Vulnerable consumers and satisfaction with public services: Does country matter?

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Abstract

Public Administration scholars and practitioners are paying increased attention to "vulnerable citizens" – groups of citizens who, for reasons beyond their control, are disadvantaged in comparison to other citizens - when consuming public services. Initial research focused on how citizens' socio-economic background shapes their behaviour and satisfaction. Citizens, however, take decisions within a context, but we know little about how their experiences differ depending on their country of residence. We contribute to the emerging strand of scholarship on citizens' vulnerability by comparatively analysing the experience of vulnerable citizens in the telecommunications and electricity markets in three large EU countries, selected to represent "advanced", "intermediate" and "laggard" stages of reform. We first establish that citizen socio-economic characteristics matter for patterns of expenditure and perceptions of service affordability and then show how citizen vulnerability differs depending on country context. Results are useful to practitioners seeking to target regulation to improve the experiences of vulnerable citizens.

Points for practitioners

Practitioners recognize that public service reform has brought with it greater market complexity and choice, and that this poses challenges to citizens, particularly, vulnerable citizens. Initial empirical work has analysed how citizens' socio-economic background affects their satisfaction, however, we know little about how vulnerability is shaped by country context. We analyse electricity and telecommunications markets in three large EU countries, establishing first that consumer socio-economic background matters for citizens' expenditure and perceptions of service affordability, and then demonstrate that country context also influences these experiences. Less-educated, elderly and non-employed citizens experience more frequent problems with these services than other citizens, while the country context conditions these experiences significantly.

Keywords

Public infrastructure services, regulation, vulnerable citizens, country differences, Behavioural Sciences.

Introduction

From the late 1980s onwards, public infrastructure services - including telecommunications and electricity - underwent significant, market-oriented reform, including liberalization, deregulation and privatization policies, across the European Union (EU). While the UK was a first mover, most other EU countries followed suit, albeit unevenly, by country and sector (Clifton *et al*., 2006). The stated beneficiaries of these reforms were citizens - recast as consumers - who would enjoy greater choice and lower prices. Simultaneously, following international trends associated with New Public Management, the European Commission (EC) commenced surveying citizens about their satisfaction with service performance after reform (Grosso and Van Ryzin, 2012).

Gradually, evidence mounted that public infrastructure services reform was more complex than first thought (Bel and Warner, 2016; Clifton et al., 2016). From a "top-down" perspective, attaining real competition was challenging, as some incumbents clung onto market power (Fiorio and Florio, 2011). From the bottom-up – or citizen – perspective, reform success had been predicated on an "active consumer": however, the EC (2012) acknowledged that citizens were often less informed and pro-active than had initially been assumed. Scholars (Clifton et al., 2011, 2014; Jilke, 2015) and practitioners (EC, 2012, 2015a; EP, 2012), worried that vulnerable citizen groups may be less well positioned than other citizens to deal with newly reformed public

infrastructure markets. Since these markets were more complex than previously, due to choice, switching, and so on, they may present particular difficulties to vulnerable citizens. The salience of the concept of "vulnerable citizens" increased. Andreasen and Manning (1990) defined "vulnerable citizens" as those "at a disadvantage in exchange relationships where that disadvantage is attributable to characteristics that are largely not controllable by them".

Practitioners therefore called for more empirical evidence on the experiences of vulnerable citizens in diverse markets (Van Bavel et al., 2013), including liberalized public service markets (Sousa Lourenço et al., 2016), with a view to implementing specific new regulation (EC, 2015b, ECCG, 2013; EP, 2012). Unfortunately, of the EC surveys conducted on citizen satisfaction from 2000 onwards – *with the singular exception of EC (2007)* - opinions only of citizens who consumed services were recorded. This biased the survey results since opinions of citizens who could not afford or access services, or who did not use them for other reasons, were excluded. Hence, we focus in this article on the unique data available on all citizens in EC (2007).

Following Burden (1998), citizen vulnerability is not directly observable. Hence, studies on vulnerability use proxies, specifically, socio-economic indicators potentially associated with vulnerability, such as age, employment status, race, health, income and household tenure. Early research used these proxies to enquire how specific aspects of citizens' socio-economic background were associated with less satisfaction *vis-à-vis*

diverse markets. Since most of these studies were performed at the national level (George et al., 2011), country differences were scarcely analysed.

However, it is important to understand the consequences of citizen vulnerability in different country contexts. Following the subsidiarity principle, if problems in markets are common across countries, an EU approach to regulation may reduce costs; however, where difficulties are heterogeneous, a national, differentiated approach to regulation is required. Until recently, scholars neglected to analyse citizen vulnerability across countries partly due to methodological challenges (Ferrari and Manzi, 2014). Jilke et al. (2015) used multilevel modelling techniques to overcome problems presented when respondents in multiple countries answer survey questions in different ways.

