D. Accounting for interest rate repayment reduces net imputed rent dramatically. For the 10th income decile, owners with a loan receive on average about 1,800 euros in scenario 1 (around 2,500 when suppressing property tax in scenario 4, which comprises only around 25% of the subsidy of full right owners with a similar income level).

Moreover, the distribution of imputed rents across age groups reveals a steep intergenerational inequality, as illustrated in panel A in Figure IV. The untaxed imputed rent revenue is undeniably larger for older age groups, representing on average 194 euros for 18-to-29-year-olds, whereas they accounted for 3,713 euros and 3,316 euros for the age-60-to-74 and 75-and-over cohorts, respectively. These patterns can be explained easily when examining panel B. Indeed, relatively few households in the 18-29 and 30-44 cohort groups are homeowners (13% and 50%, respectively), and among those who own their homes, a large majority have a mortgage. However, the homeownership rate is relatively high for older groups (more than 60%), and most of the older homeowners are full right owners.
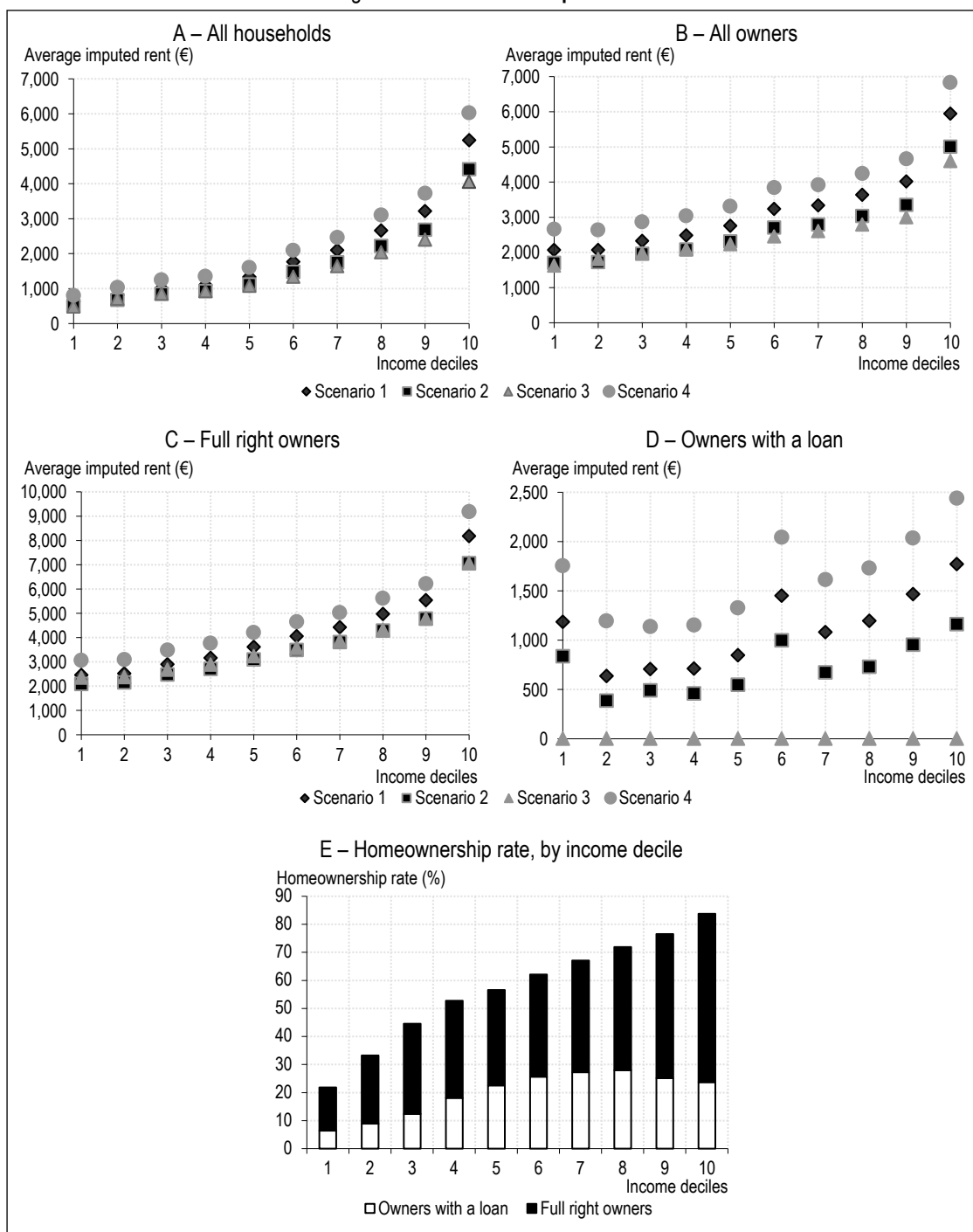
Finally, even if the data set is not geolocated precisely, it is also interesting to compare how imputed rents vary across French regions. Our data set only allows for comparing three area types: rural or small urban areas (Area 3); large urban areas with more than 200,000 inhabitants (Area 2); and the Paris urban area (Area 1). We report the average imputed rent by area in Figure A1-IV. One can observe that for homeowners, imputed rents are higher in Paris and in large urban areas than in other regions of the country. However, when considering all households, rural and small urban areas receive, on average, larger imputed rents than urban areas with more than 200,000 inhabitants because the homeownership rate is higher in rural areas (see Figure A1-IV in the Appendix).

4. Results

4.1. Non-Taxation of Imputed Rent Is the Most Important Subsidy to Homeowners

We first present our estimates of the aggregate fiscal subsidy provided by non-taxation of imputed rent. As illustrated in Table 3, following the simulation's parameters, the total fiscal subsidy represents between 9 and 11 billion euros. This subsidy represents around 25% of the total subsidies dedicated to housing in the 2010 French national accounts. Indeed, as described in Table A1-2 in the Appendix, which reported the 2010 housing national accounts updated with our results, total subsidies represented 40 billion euros in 2010. Thus, non-taxation of imputed rent is the second most important housing program after housing allowances, which represented 17 billion euros. Notably, this subsidy is larger than the property tax paid by homeowners, which represented about 10 billion euros in 2010, as illustrated in Table A1-1 in the Appendix.

Figure III – **Net taxable imputed rent**

A – All households

B – All owners

C – Full right owners

D – Owners with a loan

E – Homeownership rate, by income decile

Source: Authors' computations from TAXIPP (Landais *et al.*, 2011) and 2010 *Patrimoine* survey, INSEE.

Consequently, replacing the property tax with imputed rent taxation for homeowners would be totally self-financed.

Non-taxation of imputed rent appears, by far, to be the major subsidy for homeowners, followed by the deduction of interest rates from loans, made possible between 2007 and 2009 (*Travail Emploi Pouvoir d'Achat* [TEPA] fiscal device) and still inflicting budgetary consequences years

after its repeal. Support to homeownership is underestimated as non-taxation of imputed rent is not taken into account by national accounts. We notice that the inclusion of non-taxation of imputed rent dramatically changes the distribution of subsidies between housing tenures. While current national accounts indicate that the vast majority of housing subsidies go to the rental sector, this trend is no longer valid when

Figure IV – **Net taxable imputed rent and home ownership rates by age group**
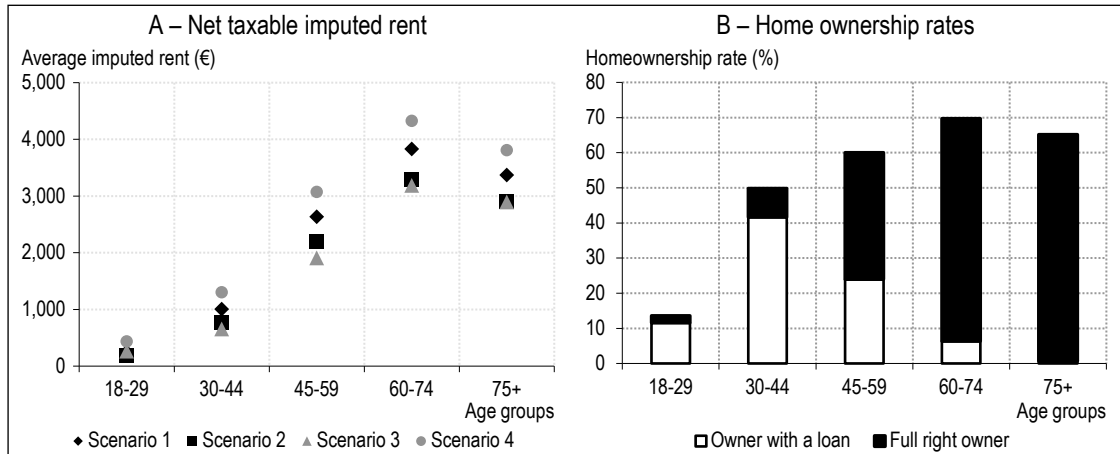
Source: Authors' computations from TAXIPP (Landais *et al.*, 2011) and 2010 *Patrimoine* survey, INSEE.

accounting for non-taxation of imputed rent. Indeed, total subsidies to owners almost doubled and are very close to subsidies created for tenants (around 23 billion euros for owners compared with 26 billion euros for tenants).