We build on the emerging research that seeks to understand the importance of country context for citizen vulnerability. We comparatively analyse experiences of groups of vulnerable consumers in public service markets across countries. Specifically, we analyse whether and how country context - combined with the socio-economic background of citizens - shapes experiences of citizen vulnerability, as reflected in citizens' decisions and satisfaction with services. To do so, we contrast information about citizens' expenditure (revealed preferences, RP) with data on citizens' perceived service affordability (stated preferences, SP), following Clifton et al. (2014), to comparatively analyse the dynamics of vulnerability in two major public services

(telecommunications and electricity) across three large EU countries: the UK, Italy and Spain. These countries represent mature, intermediate and laggard reform markets for the two services under analysis. The UK represents a "first mover", having pioneered reform of both services in the EU; Italy represents a reform "laggard" in both; and, finally, Spain, an "intermediate" case, (following the UK but ahead of Italy). Data availability means not all proxies potentially associated with vulnerability can be assessed. We proxy vulnerability by three commonly used socio-economic dimensions where comparable information is available: education, age and employment. We first establish *how* specific socio-economic characteristics associated with vulnerability affect citizens' expenditure and their perceptions of service affordability. Next, we analyse whether differences across the three countries further shape these experiences, by introducing interaction effects between countries and each proxy for vulnerability.

We find that, in all three countries, citizens' socio-economic background conditions their expenditure decisions and their perceptions of service affordability. The experiences of vulnerable citizens in reformed public service markets, when compared to the rest of citizens, are reflected in their lower perceptions of service affordability and different expenditure decisions, for some services. Next, we show how country context matters as regards shaping experiences of vulnerability. In telecommunications, where reforms and technological innovations were intense and widespread, we find common trends in the experiences of vulnerable citizens in different countries. In electricity,

where reforms were more halting and uneven, we find that the experiences of vulnerable citizens are more country specific.

The paper is organized as follows. Section two explains why public infrastructure service regulation, originally based on a supply-side perspective, was extended to consider citizens' socio-economic background and the issue of vulnerable citizens. Section three describes country context by comparatively analysing different reform maturities in telecommunications and electricity. Section four describes the data and the empirical approach. Section five interprets the results; conclusions for policy-making follow.

Public infrastructure service reform: from consumers to vulnerable citizens

Practitioners assumed the market-oriented reform of utilities from the 1980s would augment choice and efficiency in service provision. Following neoclassical economics, it was presumed the benefits of these reforms would filter down to citizens, recast as consumers. Consumers were conceived as rational maximizers of their individual utility (*homo oeconomicus*): they would make an appropriate use of the possibilities of choice generated. Consumer satisfaction and social welfare would improve as a consequence (EC, 2010).

However, these assumptions were increasingly questioned. Firstly, evidence showed that liberalization and privatization were being implemented *unevenly* by country and sector in the EU (Clifton et al., 2006). Even when liberalization was legally in place, incumbents were sometimes reluctant to reduce their market share (Florio, 2014). Secondly, evidence from EC consumer satisfaction surveys suggested that satisfaction was not necessarily improving (Bacchiocchi et al., 2011; Fiorio and Florio, 2011). Results from satisfaction surveys, as well as empirical studies pointing to new challenges in markets associated with accessing and switching services, suggested that vulnerable citizens may be less well positioned to take advantage of public service reform than other groups of citizens (Clifton et al., 2016). Supply-side reform had not foregrounded consumer heterogeneity: it was based on the "average consumer", a reasonably well informed and active citizen (ECCG, 2013; Lavrijssen, 2014). European documentation started to admit that consumers were not as rational as reformers had assumed (ECCG, 2013; EP, 2012).

From the 2000s, practitioners paid increased attention to the problems that vulnerable citizens might face (EC, 2015a; EP, 2012; OECD, 2008). Following Burden (1998), vulnerability was not understood as a static, directly observable, phenomenon. Instead, specific socio-economic variables were understood as rendering citizens *potentially vulnerable* in *certain situations* (George et al., 2011; OECD, 2008).

Liberalization and deregulation *should* bring market choice: however, some citizens lacked the skills, experience or confidence for optimal decision-making in reformed markets (George *et al*., 2011). Hence, some citizens were taking less-than-optimal decisions when they chose to use a service or not, conducted a service search, switched services or selected a service tariff (Lunn, 2012). Behavioural approaches, building on insights from economics and psychology, were invoked by practitioners to help explain vulnerable citizens' experiences. Since the 2000s, insights from behavioralism have been increasingly integrated into the social sciences, including Public Administration (Tummers et al., 2016).

Traditionally, two different approaches are used to evaluate public infrastructure services from the citizen perspective: RP, information on citizens' observable choices; and SP, citizens' self-evaluation reflected in satisfaction (Van Dooren and Van de Walle, 2008). Both approaches have advantages and limitations. The advantage of RP is that it provides indicators which are considered relatively objective, such as citizen expenditure on a service. However, citizens' decisions may not always lead to their own utility maximization (Tummers et al., 2016). Hence, RP, alone, are insufficient to assess individual and social welfare. This is particularly important in the case of public infrastructure markets, which are not genuinely competitive, but quasi-markets: hence both leaving and switching supplier have a high cost for consumers. The limitation of SP is they are based on subjective information and, when analysed alone, do not lead to

clear conclusions as regards country comparisons (Jilke et al., 2015). Whitehead et al., (2008) showed that RP and SP can best be used as complementary, rather than alternative, sources of information, thus exploiting the respective strengths of both. This approach facilitates the enriching of data interpretation when analysing the socio-economic factors associated with consumer vulnerability in public services markets (Clifton et al., 2014).

Behavioural sciences offer various concepts which practitioners can use to better understand citizen experiences in public service markets. One example is the status quo bias: citizens, rather than being systematically active players in complex markets, are biased towards the existing situation, reflected in inertia (Kahneman et al., 1991). Inertia may slow down the take-up of new services and switching. Acknowledging this, in 2009, the EC Consumer Rights Directive recognized the importance of default options. Another important behavioural bias is choice overload: an excessive number of options makes choice too complex, reducing, rather than increasing, satisfaction (Jilke et al., 2016). Usually, citizens confront difficult choices by using heuristics (shortcuts for taking decisions, instead of exhaustive calculations), which may lead to failures in optimal decision-making.

Empirical evidence shows that groups of vulnerable citizens are more prone to experience these behavioural biases, in particular where decision-making is subject to complexity (Lunn and Lyons, 2010). Due to inertia, choice overload and/or an

inappropriate use of heuristics, vulnerable citizens may take poorer decisions when consuming services, reflected in paying a higher unit price. If this occurs and, if their consumption (quantity purchased) of the service is unrestricted, we observe:

H1. Vulnerable groups of citizens perceive services as less affordable, but spend more on them.

Vulnerable citizens such as the less-educated and those not employed are also more likely to earn a lower income. It is more likely therefore, they find services unaffordable. These citizens may restrict service consumption by purchasing a smaller amount (for instance, by limiting the number of phone calls), or purchase a lower quality service (such as contracting a poorer internet connection). So:

H2. Vulnerable groups of citizens perceive services as less affordable and spend less on them.

George et al. (2011) explained how behavioural biases and receiving a lower income frequently interact in groups of vulnerable citizens. For example, being on a low income means citizens are less likely to have access to cheaper credit and payment methods, complicating decision-making further. If the factors associated with *H1* (poorer decision-making as regards the price paid for the service) and *H2* (restricted service consumption derived from lower income) are combined for a group of citizens, they may be paying a higher unit price while participating less in the market, mutually compensating the effect on expenditure. So:

H3. Vulnerable citizens perceive services as less affordable, though they do not exhibit different expenditure decisions on them.

Finally, another possibility is that vulnerable citizens do not experience particular difficulties as regards service consumption. In this case, no significant differences between groups of vulnerable and other citizens as regards perceived service affordability are observed, so any differences in expenditure may be derived from various quantities purchased resulting from different needs and/or preferences. Hence:

H4. Vulnerable citizens do not perceive services as less affordable than other citizens.

Public infrastructure services and vulnerable citizens: Does country matter?

Market reform of public services risks "empowering" some citizens while "disempowering" others (Clifton et al., 2011). But does the country context in which citizens reside shape vulnerability?

Most social science would predict that the context in which citizens live matters (Lunn, 2012). Lavrijssen (2014) argues that country specificities, such as regulation, legal systems and norms, income structures, climate and culture, all impact on citizen experiences. However, to date, only a few empirical analyses of citizen experiences

with public infrastructure services have considered multiple countries in their sample, usually by including country dummy variables as controls. This approach has permitted controlling for country differences when estimating the general effects of regulation on citizens (Bacchiocchi et al., 2011; Fiorio and Florio, 2011) or the effects of citizens' specific socio-economic characteristics on their consumption experiences (Clifton et al., 2014). Jilke (2015), by introducing multilevel estimations, also controlled for potential clustering effects across countries when estimating the effects of citizens' socio-economic characteristics on their consumption experiences.

We analyse whether the consequences of the socio-economic variables representative of vulnerability on service expenditure and affordability differ depending on country context. Following Lavrijssen (2014), we take the country as an environment in which citizens with different socio-economic backgrounds interact with services. We focus on three large EU markets representing different reform maturities (advanced, intermediate and laggard markets) in 2006. Though EU telecommunications and electricity directives ensured some homogeneity across all Member States, the timing, sequence and extent of reform differed (Clifton *et al*., 2006). Market-oriented reform was justified by claims it would lower prices and increase choice. From the perspective of vulnerable citizens, then, it is of interest to enquire whether more reformed markets performed better than laggard markets.

Our country selection is based on the evolution of telecommunications and electricity reform in the UK, Italy and Spain. We use data on the timing and extent of reform in both markets from the OECD (2016). Telecommunications reform commenced before electricity reform, and was implemented faster and more completely, driven by technological change. The UK pioneered telecommunications reform in the EU: liberalization commenced from 1982 and was completed in a decade. By 1992, competition was real, as diverse new entrants had made significant inroads into market share. Privatization commenced from 1984 and was also completed early, by 1997. Spain represents an intermediate market: liberalization commenced in 1994, though the incumbent retained market share for longer than in the UK. New entrants took one decade longer in Spain than the UK to achieve market penetration. Privatization was promoted gradually, and was fully achieved in the late 1990s. Italy was a laggard: liberalization began from 1993, though the market penetration by new entrants proceeded at a similar pace to Spain. Privatization started from 1992 and was completed by 2003.

Electricity reform proceeded more slowly and unevenly across the EU. The UK commenced in 1990, reaching full liberalization by 1998. Vertical integration was reduced from 1990, maturing by 2001. The sector was fully privatized by 2002. Spain was an intermediate reformer: formal liberalization commenced in 1994 and was fully implemented by 2003, while vertical disintegration started later than in the UK.

Privatization occurred gradually and service provision was largely private by 2006. Italy was the laggard again: liberalization commenced in 1999 and was completed by 2007, while vertical disintegration commenced later than in the UK and Spain, from 1999, and progressed slowly. Privatization started from 2000 and state ownership still accounted for nearly one third of the incumbent by 2006.