When confronting these results with Figari *et al.* (2017)'s findings, in the case of imputed rent taxation, additional tax receipts would remain relatively modest because the income tax only represents less than 10% of the public revenues in France (Guillot & André, 2014) and is supplemented by social contributions as *contribution sociale généralisée* (CSG) and *contribution pour le remboursement de la dette sociale* (CRDS), which are supplemental income taxes with a single tax rate of 17.2%. Notably, including net imputed rent in social contributions' tax base would generate an additional tax receipt ranging from 9 to 12 billion euros, approximately doubling the reform's impact. In this paper, we focused on the redistributive impact arising from the income tax.

Notably, these estimates and the redistributive profiles do not account for households' potential behavioral responses and general equilibrium effects. We discuss these issues in section 5.4.

In Table A1-3 in the Appendix, we also report the characteristics of our microsample of fiscal households. Notably, from our estimates, about 1.8 million households – mostly from the third,

fourth, and fifth deciles – would be taxed if imputed rents were included in the tax base. Nevertheless, on average, their income tax would be less than 300 euros.

4.2. Non-Taxation of Imputed Rent Mainly Benefits Older Households

Figure V indicates the average subsidy by age group. The overall results emphasize that older groups (those age 60 to 74 and those age 75 and up) are the main beneficiaries of non-taxation of imputed rent. The subsidy closely follows the patterns of net imputed rent received by each generation and the homeownership rate by age group. One can observe that younger households, i.e. between ages 18 and 29, only receive a residual subsidy below 20 euros per year, while those between 30 and 44 receive about 100 euros (Figure V). As these generations are mostly tenants or owners with a mortgage, they would either need to pay no or very low net imputed rent tax. On the other hand, the average subsidy rises dramatically for older households, which have a higher homeownership rate and are more likely to be full right owners. Households between ages 45 and 59 or 75 and over receive an annual subsidy of between 400 and 550 euros, while those between ages 60 and 74 receive the highest subsidy, totaling 600 euros.

These trends are confirmed when we divide homeowners into full right homeowners and

Table 3 – **Estimation of the fiscal subsidy due to non-taxation of imputed rents**

	Without imputed rent	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Total tax revenue (Billions of euros)	53.54	65.60	63.57	62.92	67.75
Estimated subsidy (Billions of euros)	-	12.06	10.03	9.38	14.21

Source: Authors' computations from TAXIPP (Landais *et al.*, 2011) and 2010 *Patrimoine* survey, INSEE.

Figure V – **Current Implicit subsidy due to non-taxation of imputed rent by age groups**
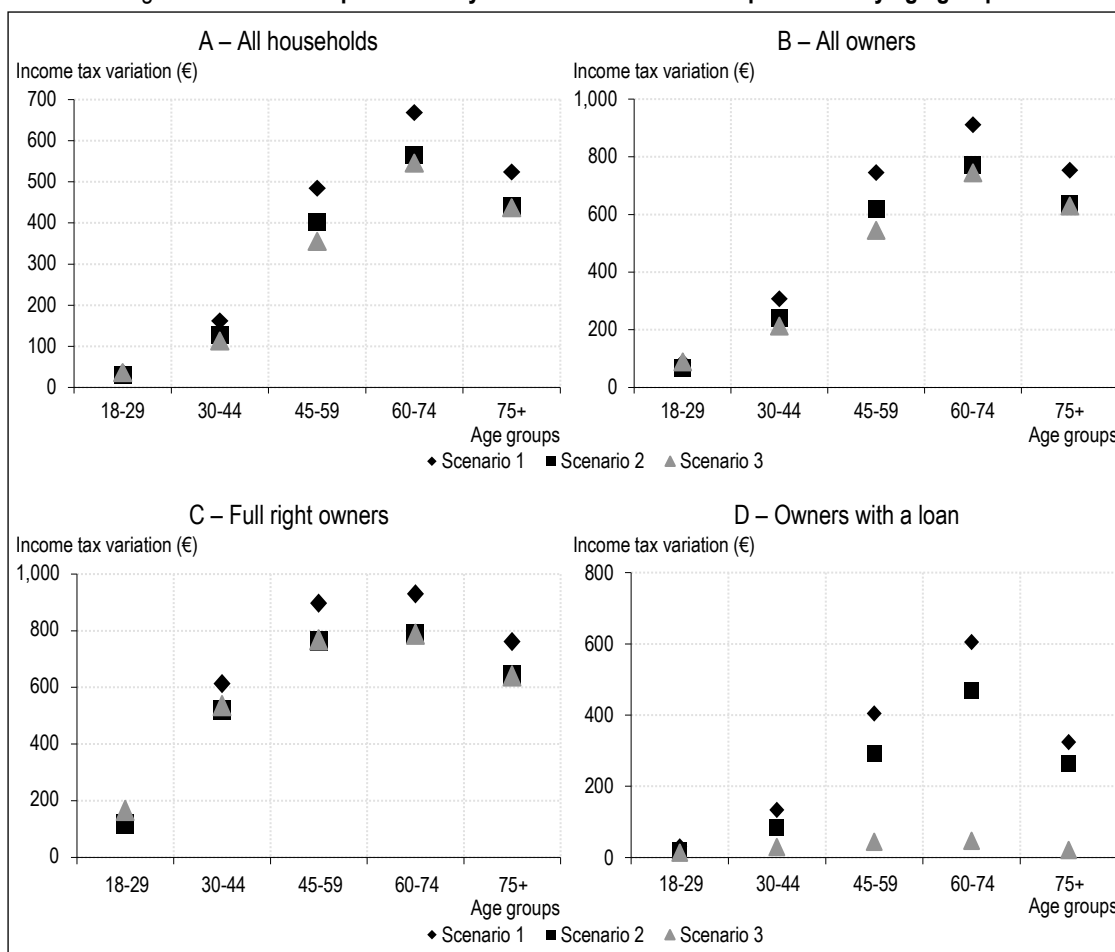
Source: Authors' computations from TAXIPP (Landais *et al.*, 2011) and 2010 *Patrimoine* survey, INSEE.

owners with a mortgage, e.g., the average subsidy is substantially higher for full right owners in the age 45-59 and 60-74 categories, who save an average of around 850 euros in income tax. The amount only would represent between 40 and 90 euros for mortgage payers from these same age cohorts. Conversely, households under 30 with a mortgage, which is the case for most fiscal households of this age group (cf. Figure IV, panel B), save an average of approximately 15 euros per year, whereas it would represent around 180 euros for full right owners (less than 0.5% of total full right homeowners across age groups).

These figures suggest that intergenerational analysis is a key issue and deserves particular attention when considering the possibility of removing this hidden subsidy

As non-taxation of imputed rent mainly benefits older households, it could exacerbate inequalities in the housing market for two reasons. First, it benefits older households who already received important capital gains in the 2000s and have a

high level of wealth, while other housing policies appear to fail to grant access to homeownership to young and poorer households. Thus, it is reinforcing inequalities between generations. Second, given inter vivos donations' growing role in homeownership access, intergenerational inequalities also inflict deep consequences on intragenerational inequalities. In such a context, one can question the relevance of a subsidy that ultimately is advantageous to households who benefited from an inter vivos donation from their relatives to access homeownership. Housing inequalities should not be neglected, as difficulties for modest young people in the housing market can inflict detrimental consequences on their capacity to find a job (Eyméoud & Wasmer, 2016).