Hence, by 2006, despite different timings, telecommunications reform was virtually accomplished in the UK, and advanced in Spain and Italy. In contrast, electricity reform had advanced most in the UK, followed by Spain, then Italy. So, by 2006, telecommunications reform had produced three, relatively homogeneous markets, while electricity reform was incomplete and irregular. Citizens in telecommunications markets across the three countries faced a significantly reformed market, which presents new, but similar, complexities for vulnerable citizens. In contrast, vulnerable citizens in electricity markets faced more moderately, and less uniformly, reformed markets, so their experiences may differ less to those of other citizen groups, but be more varied by country. From this, we build our fifth and sixth hypotheses, central to our analysis of country differences:

H5. Difficulties experienced by vulnerable citizens are more frequent, and more intense in telecommunications than in electricity markets.

H6. Difficulties experienced by vulnerable citizens in telecommunications markets are generalized across countries, whilst difficulties in electricity markets are more country-specific.

Data and methodology

Following Whitehead et al. (2008) we conduct a complementary analysis of citizens' RP and SP for telecommunications and electricity services, in order to compare the results in the UK, Italy and Spain.

The main sources for analysing SP on public infrastructure services are *Eurobarometers* (EB). We use microdata from EC (2007), a unique *Eurobarometer* providing insight on *all* citizens' opinions (both users and non-users) about services. It also provides a breakdown of citizens' socio-economic background. EC (2007) includes a sample of 1,337 individuals (UK), 1,006 (Spain) and 1,024 (Italy). We take as the dependent variable perceived service affordability, obtained from citizen responses, for each service, to the question: "In general, would you say that the price of […] is affordable or not?".

For RP, we use the information obtained, gathered and homogenized from Household Budget Surveys (HBSs) from the UK (ONS, 2006), Italy (ISTAT, 2006) and Spain (INE, 2006). These national surveys collect information on households' expenditure broadly disaggregated, and on the socio-economic characteristics of the

household representative. These provide large samples of 6,645 households (UK), 19,435 (Spain) and 23,639 (Italy). Our dependent variable is the logarithm of households' expenditure on a category of services (electricity and telecommunications), in euros per year. Here, telecommunications (fixed, mobile and internet) are considered as a joint category, since no disaggregation of individual services is conducted in the HBSs.

We interpret our results using insights from behavioural sciences (Lunn, 2012), rather than on assumptions about agents' behaviour, such as absolute rationality. To contrast SP and RP, we develop a comparison analysis, as defined by Whitehead et al. (2008): first, we perform separate regression analyses on both sources; then, we interpret this evidence jointly, according to the scenarios next described. We follow Kahneman and Thaler's (2006) behavioural approach to decision-making: first, individuals take a decision (RP); then, they express a perception based on the results obtained (SP). Firstly, analysing SP, we consider a difficulty exists for a group of vulnerable citizens when their specific socio-economic characteristic is associated with lower perceptions of service affordability. Next, we analyse RP to evaluate if this is reflected in different expenditure decisions.

Assuming that expenditure on a service is derived from a unit price multiplied by quantity purchased, we interpret the results according to four scenarios (Figure 1). Scenario 1, corresponding to *H1*, is where a socio-economic group is associated with

lower perceptions of service affordability, but greater expenditure on the service. Scenario 2 (*H2*) is where a socio-economic group is associated with lower perceptions of service affordability and also lower service expenditure. In scenario 3 (*H3*) a socio-economic group is associated with lower perceptions of service affordability but non-significant differences as regards expenditure. This scenario may result from a combination of lower consumption and a higher unit price paid, or may reflect dissatisfaction with other aspects of service provision. Finally, scenario 4 (*H4*) applies where no significant differences are observed regarding service affordability.

The scenarios, as the hypotheses, are mutually exclusive. Scenarios 1, 2 and 3 indicate the existence of particular difficulties for vulnerable citizens, whilst scenario 4 reflects that this is not the case.

FIGURE 1 HERE

Do the experiences of vulnerable citizens as regards these services differ depending on country context? We first perform general estimations for the three countries to contrast which scenario applies to each service and socio-economic group. Then, we reproduce the estimations introducing interaction effects between each socio-economic dimension and the country of residence. We use the UK as reference in these additional estimations, so the effect for each socio-economic variable represents the

effect of that characteristic for those living in the UK. The interaction effect of each socio-economic variable and the country (Italy and Spain) indicates the effect that characteristic has upon those living in Italy and Spain, respectively, versus those in the UK. So, we establish the scenario applicable for the "first-mover" UK, and see whether this coincides with a "follower" (Spain) and a "laggard" (Italy).

To operationalize the empirical analysis, as regards SP, from the information provided by EC (2007) we define a binary variable *y*, being:

$y_i = 1$, if the individual *i* states the service is "affordable".

$y_i = 0$, otherwise.

Assuming that the probability of service affordability is distributed as a standard normal, we relate *y* to a vector of independent variables *x*, through the following probit model:

$$\Pr(y_i = 1) = \Phi(x_i'\beta)$$

From this model, we estimate the marginal effects of each independent variable x_j on the dependent variable, using the following equation:

$$\frac{\partial \Pr(y_i = 1)}{\partial x_{ij}} = \Phi(x_i'\beta)\beta_j$$

These marginal effects reflect the estimated change in the probability of perceiving the service as affordable associated with a unitary change in each independent variable.

As regards RP, for each category of services, the dependent variable is analysed using:

$$\ln(EXP_i) = x_i'\beta + u_i$$

Where:

EXP_i is household *i* expenditure on a category of services.

x_i is a vector of independent variables for household *i*.

Independent variables were selected based on the citizen vulnerability literature (OECD, 2008; George et al., 2011). We select variables where available and comparable data are available both in the *Eurobarometer* and the HBSs. These are: 1) Education, citizens with basic education (*EDUCBAS*) versus citizens with higher education (category of reference), incorporating secondary education as a control variable; 2) Age, citizens over 64 (*AGE>64*) versus younger citizens (considering those between 35 and 49 as the category of reference), including those under 35 and those between 50 and 64 as controls; and 3) Employment status, non-employed (*NOEMPLOYED*) versus employed citizens. In RP, this information refers to all household members (for employment), and to the reference person of the household according to the survey (for education and age). We also include control variables available in both SP and RP: country of residence, controlling for the differential elements linked to country context (in particular, country differences in satisfaction with life in general or satisfaction with services provided); household size (capturing the

effect of scale on consumption); housing occupancy status (differentiating home-owners and the rest); and gender. For RP, we also include the logarithm of household equivalent expenditure (according to the OECD modified scale).

Results

Estimations for service affordability (SP) and for service expenditure (RP) are shown in Tables 1 and 2, respectively. Table 3 summarises results obtained for each sector and country, interpreted according to the four scenarios.

TABLES 1 AND 2 HERE

Telecommunications

Education

From the general estimations, we find that perceptions of service affordability are lower for citizens with basic education for *all* the telecommunications services when compared to better-educated citizens. The gap differs according to the technology, being highest for internet (-17.9% of probability of perceiving the service as affordable). Results from RP show that expenditure on telecommunications by lesser-educated citizens is lower than that by better-educated citizens. For these citizens, lower service

affordability, combined with lower expenditure, is captured by scenario 2: they restrict their consumption in telecommunications markets by limiting the amount of the service they purchase and/or their quality.

Does country matter? Using country interactions, we find that the lower perceptions of affordability of telecommunications among the less-educated are observed in the UK for mobile telephony and the internet. Results for Italy and Spain in SP, when compared to the UK, are similar, except that internet affordability among the less-educated is even lower in Italy. But country differences exist as regards RP: in the UK, the less-educated are not associated with lower expenditure on telecommunications, whilst in Italy and Spain they are. So, scenario 2 holds when interpreting the results in Italy and Spain. In the UK, the explanation needs to be combined with a higher unit price paid, or with dissatisfaction with other dimensions (scenario 3).

Age

Citizens over 64 perceive the internet (-27.8%) and mobile telephony (-18.8%) as less affordable than the reference group (those between 35 and 49). This is not observed for fixed telephony. As regards RP, expenditure on telecommunications among citizens over 64 is generally higher. The elderly exhibit inertia, opting to use fixed telephones more than younger citizens, instead of newer technologies such as mobile and internet

services (Clifton et al., 2014). In consequence, older citizens obtain poorer results: they are less satisfied but pay more for telecommunications (for example, using a fixed phone to call a mobile) (scenario 1).

Introducing country interactions, lower perceived affordability among the elderly is observed in all three countries for mobile telephony and internet (particularly in the UK). Regarding fixed telephony, in the UK, the elderly perceive the service as more affordable than younger citizens, but this is not observed in Italy and Spain. As regards RP, expenditure on telecommunications among the elderly is greater than for other citizens in the UK. However, this effect is unclear in Italy and Spain. Scenario 1 reflects the situation of older citizens in telecommunications markets in the UK (except for fixed telephony), whilst Italy and Spain are closer to scenario 3.

Employment

Considering the general estimations, non-employed citizens perceive mobile telephony and internet as slightly less affordable services than other citizens (-4.4%, in both cases). This effect is non-significant for fixed telephony. As regards RP, expenditure on telecommunications among these citizens is lower. Lower service affordability combined with lower expenditure may reflect particular difficulties of the non-employed in telecommunications, translated into a reduced participation (consumption) (scenario 2). As in the case of lesser-educated citizens, the non-employed restrict

consumption in telecommunications markets. Difficulties experienced by these citizens may be compounded by their receiving lower and less predictable incomes (George et al., 2011).

Introducing country interactions, lower perceived affordability of mobile telephony, the internet and fixed telephony is observed among the non-employed in the UK. In Spain, the results do not significantly differ from those in the UK. However, in Italy, the relationship is unclear. Regarding RP, expenditure on telecommunications in the UK is lower for the non-employed than for their counterparts. This effect is similar in Italy and Spain. Hence, in the UK and Spain, scenario 2 best represents the situation of non-employed citizens in telecommunications markets, while, for Italy, scenario 4 is more appropriate.

Electricity

Education

The first general estimations show that less-educated citizens perceive electricity as less affordable (-7.4%), and spend less on the service than better-educated citizens (scenario 2). However, when introducing country interactions, we observe that, in the UK, basic education is not associated with lower affordability perceptions. Spain shows a similar result but, in Italy, basic education *is* associated with lower perceived service affordability, compared to the UK. As regards RP, expenditure on electricity is lower

among less-educated UK citizens, but this effect is unclear in Italy and Spain. Interpretation of the results differs by country. In the UK and Spain, no particular difficulties are detected for less-educated citizens, and expenditure differences can be explained by a lower quantity purchased (scenario 4). However, in Italy, lower service affordability combined with unclear effects on expenditure (scenario 3) may result from lower consumption combined with a higher unit price (i.e., resulting from poorer energy saving strategies), or it may reflect dissatisfaction with other aspects of service provision.