Figure VI illustrates how age groups would be affected by replacing the property tax with imputed rent taxation for homeowners. As expected, such a subsidy would benefit the youngest and owners with mortgages, given that the youngest have the greatest financial liabilities and are in the lowest income brackets. On

Figure VI – **Variation in taxation when substituting the property tax with imputed rent taxation by age group**
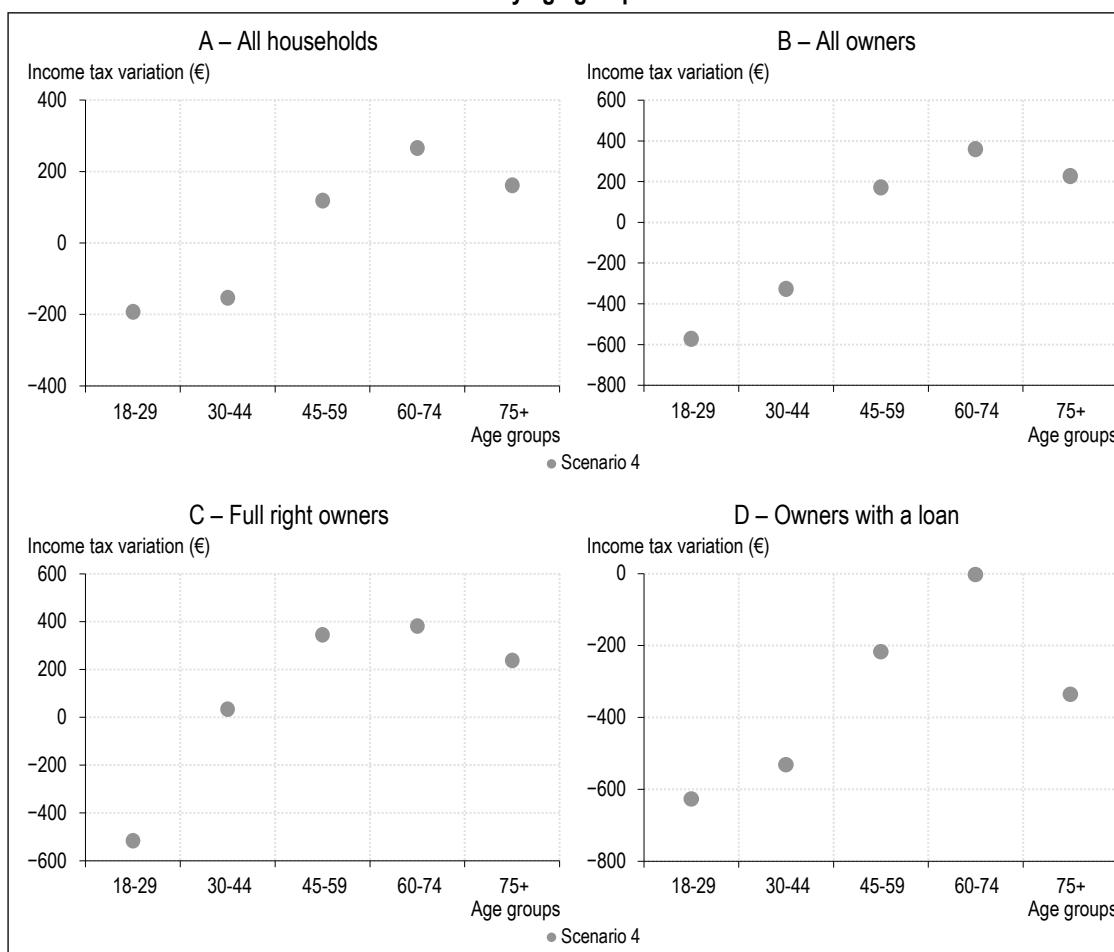
A – All households

B – All owners

C – Full right owners

D – Owners with a loan

Source: Authors' computations from TAXIPP (Landais *et al.*, 2011) and 2010 *Patrimoine* survey, INSEE.

average, young households would benefit from a tax cut of around 200 euros, while older households would see their taxation level increase by more than 150 euros. The reform would benefit owners with mortgages significantly, as they would benefit from a drop of 600 euros at their taxation level. Such a reform would constitute a major transfer from the elderly to the youngest households in the short run and could be a suitable response to increasing wealth inequality resulting from a surge in housing prices. Indeed, when examining the evolution of net wealth by age group, as illustrated in Figure VII, one can observe that older generations mostly benefited from appreciating housing wealth, while younger households' wealth remained almost static.

4.3. Full Right Owners of Upper Deciles Are the Main Beneficiaries

Figure VIII represents the distribution of the subsidy by income deciles. Clearly, non-taxation of imputed rent mostly benefits high-income households. Two factors may explain this.

First, as already mentioned, richer households are mostly owners, consume more housing, and are less dependent on mortgage funding; thus, their implicit rent is much higher, as illustrated in Figure III. Second, it is important to remember that 50% of French fiscal households are not paying any income tax because their total income is below the taxation threshold. This casts some doubts on the capacity of such a subsidy to increase the homeownership rate, as it benefits mostly richer households who are already owners. Indeed, increasing the homeownership rate would require programs mostly focused on poorer households who comprise the vast majority of tenants.

As expected, the subsidy mostly concerns full right owners who receive an implicit subsidy of 2,000 euros for the top income decile, but only between 500 and 800 euros for the seventh, eighth, and ninth richest deciles. Finally, the subsidy received by the lower deciles is below 500 euros and almost null for the first two deciles. As far as owners repaying a mortgage

Figure VII – **Evolution of net wealth by age group (1997-2010)**
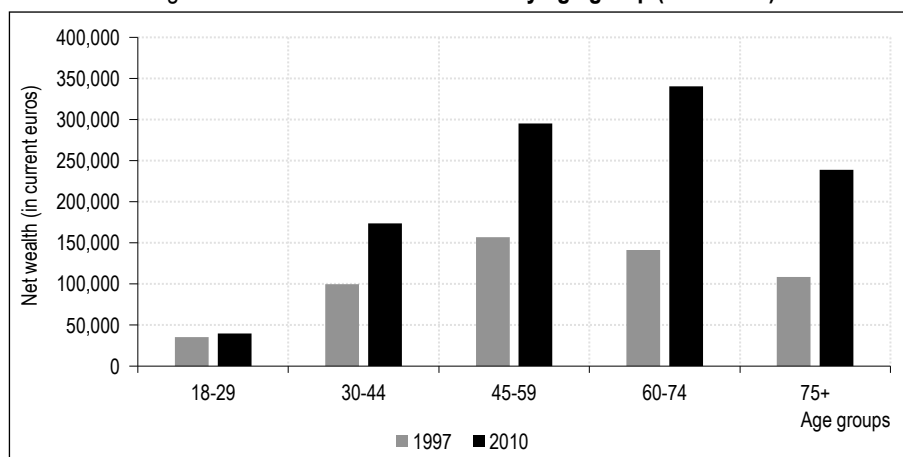
Source: Authors' computations from the 1997 and 2010 *Patrimoine* surveys, INSEE.

are concerned, the annual subsidy received for the top income decile is slightly higher than 100 euros. Therefore, full right owners in top income deciles receive most of the benefit, while owners with mortgages receive almost no subsidy. We provide the subsidy's redistributive profile in Appendix. In Table A2, we estimate the marginal tax rates that are increasing for each income decile. Moreover, Figure A2 reproduces Figure VIII expressing the variation in taxation in percentage of income. The profile remains the same, with the exception of the ninth decile being less taxed than the eighth decile. Finally, in Appendix Figure A1-II, we also examine a