Age

In the first general estimations, no significant differences in electricity affordability are detected between older citizens and the reference category. Thus, greater expenditure on the service observed can be interpreted as a result of a larger quantity purchased (scenario 4). Introducing country interactions, this appears to be the case of the UK, and also Italy, as non-significant differences in SP are observed between both countries. However, in Spain, older citizens are less satisfied with electricity affordability, whilst the effect of this characteristic on expenditure is unclear (scenario 3).

Employment

No general differences in service affordability perceptions are found. As regards RP, expenditure on electricity by the non-employed is generally lower than by the employed. Introducing country interactions, differences in service affordability regarding employment are non-significant. Thus, differences in expenditure on electricity affecting those not employed can be interpreted in all three countries according to different quantities purchased (scenario 4).

TABLE 3 HERE

Conclusions

Practitioners and scholars worry whether all citizens are equally able to deal with the increasing complexity produced after market-oriented reform of public services: the salience of "vulnerable citizens" has risen on political agendas (EC, 2012; EP, 2012; ECCG, 2013). Initial research proxied socio-economic features associated with vulnerability and examined these as regards citizen satisfaction and behaviour. However, most studies were nationally based, and little was known about how country contexts influenced experiences of vulnerability (Lavrijssen, 2014).

We comparatively analysed country differences as regards the relation between citizens' socio-economic background and their experiences in electricity and

telecommunications markets, focusing on three dimensions representative of vulnerability. We established that socio-economic differences mattered as regards citizen expenditure and service affordability, and then tested if and how country differences might influence vulnerable citizens' experiences. We selected three countries to represent pioneer, follower and laggard reform experiences, and two sectors where reform had been relatively fast and homogeneous (telecommunications) and slow and heterogeneous (electricity). Using reform and regulation as a proxy for country differences, we anticipated that vulnerable citizens from different countries might experience similar, significant problems in markets where reform had advanced uniformly, whereas citizens might experience diverse and less significant challenges where market reform was slower. Given the faster and uniform pace of telecommunications reform, we surmised country context would matter more in electricity than telecommunications markets.

We established that citizens characterised by specific socio-economic backgrounds associated with vulnerability frequently perceived services were less affordable while they exhibited different service expenditure patterns when compared to other citizen groups. We interpreted these results using four possible scenarios. Overall, as predicted, the main difficulties detected were concentrated in telecommunications services, particularly in the newest ones: mobile telephony and the internet. Vulnerable citizens reduced their participation in telecommunications markets (particularly, less-

educated citizens and those who did not work), or restricted their use in favour of more traditional and less efficient services (particularly, older citizens).

We also found that most of the difficulties in telecommunications markets for vulnerable groups appear across all three countries. However, country context did matter since the concrete scenario to understand problems experienced by vulnerable citizens frequently differed depending on the country. Country context was particularly important for electricity. Though problems experienced by vulnerable citizens were less frequent than for telecommunications, they were also more country-specific. While no particular issues were found in the UK, in Italy, challenges were apparent for less-educated citizens, and in Spain, for older citizens.

The interaction between socio-economic characteristics and country contexts offers further interesting insights. Less-educated citizens are more frequently associated with difficulties as regards the three services in Italy than the UK and Spain. Conversely, the non-employed are more frequently associated with problems in the UK and Spain than in Italy. Country-specific and contextual factors are important for the definition of vulnerability. Thus, the interaction between country context and socio-economic background is instrumental for a real understanding of public infrastructure services from the citizen perspective.

These findings provide evidence for practitioners seeking to reinforce social cohesion and equity through improving the experiences of vulnerable groups in public

infrastructure markets. Armed with more detailed empirical evidence about specific contexts, regulation can be used to improve citizen satisfaction. Regulation can target specific citizens found to be experiencing challenges in concrete public services. For example, clearer, accessible information and support to switch service provider should ease the challenges faced by elderly citizens. More surveys, comparable across countries and time, would facilitate the application of techniques such as panel data analysis and multilevel analysis to deepen analysis. Furthermore, work is needed to explore the interaction between the effects of different socio-economic dimensions representative of vulnerability, such as non-employed and being less educated.

Finally, country context matters: difficulties faced by specific socio-economic groups may be more or less intense and homogeneous in different contexts. This has practical use for practitioners. First, new regulation can be prioritized in those markets and for those socio-economic groups where difficulties are most intense. Second, where difficulties are homogeneous, common approaches to regulation may be optimal; where difficulties are heterogeneous, specific approaches are required. Incorporating these insights into regulation is a promising means of ensuring the benefits of reform reach all citizens.