Figure VIII – **Current Implicit subsidy due to non-taxation of imputed rent by income decile**
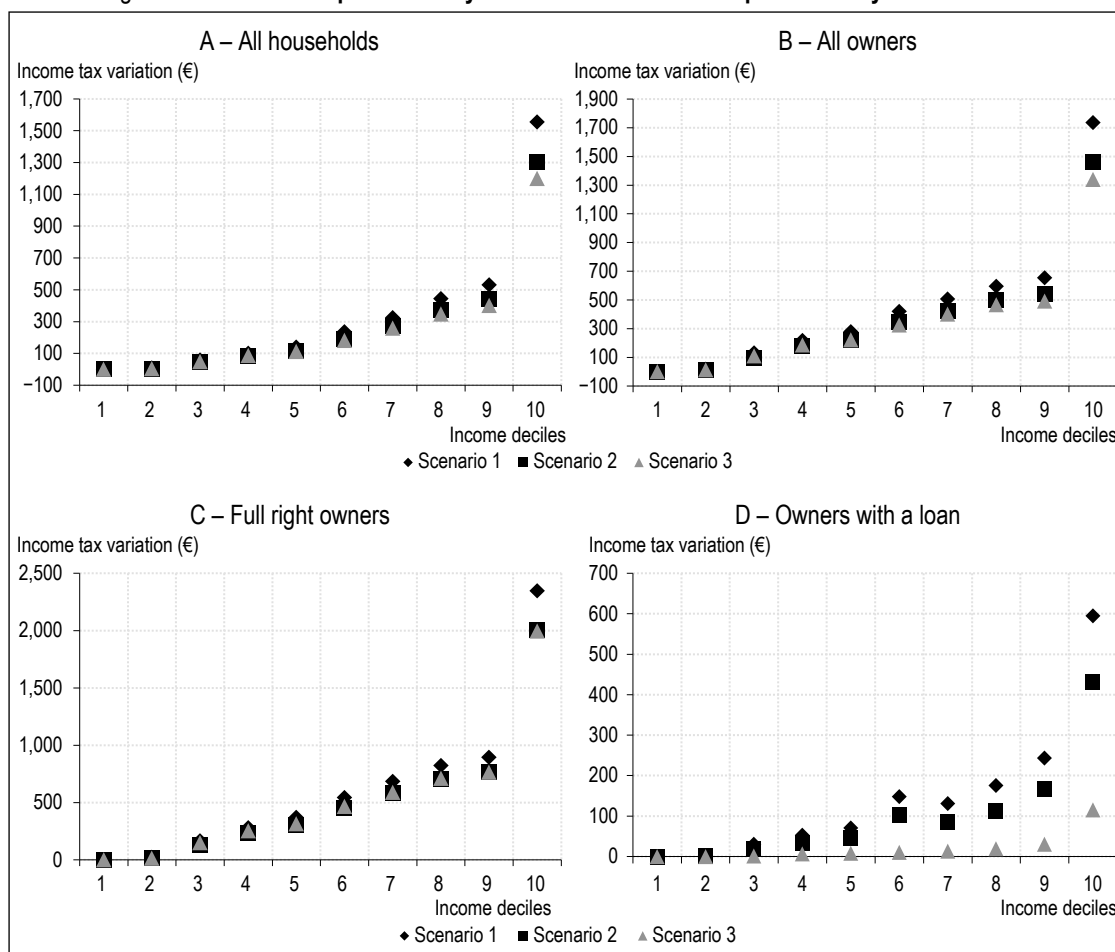
Source: Authors' computations from TAXIPP (Landais *et al*., 2011) and 2010 *Patrimoine* survey, INSEE.

case in which imputed rent could be subject to a 17.2% flat rate in social contributions. The profile remains unchanged while the tax receipts for each decile would be higher. Due to the existence of a flat rate, more households in the bottom deciles would experiment a tax hike.

Figure IX illustrates the redistribution between deciles after replacing the property tax with taxation of imputed rent. Notably, such a reform mostly would benefit the first five income deciles, who would see their taxation decrease by 200 euros (500 euros for homeowners in the first two deciles). The reform would be neutral for deciles 6–9, while the 10th decile's taxes would increase by 800 euros (1,000 euros for homeowners). Such a reform would subsidize households in which the homeownership rate is the lowest and tax households with the highest income and homeownership rate. Finally, as illustrated in Figure A1-III in the Appendix, no households of the two bottom deciles would experience a tax hike while 70% of the households in the top deciles would see their taxation increase.

This is of particular interest provided that the lowest-income deciles experience a dramatic drop in their homeownership rate. In 1984, 43.6% of the first decile owned their homes, while only 24.2% did in 2013. However, the top income decile's homeownership rate increased dramatically, from 74.5% in 1984 to 89.9% in 2013. In fact, putting aside general equilibrium effect, one might hope that such a reform could help improve the poorest households' access to homeownership and partially mitigate these households' housing burden. With progressive taxation that accounts for each household's situation, this substitution could prove more useful than other policies that support homeownership for low- and medium-income households. Indeed, additional policies developed to decrease the cost of homeownership, e.g., subsidized loans, have been proved to be relatively inefficient, making a positive impact on housing prices (Labonne & Welter-Nicol, 2015) and resulting to a large extent in a pure windfall effect for potential owners (Gobillon & Le Blanc, 2008). One might expect that such a

Figure IX – **Variation in taxation when substituting the property tax with imputed rent taxation by income decile**
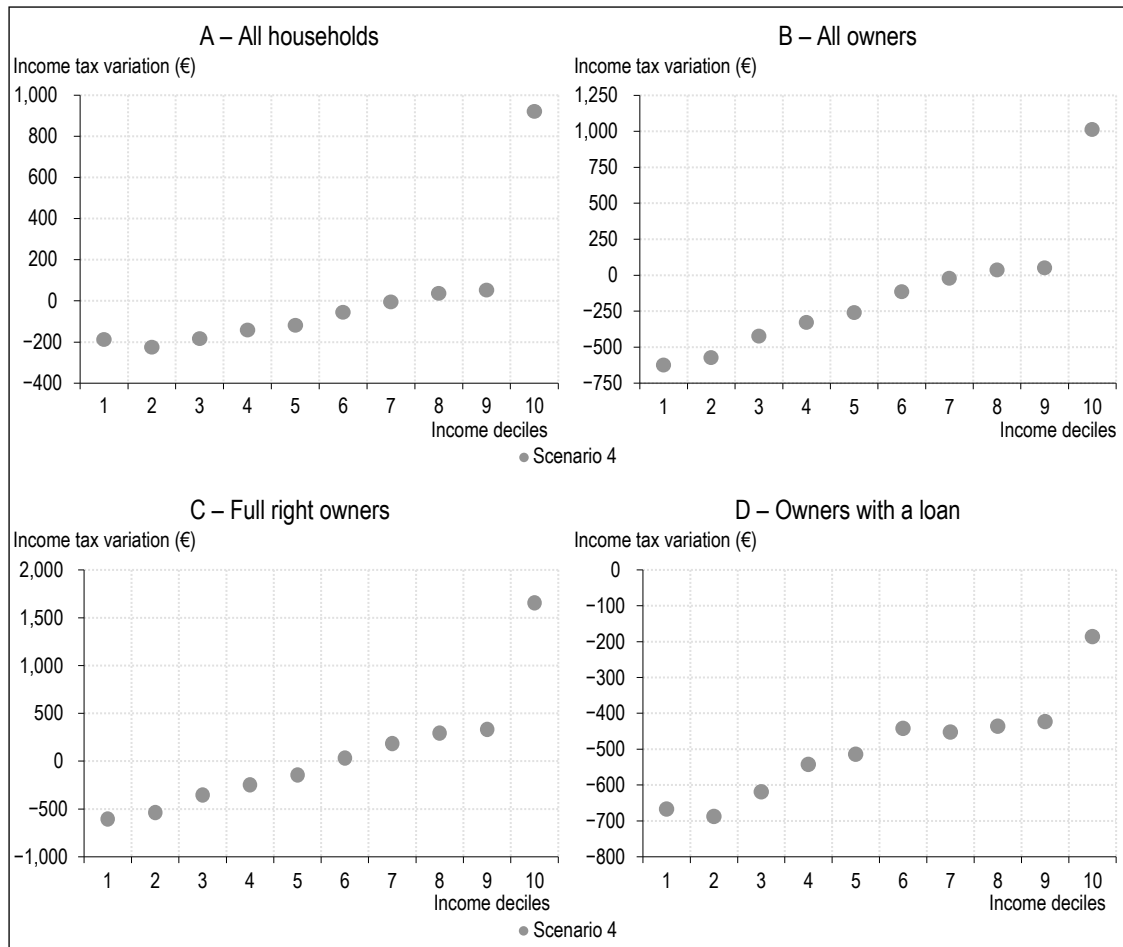
Source: Authors' computations from TAXIPP (Landais *et al.*, 2011) and 2010 *Patrimoine* survey, INSEE.

tax scheme would benefit mostly low-income households by reducing their fiscal burden and reducing the willingness to pay of households in the highest tax income brackets. It remains unclear whether such a reform would reduce housing prices, as it provides some incentives to finance homeownership with debt. Nevertheless, provided that the reform decreases the benefits of homeownership for the top-income decile, one might hope that such a tax scheme could improve low-income and middle-income households' position in the housing market.