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Figure 1. Contrasting stated and revealed preferences: four scenarios to interpret results

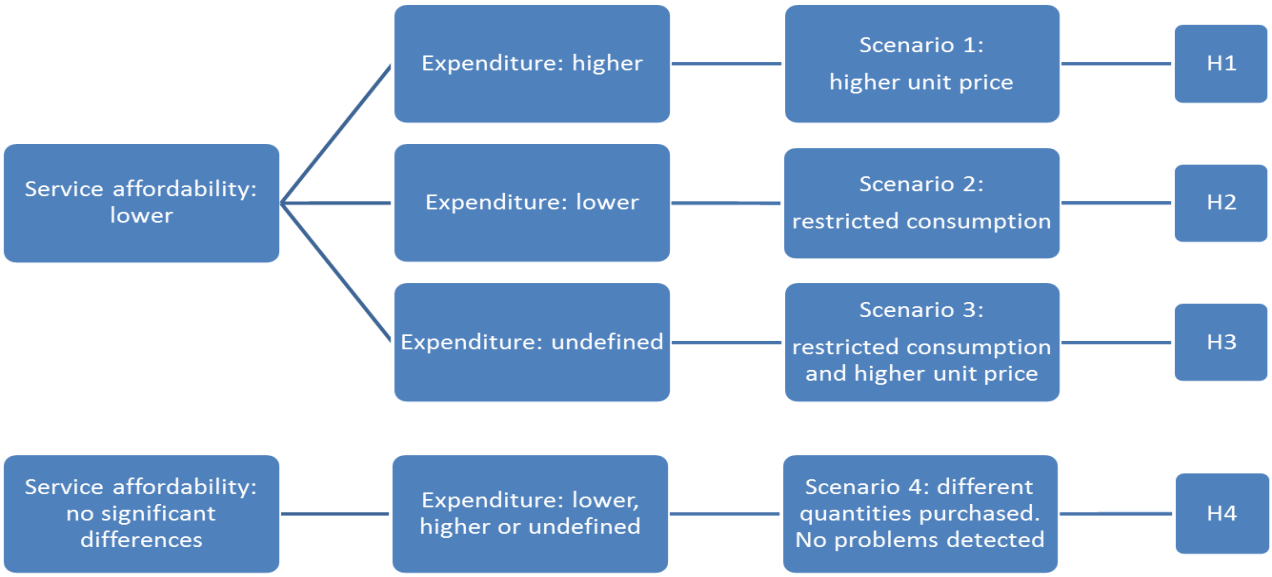

Table 1. Marginal effects on services affordability

Variable	Electricity		Fixed tel.		Mobile tel.		Internet	
EDUCBAS	-0.074***		-0.082***		-0.115***		-0.179***	
	(0.026)		(0.026)		(0.026)		(0.026)	
EDUCBAS (UK)		-0.012		-0.036		-0.130***		-0.144***
		(0.037)		(0.039)		(0.036)		(0.036)
EDUCBAS-ITA (vs UK)		-0.133***		-0.056		-0.000		-0.076*
		(0.044)		(0.045)		(0.043)		(0.044)
EDUCBAS-SPA (vs UK)		-0.024		-0.062		0.048		-0.038
		(0.045)		(0.046)		(0.044)		(0.044)
EDUCSEC	-0.074***	-0.072***	-0.065**	-0.060**	-0.058**	-0.060**	-0.096***	-0.099***
	(0.027)	(0.026)	(0.027)	(0.026)	(0.027)	(0.027)	(0.027)	(0.027)
EDUCUNIV (ref.)								
AGE<35	-0.005	-0.007	0.003	0.001	0.036	0.037	0.050**	0.050**
	(0.023)	(0.023)	(0.022)	(0.022)	(0.023)	(0.023)	(0.022)	(0.023)
AGE 35-49 (ref.)								
AGE 50-64	-0.017	-0.018	0.036	0.032	-0.028	-0.031	-0.045*	-0.048*
	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.025)	(0.025)
AGE>64	-0.065**		0.004		-0.188***		-0.278***	
	(0.032)		(0.032)		(0.031)		(0.032)	
AGE>64 (UK)		-0.025		0.095**		-0.195***		-0.366***
		(0.046)		(0.048)		(0.041)		(0.041)
AGE>64-ITA (vs UK)		-0.000		-0.112*		0.054		0.160**
		(0.061)		(0.062)		(0.059)		(0.067)
AGE>64-SPA (vs UK)		-0.138***		-0.152***		-0.049		0.125**
		(0.055)		(0.056)		(0.051)		(0.054)
NOEMPLOYED	-0.012		-0.031		-0.044**		-0.044**	
	(0.020)		(0.020)		(0.020)		(0.020)	
NOEMPLOYED (UK.)		-0.040		-0.099***		-0.083**		-0.078**
		(0.036)		(0.037)		(0.035)		(0.033)
NOEMPLOYED-ITA (vs UK)		0.021		0.128***		0.088*		0.075
		(0.047)		(0.047)		(0.046)		(0.045)
NOEMPLOYED-SPA (vs UK)		0.070		0.048		0.012		0.031
		(0.048)		(0.048)		(0.047)		(0.046)
1PERSON	-0.021	-0.023	-0.048*	-0.045*	-0.083***	-0.083***	-0.084***	-0.082***
	(0.026)	(0.026)	(0.026)	(0.026)	(0.025)	(0.025)	(0.027)	(0.026)
2PERSONS (ref.)				0.011				
3PERSONS	-0.022	-0.023	0.012	0.011	0.024	0.022	0.014	0.013
	(0.026)	(0.026)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
4PERSONS	-0.085***	-0.088***	0.007	0.003	0.016	0.012	0.065**	0.063**
	(0.026)	(0.026)	(0.026)	(0.025)	(0.026)	(0.026)	(0.026)	(0.026)
>4PERSONS	-0.043	-0.048	-0.003	-0.005	-0.019	-0.026	0.013	0.008
	(0.032)	(0.032)	(0.033)	(0.033)	(0.032)	(0.032)	(0.032)	(0.032)
WOMAN	-0.014	-0.014	0.011	0.012	-0.000	-0.002	-0.047***	-0.047***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)