Finally, in Figure X, we represent the three main housing policies' redistributive profiles: housing allowances; social housing (the benefits of which were estimated in Trevien (2014)); and non-imputed rent taxation. Notably, non-imputed rent taxation cancels the two previous schemes' redistributive profiles. If the first two deciles receive the largest annual transfer (3,200 and 2,200 euros, respectively), then the third income decile receives as much as the 10th income decile (around 1,500 euros). The middle class (deciles 4–9) receives about 500 euros. While housing subsidies, particularly housing allowances, often are presented as the French fiscal system's main redistributive tool, it is notable that accounting for non-taxation of imputed rents tends to attenuate this view, as the top income decile appears to benefit much more from the fiscal devices than deciles 4–9.

4.4. Potential General Equilibrium Effects of Imputed Rent Taxation

In this paper, we adopted a static framework with no adjustment in agent's behavior and no general equilibrium effect to estimate the implicit subsidy level that homeowners receive. This approach is standard in the literature to estimate tax savings (Poterba & Sinai, 2008; Figari *et al.*, 2017), but does not account for the incidence of such a policy. Given the high transaction costs on the real estate market and homeowners' low mobility rate, one might argue that the estimated tax savings would be relatively close to actual tax receipts in the case of reestablishing imputed rent taxation during the first years.

In the short term, replacing property tax with imputed rent taxation is likely to generate some redistribution from older to younger generations. Few extant studies have tried to estimate the general equilibrium effect of non-taxation of imputed rent. One notable exception is Skinner (1996), whose Overlapping Generation Model (OLG) estimates the efficiency cost of the preferential tax treatment of housing. If the model does not include a tenure choice dimension and has no heterogeneity in income, the efficiency implications of the preferential tax treatment of housing complement our estimates, which stress capital gains' role. In this framework, a preferential tax treatment of housing generates a rise in housing prices and, thus, a windfall capital gain for current homeowners at the expense of future generations, who face higher prices for the same houses. This description appears to be extremely close to what is described in Figure VII. The tax incidence might have magnified the intergenerational inequalities that we highlighted. Moreover, Skinner (1996) goes beyond such a tax scheme's simple redistributive impact and finds that such an intergenerational transfer comes at a large efficiency cost. In a general equilibrium perspective, lower housing prices generated by imputed rent taxation should improve economic efficiency.

Figure X – **Distributive profile of the three main housing polic**
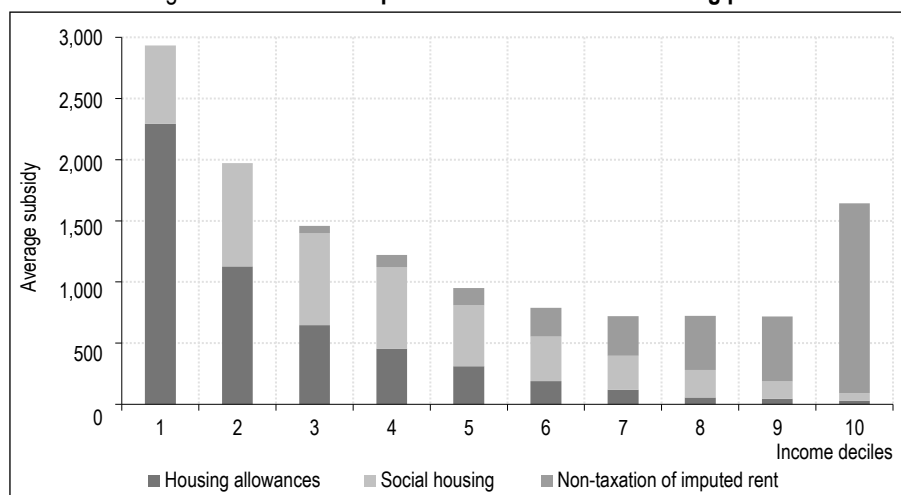
Source: Authors' computations from Trevien (2014) and *Revenus fiscaux et sociaux* survey, 2010.

From an equity perspective, we stressed that non-taxation of imputed rents mostly benefits wealthier households. Reestablishing imputed rent taxation should increase richer households' user costs and decrease modest households' user costs in terms of replacing the property tax. Thus, the net redistributive effect of such a reform, accounting for tax incidence, is difficult to predict. First, owners with a low debt level might try to increase their indebtedness to reduce their net imputed rent, which would decrease non-imputed rent taxation's redistributive profile in a similar way as that illustrated in the mortgage interest deduction literature (Maki, 1996; Dunsky & Follain, 2000; Hendershott & Pryce, 2006; Gervais & Pandey, 2008; Cole *et al.*, 2011). Second, prices and rents might vary in the medium run. If one might expect a drop in real estate prices for households in the highest income brackets, prices also might capitalize the subsidy that low-income households receive (Hilber & Turner, 2014). The net effect would depend on how segmented housing markets are connected (Piazzesi *et al.*, 2015). Some studies, such as Fack (2005), found that housing allowances tended to be capitalized into the rent that low-income households paid relative to households not concerned by the policy. This might be particularly true in regions where the housing supply is inelastic (Eriksen & Ross, 2015). This evidence suggests that our estimated redistributive impact from replacing the property tax with imputed rent taxation might be a lower bound of its true redistributive effect, as prices might vary for different market segments. High-income households living in an expensive segment also might experience a capital loss, while low-income households living in less-expensive neighborhoods might experience a drop in the capitalization rate.

* *
*

In this paper, we documented how non-taxation of imputed rent represents a significant amount of fiscal spending, mostly directed toward the wealthiest homeowners with no financial liabilities. Imputed rents are, as observed in French national accounts, the second-largest housing subsidy in the country after housing allowances. Moreover, we consider that the recent rise in housing prices during the 2000s, which widened the wealth gap between older and younger generations, should re-open the debate on the opportunity to restore a tax on land through imputed rent taxation.

From our computations, using the TAXIPP model and restoring imputed rent taxation in the income tax base, as was the case before 1965, we find that the suppression of a subsidy mainly captured by the top income deciles should not affect homeowners with mortgages and, thus, should not be detrimental to homeownership access. In addition to this, further simulations allowed us to account for a scenario that potentially replaces the current property tax with imputed rent taxation. Our results indicate that this change in taxation would lower current taxation for the four most modest deciles and emerge as a much more viable policy option that would increase taxation to a lesser extent for the remaining deciles. Recent changes since 2010 are likely to reinforce our findings: the drop-in interest rates that took place until 2020 might increase potential tax receipts from a reestablishment of imputed rent taxation. In fact, as it raised upper income tax rate, from 41% to 45% in 2013, it probably also increased the relative size of the subsidy received by the richest households further.

Finally, concerning a broader discussion of intergenerational inequality, discussing imputed rent taxation could help improve inter- and intragenerational equity. In actuality, a new set of policies that include reviving imputed rent taxation, to a certain extent, could stop subsidizing wealthier households that benefited from unprecedented capital gains in the 2000s that created intergenerational inequalities perpetuated through *inter vivos* donations or inheritances transferred to relatives, reinforcing intragenerational inequalities in France, as Bonnet *et al.* (2016) described. Moreover, as inter- and intragenerational inequalities are rising worldwide, this assessment applies beyond our case study of the French context. □

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APPENDIX 1

ADDITIONAL CHARTS AND TABLES

Figure A1-I – **Homeownership status by age groups**
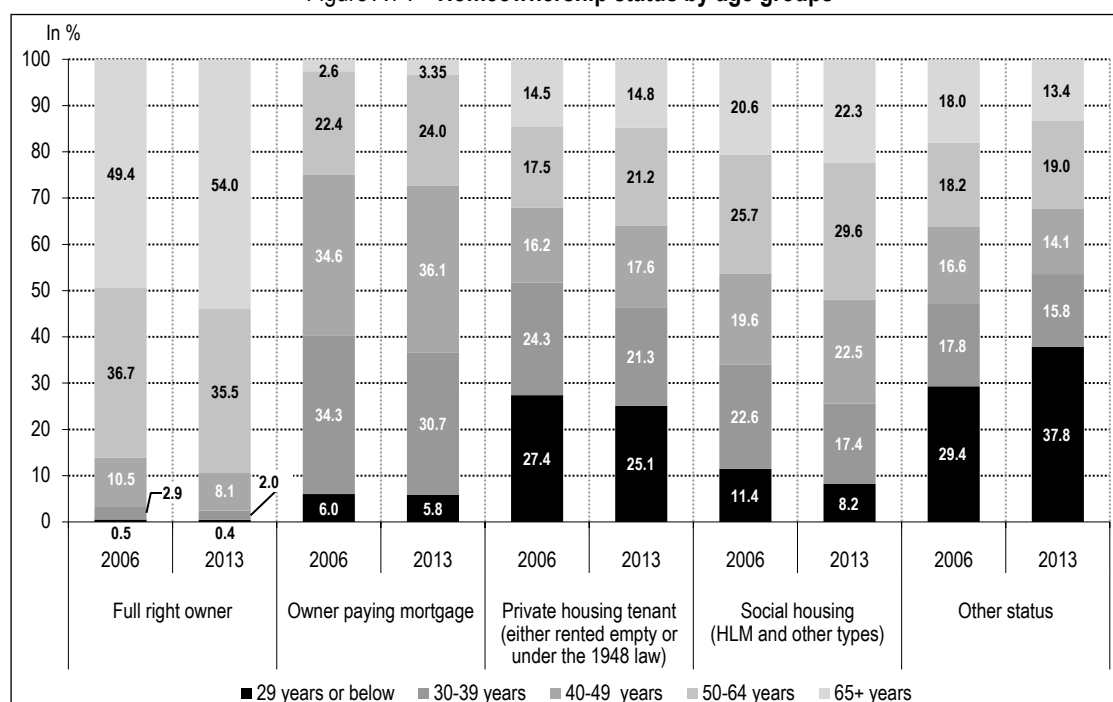
Note : Stacked bars above represent the evolution of homeownership status by age groups between 2006 and 2013. The left axis accounts for the percentage of each age group within each homeownership status either in 2006 or 2013.
Source: Authors' computations from the French housing survey (*enquête Logement*) 2006 and 2013.

Table A1-1 – **Property tax income (TFPB) by source**

Contributors	Amount of TFPB (in billion euros)	Percent
Owners with mortgage	3.392	19.8
Owners outright	6.767	39.5
Landlords	2.815	16.4
Social housing	2.094	12.2
Others	2.063	12.0
All	17.137	100

Source: Authors' computations from the French housing account 2014 (*Comptes du logement* 2014).

Table A1-2 – **Total housing subsidies in 2010**

	Owners	Main residences (MR)				Total (MR)	Secondary residences	Provisionary residences	Total
		Rental	sector						
		Physical landlords	Social landlords	Other landlords	Total (rental)				
Subsidies to consumers									
Housing allowances	0.948	7.757	5.772	0.760	13.843	14.791	-	1.137	15.928
Other allowances	0.005	0.095	0.131	0.038	0.264	0.268	-	0	0.268
Fiscal subsidy	1.061	-	-	-	0.354	1.141	-	-	1.414
Total	2.013	-	-	-	14.460	16.474	-	1.137	17.611
Subsidies to producers									
Operating and investment subsidies	0.134	0.230	1.288	0.497	2.015	2.149	-	0.027	2.176
Subsidized loans	2.818	-	-	-	2.833	5.651	1	0	5.652
Fiscal subsidies	7.027	-	-	-	4.249	11.276	-	-	11.276
Others	1.252	0.156	1.936	0.419	2.510	3.762	0.099	0.070	3.931
Total	11.231	-	-	-	11.607	22.838	0.100	0.096	23.034
TOTAL									
Total	13.244	-	-	-	26.067	39.311	0.100	1.233	40.645
Accounting for non-taxation of imputed rent									
Non-taxation of imputed rent	9-11	0	0	0	0	9-11	0	0	9-11
Total with non-taxation of imputed rent	22.244-24.244	-	-	-	26.067	48.311-50.311	0.100	1.233	49.645-51.645

Source: French housing account 2010 and authors' computations from TAXIPP (Landais *et al.*, 2011) and 2010 *Patrimoine* survey, INSEE.

Table A1-3 – **Descriptive statistics of beneficiaries' socio-demographic traits**

	All	Never taxed	Become taxed	Always taxed
Weigthed number (in thousands)	35,560	13,024	1,826	20,710
Average imputed rent (in euros)	2,750.89	1,374.63	5,266.81	3,394.55
Average tax without imputed rent taxation (in euros)	1,505.73	0.00	0.00	2,585.42
Average tax with imputed rent taxation (in euros)	1,780.99	0.00	291.69	3,032.34
Average tax savings (in euros)	275.26	0.00	291.69	446.92
Demographics				
Married (%)	35.88	22.20	34.25	44.63
Women (%)	45.27	26.37	31.36	58.39
Average age	48.27	45.39	61.15	48.94
Age groups				
18-29 (%)	20.98	27.93	10.01	17.57
30-44 (%)	28.33	30.27	14.20	28.35
45-59 (%)	24.28	19.01	18.22	28.13
60-74 (%)	14.51	10.41	26.90	15.99
≥ 75 (%)	11.90	12.38	30.67	9.95
Area				
Area 1 – Paris (%)	13.28	9.27	7.24	16.34
Area 2 – other agglomerations (%)	32.83	34.30	28.22	32.31
Area 3 – others (%)	53.89	56.43	64.54	51.34
Gross income deciles				
1	10	27.47	0.01	0.00
2	10	26.67	3.32	0.00
3	10	20.48	25.47	2.04
4	10	10.43	25.82	8.33
5	10	6.73	21.44	11.05
6	10	3.90	14.61	13.43
7	10	2.36	4.13	15.32
8	10	1.20	2.56	16.19
9	10	0.43	1.51	16.77
10	10	0.32	1.13	16.87

Note: Characteristics of the TAXIPP microsample by status. Column 1 corresponds to the entire sample, column 2 to households that are never taxed (in scenario 1), column 3 to households that are initially not subject to income tax and become taxable in scenario 1, and column 4 to taxable households before and after taking into account imputed rent in scenario 1.
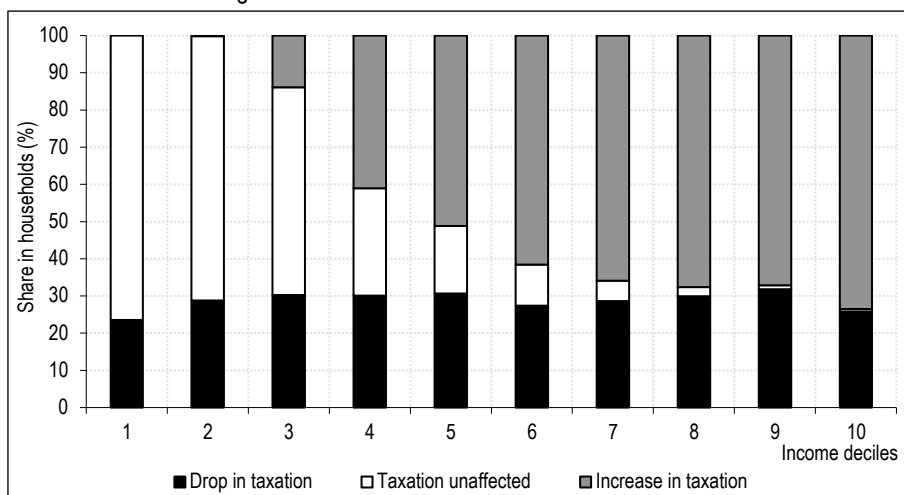Source: Authors' computations from TAXIPP (Landais *et al.*, 2011) and 2010 *Patrimoine* survey, INSEE.