NOHOUSEOWN	-0.079***	-0.076***	-0.112***	-0.111***	-0.115***	-0.115***	-0.105***	-0.105***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
UK (ref.)								
ITALY	-0.232***	-0.179***	-0.313***	-0.327***	-0.160***	-0.217***	-0.220***	-0.246***
	(0.020)	(0.032)	(0.019)	(0.031)	(0.020)	(0.032)	(0.020)	(0.031)
SPAIN	-0.124***	-0.126***	-0.207***	-0.164***	-0.148***	-0.169***	-0.148***	-0.165***
	(0.021)	(0.036)	(0.021)	(0.037)	(0.020)	(0.037)	(0.021)	(0.036)
N	3,367	3,367	3,367	3,367	3,367	3,367	3,367	3,367
Wald chi2	174.55	200.91	287.24	312.95	274.05	339.61	381.44	499.60
Prob > chi2	0.000	0,000	0,000	0,000	0,000	0,000	0,000	0,000

Standard errors in parenthesis. Statistical significance at 1% (***), 5% (**), 10% (*).

Table 2. Estimates on households' expenditure on the services

Variable	**Electricity**		**Telecommunications**	
Constant term	1.650***	1.628***	-0.428**	-0.549**
	(0.219)	(0.216)	(0.218)	(0.220)
EDUCBAS	-0.083***		-0.121***	
	(0.030)		(0.027)	
EDUCBAS (UK)		-0.220***		-0.022
		(0.058)		(0.046)
EDUCBAS-ITA (vs UK)		0.235***		-0.117***
		(0.056)		(0.044)
EDUCBAS-SPA (vs UK)		0.168***		-0.206***
		(0.058)		(0.051)
EDUCSEC	-0.058*	-0.067*	-0.041	-0.038
	(0.030)	(0.031)	(0.028)	(0.028)
EDUCUNIV (ref.)				
AGE<35	-0.128***	-0.115***	-0.046	-0.034
	(0.041)	(0.041)	(0.036)	(0.036)
AGE35-49 (ref.)				
AGE 50-64	0.221***	0.225***	0.127***	0.122***
	(0.027)	(0.027)	(0.022)	(0.022)
AGE>64	0.385***		0.109***	
	(0.038)		(0.033)	
AGE>64 (UK)		0.877***		0.276***
		(0.083)		(0.069)
AGE>64-ITA (vs UK)		-0.787***		-0.314***
		(0.079)		(0.070)
AGE>64-SPA (vs UK)		-0.735***		-0.164***
		(0.083)		(0.077)
NOEMPLOYED	-0.124***		-0.333***	

	(0.042)		(0.038)	
NOEMPLOYED (UK)		-0.308***		-0.365***
		(0.083)		(0.071)
NOEMPLOYED-ITA (vs UK)		0.290***		0.102
		(0.082)		(0.071)
NOEMPLOYED-SPA (vs UK)		0.341***		-0.020
		(0.086)		(0.079)
ONEMPLOYED	0.003	0.002	-0.087***	-0.086***
	(0.025)	(0.025)	(0.021)	(0.021)
1PERSON	-0.262***	-0.276***	-0.456***	-0.469***
	(0.030)	(0.030)	(0.029)	(0.029)
2PERSONS (ref.)				
3PERSONS	0.203***	0.209***	0.281***	0.282***
	(0.030)	(0.030)	(0.025)	(0.025)
4PERSONS	0.373***	0.369***	0.444***	0.444***
	(0.034)	(0.034)	(0.029)	(0.029)
>4PERSONS	0.512***	0.524***	0.640***	0.651***
	(0.054)	(0.054)	(0.038)	(0.038)
WOMAN	-0.042	-0.025	0.128***	0.139***
	(0.027)	(0.027)	(0.023)	(0.023)
NOHOUSEOWN	-0.437***	-0.421***	-0.094***	-0.101***
	(0.030)	(0.030)	(0.024)	(0.024)
LnEXPENDITUREeq	0.422***	0.423***	0.685***	0.690***
	(0.020)	(0.020)	(0.021)	(0.021)
UK (ref.)				
ITALY	0.283***	0.299***	-0.085***	0.023
	(0.025)	(0.034)	(0.021)	(0.028)
SPAIN	0.099***	0.113***	0.002	0.149***
	(0.027)	(0.036)	(0.024)	(0.033)
N	49,719	49,719	49,719	49,719
F	108.35	132.59	273.67	238.73
Prob > F	0.000	0.000	0.000	0.000

Standard errors in parenthesis. Statistical significance at 1% (***), 5% (**), 10% (*).

Table 3. Summary of the scenario/hypothesis applying to each service, socio-economic dimension and country

SERVICE	SOCIO-ECONOMIC CHARACTERISTIC	GENERAL SCENARIO	COUNTRY	COUNTRY-SPECIFIC SCENARIO
Telecommunications	Lesser-educated	2	UK	3
			Italy	2
			Spain	2
	Older	1	UK	1
			Italy	3
			Spain	3
	Non-employed	2	UK	2
			Italy	4
			Spain	2
Electricity	Less educated	2	UK	4
			Italy	3
			Spain	4
	Older	4	UK	4
			Italy	4
			Spain	3
	Non-employed	4	UK	4
			Italy	4
			Spain	4