Figure A1-II – **Redistributive profile accounting for social contributions, all households**
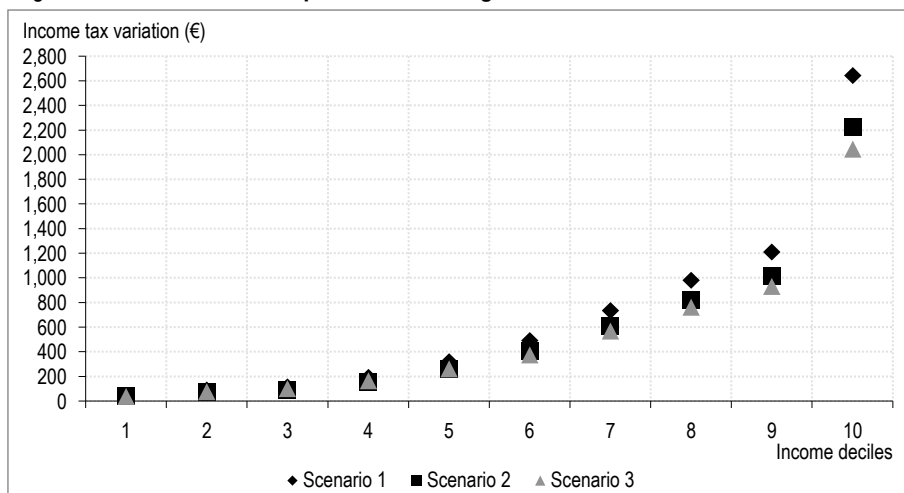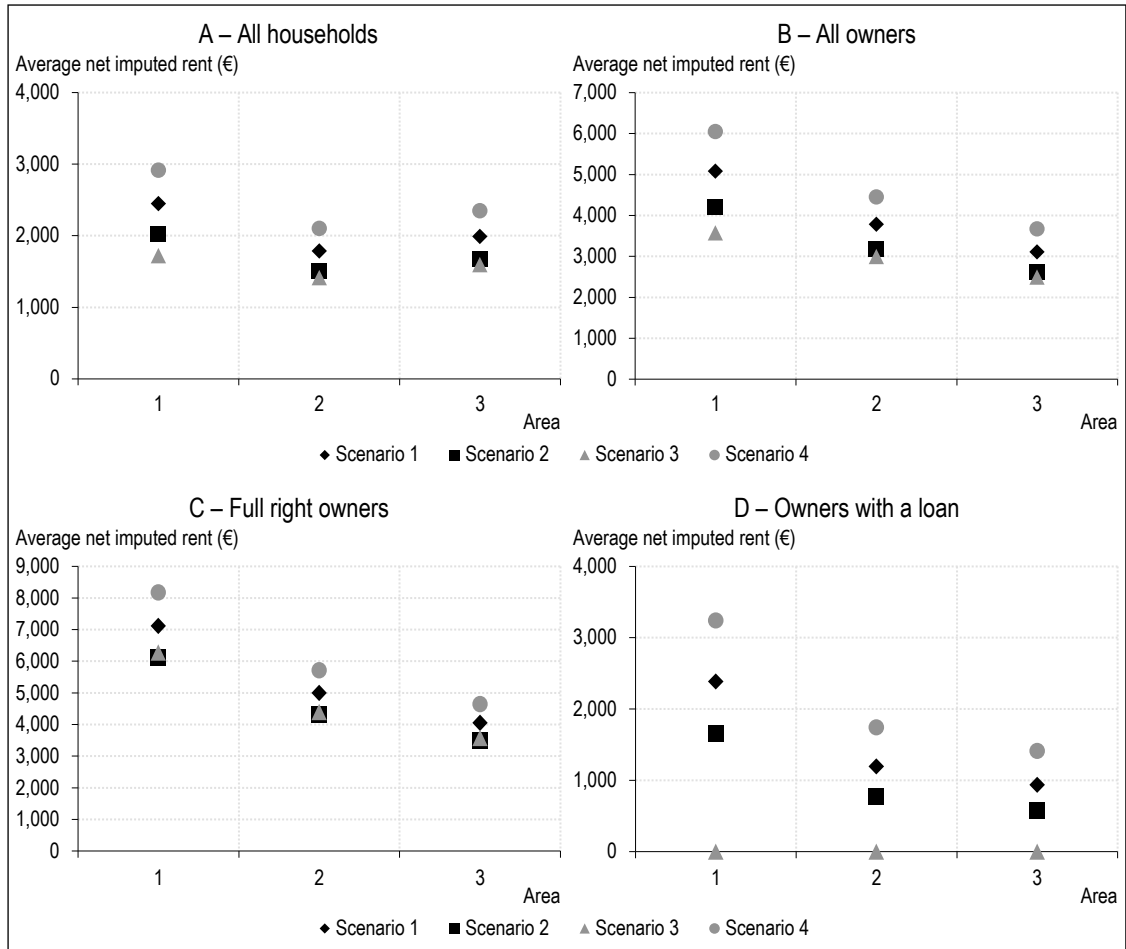

Note: This graph reproduces panel A in Figure VIII, including a 17.2% flat rate in social contributions (CSG+CRDS).
Source: Authors' computations from TAXIPP (Landais *et al.*, 2011) and 2010 *Patrimoine* survey, INSEE.

Figure A1-III – **Winners and losers in scenario 4**

Source: Authors' computations from TAXIPP (Landais *et al.*, 2011) and 2010 *Patrimoine* survey, INSEE.

Figure A1-IV – **Net taxable imputed rent by area**

A – All households

Average net imputed rent (€)

B – All owners

Average net imputed rent (€)

◆ Scenario 1 ■ Scenario 2 ▲ Scenario 3 ● Scenario 4

C – Full right owners

Average net imputed rent (€)

D – Owners with a loan

Average net imputed rent (€)

◆ Scenario 1 ■ Scenario 2 ▲ Scenario 3 ● Scenario 4

Note: Areas 1, 2 and 3 correspond to the zoning established in 1978 to implement housing policies. Area 1 corresponds to the Paris urban area, area 2 includes the large urban areas with more than 200,000 inhabitants, and area 3 corresponds to the rest of the territory.
See https://www.ecologie.gouv.fr/zonage-1-2-3 for more details.
Source: Authors' computations from TAXIPP (Landais *et al.*, 2011) and 2010 *Patrimoine* survey, INSEE.

ESTIMATING THE MARGINAL TAX RATE OF IMPUTED RENTS

As emphasized in equation 5, the magnitude of the subsidy is defined by the marginal income tax rate of households and their net imputed rent. As the income tax schedule is progressive, we estimate in column 1 and 3 of Table A2, the following equation:

$$Y_i = \tau_j \times D_{d(i)=j} \times R_i + \varepsilon_i.\qquad\text{(A.1)}$$

We interact the income decile dummies ($D_{d(i)=j}$) with the imputed rent (R_i) to recover the marginal tax rate of each income decile j (τ_j). In column 1, Y_i is the implicit subsidy estimated in scenario 1 and defined in equation 5. In column 3, Y_i is the variation in taxation resulting from a substitution of the property tax by imputed rent taxation[12] as defined in scenario 4. Columns 2 and 4 estimate the following equation:

$$Y_i = \tau \times R_i + \varepsilon_i,\qquad\text{(A.2)}$$

which allows us to recover τ which is the average marginal tax rate of imputed rent for the whole sample of landlords. The dependent variables are the same as in columns 1 and 3.

Following closely results shown in Table A2, we observe that in the first scenario, all income deciles would face a progressive increase in their income tax payment if imputed rent taxation was reestablished in France while keeping the current fiscal system. In fact, the first and second deciles would pay respectively 0.01 and 0.0248 euros per net taxable euro of imputed rent leading to a marginal taxation of 1% and 2.48%. On the other hand, middle-classes in the 5th and 6th deciles would pay respectively 0.110 euros and 0.139 euros per net taxable euro, with marginal rates at 11% and 13.9%. Finally, upper classes in the 9th and 10th deciles, would pay 0.167 euros and 0.346 euros per each net taxable euro, which would imply a 16.7% marginal tax rate for the 9th decile and a marginal rate of 34.6% for the 10% highest incomes in France. In addition to this, it can be observed that, in the first scenario, when only regressing on taxable net imputed rent without controlling for income deciles, we see that overall, for every net taxable euro in imputed rent, there would be a 0.273 euros increase, which represents a 27.3% marginal tax rate.

Concerning the fourth scenario, which consists of simultaneously reintroducing imputed rent taxation and eliminating property tax for homeowners, the fiscal burden is transferred from a local regressive tax to a progressive national tax. Looking at results in columns 3 and 4 (Table A2), we can conclude by merely looking at the signs in our coefficients, that the first income deciles would benefit from a decrease in income tax, favoring redistribution. Marginal negative rates for the 40% most modest revenues in France would be comprised between −12.8% (first income decile) and −2.24% (fourth income decile). Moreover, for the middle class (from the 5th and 6th deciles), marginal rates would represent 0.349% and 3.61%, lower than those calculated for the 1st scenario. Finally, for the highest income deciles, eliminating property tax, would lead to marginal tax rates lower than those described in columns 1 and 3: 11.3% for the 9th decile and 6.43% for the 10th decile. When regressing solely the dependent variable on net taxable imputed, the overall marginal tax rate is 23%. The progressivity is also confirmed when investigating the variation in taxation in percentage of income as illustrated in Figure A2.
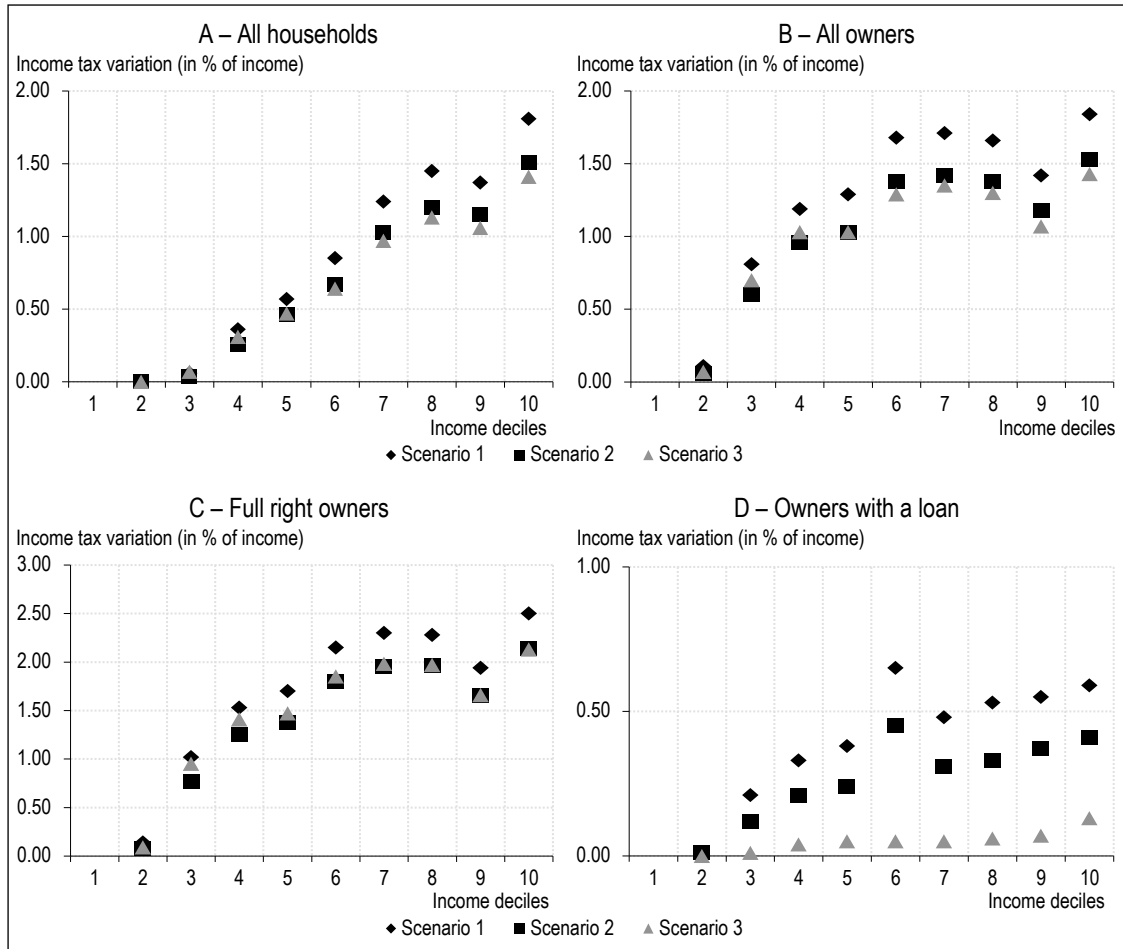
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12. $Y_i = \Delta\text{Taxation} = \tau(w + R) \times R - \tau(w) \times w - \tau_p.$

Table A2 – **Marginal taxation rate by net taxable imputed rent and income decile**

	Maintaining the property tax		Suppressing the property tax	
	(1)	(2)	(3)	(4)
	Variation in taxation			
1st Income decile * R	0.0100***		−0.128***	
	(0.0009)		(0.0013)	
2nd Income decile * R	0.0248***		−0.103***	
	(0.0008)		(0.0012)	
3rd Income decile * R	0.0672***		−0.0485***	
	(0.0007)		(0.0010)	
4th Income decile * R	0.0917***		−0.0224***	
	(0.0007)		(0.0010)	
5th Income decile * R	0.110***		0.00349***	
	(0.0006)		(0.0009)	
6th Income decile * R	0.139***		0.0361***	
	(0.0005)		(0.0007)	
7th Income decile * R	0.160***		0.0591***	
	(0.0005)		(0.0007)	
8th Income decile * R	0.168***		0.0665***	
	(0.0004)		(0.0006)	
9th Income decile * R	0.167***		0.0643***	
	(0.0003)		(0.0005)	
10th Income decile * R	0.346***		0.230***	
	(0.0001)		(0.0002)	
R		0.273***		0.160***
		(0.0002)		(0.0002)
Observations	489,578	489,578	489,578	489,578
R^2	0.920	0.777	0.697	0.463

Note: The dependent variable in columns (1) and (2) corresponds to the implicit subsidy received by a household because of non-taxation of imputed rent computed in scenario 1 with the current fiscal system. The dependent variable in columns (3) and (4) indicates the change in taxation after the substitution of the property tax by the imputed rent taxation computed in scenario 4. For columns (1) and (2), interaction terms represent the marginal values per income decile based on R in euros. Standard errors are in parentheses (*** : p<0.01, ** : p<0.05, * : p<0.1).

Figure A2 – **Redistributive profile in % of income**

A – All households

Income tax variation (in % of income)

B – All owners

Income tax variation (in % of income)

◆ Scenario 1   ■ Scenario 2   ▲ Scenario 3

C – Full right owners

Income tax variation (in % of income)

D – Owners with a loan

Income tax variation (in % of income)

Income deciles

◆ Scenario 1   ■ Scenario 2   ▲ Scenario 3

Source: Authors' computations from TAXIPP (Landais *et al.*, 2011) and 2010 *Patrimoine* survey, INSEE.

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