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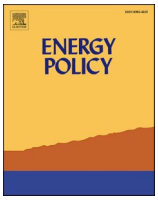

When indicators fail electricity policies: Pitfalls of the EU's retail energy market Barrier Index

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ABSTRACT

An important goal of EU energy policy is to ensure energy justice during the green transition. The Commission considers the functioning and competitiveness of the retail energy market for households to be proxies for justice and consumer welfare. The European Barriers in Retail Energy Market Project (the EB Project) is instrumental in assessing and ensuring this competitiveness. The EB Project centres on the creation of the Barrier Index (BI), which identifies barriers to entry in the national markets for electricity and gas suppliers across the EU and ranks Member States on the basis of eight indicators. This article critically assesses the reliability of the BI. A faulty BI could lead Member States down the wrong path or towards bad decisions with respect to the regulation of the retail energy market in light of the EU's policy goals. This research identifies problems with the methodology and data collection regarding the construction of the BI indicators in the electricity market specifically. The latter is exemplified through case studies of the Dutch and Portuguese national reports. The identified issues call into question the reliability of the BI as a whole. Possible measures to improve the quality of indicators are discussed in the conclusions.

1. Introduction

Through its Communication on the Green Deal, the European Commission has made it clear that the future of the European Union's economy is one in which high resource-efficiency and low carbon usage are the main focus. At the same time, the resulting economy (and the transition towards it) needs to be one that is 'just and inclusive', protecting Europe's natural and human capital across industries and Member States (European Commission, 2019). Over the past decades, the EU has successfully created an internal market driven by a "highly competitive social market economy" (Article 3, TEU). The creation and maintenance of such a market, based on balanced economic growth, fair competition, ever-increasing environmental sustainability, and a high level of consumer protection, have long justified the 'EU's existence. The most recent refocus of these ambitions to a zero-net emissions economy promises positive changes to consumers and citizens. At the same time, the EU's continued emphasis on carbon pricing in achieving its own ambitions, as well as its international agenda as reflected in the Paris Agreement's objectives, raises concerns as to how the costs of this transition to a low carbon economy will be dispersed (European Commission, 2019).

Retail energy markets are especially implicated in these changes and could be an important forum in which many of these changes play out. Since the addition of Title XXI on Energy in the Treaty on the Functioning of the European Union (TFEU), retail energy markets could similarly be expected to fit the European model of a competitive and open market with good conditions for enabling energy justice (Jenkins et al., 2016; Sovacool 2016; Heffron et al., 2018) and consumers welfare (Esposito and Almeida, 2018). In practice, however, the retail energy markets for households, which aim to provide energy services to individual consumers, are characterised by a distinct lack of competition and severe barriers to entry for newcomers.

Although the increase in competition in the retail energy market for households tends to be gradual, the delay in removing barriers for new entrants suggests a policy failure that ultimately harms many potential providers and consumers. This policy failure specifically refers to a set of actions taken (or not taken) by Members States in the implementation phase (Nakamura and Smallwood, 1980), which has resulted in so-called "material policy failure" (as per Sokolowski and Heffron, 2022). This is problematic in itself, and even more so when considering

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the role of the retail energy market in the EU's future plans for its economic and energy transitions, in which the decentralisation and deployment of renewable electricity rely, *inter alia*, on an active role of consumers as prosumers and potential suppliers of electricity through peer-to-peer trading (Almeida et al., 2021).

In order to identify mistakes, wrong paths, and bad decisions taken by Member States that led to failures of EU energy policy, the European Commission ordered the European Barriers in Retail Energy Market Project (the EB Project). The EB Project created a new matrix for the market barriers in relation to retail energy markets for the residential market segment: the Barrier Index (BI). The BI is based on a correlation matrix of eight indicators, including market foreclosure by price regulation, regulatory burdens, complexity licensing procedures. The resulting report, which was released in February 2021, ranks the openness of Member States' retail energy markets to new entrants based on the BI, finding that Slovenia, Sweden, the Netherlands, Finland, Czech Republic and Portugal are the most entrant friendly, while Cyprus, Bulgaria, Poland, Lithuania and Romania are high-barrier countries (Final Report 2021).

The Commission had high expectations with respect to the EB Project and its related BI, especially as to the BI's ability to identify policy failures that resulted in barriers for more competitive and just retail markets. While the Project provides several conclusions and recommendations regarding these issues, the divergence between the BI and other quantitative indicators puts in question the reliability of the BI as a basis for these results. For example, the European Union Agency for the Cooperation of Energy Regulators (ACER) has relied on the Herfindahl-Hirschman Index (HHI) in determining the market concentration in retail energy markets. Given that both indices measure comparable problems (i.e. the openness of national retail energy markets and by extension their potential competitiveness), one would expect a country with high barriers to entry – a high BI score – to similarly have a high HHI. However, this has not been the case. For example, based on the Barrier Index for electricity markets, both the Netherlands and Portugal are ranked among the Member States with the fewest barriers and considered entrant friendly, suggesting that competition in these markets is possible and even likely. Their respective HHI scores for the household market, however, are very different; 2,000 and 6,000, respectively. In addition, other discrepancies can be pointed out, such as Denmark ranking 12th among the high-barrier countries, despite having an HHI score of only 700 points, the lowest for household markets among all the Member States; Luxemburg ranking 14th among the BI, in the middle, despite having one of the worst HHI scores of almost 8,000 points.

The divergences between the HHI and BI's results raise *prima facie* concerns about its reliability. Therefore, this article provides a critical assessment of the EB Project, in two ways. First, it tests the validity of methodology to build the BI by revisiting the indicators' identification, selection, and categorisation. Despite the identified flaws, we consider the construction of indicators still falling into a sphere of discretion, and the reliability test of the BI needs to go even further (Section 3). Second, the research also tests the reliability of data collection and, to do so, we include a case study that compares the Dutch and Portuguese national reports, investigating a subset of indicators in-depth (Section 4). This case study points to unjustified omissions and inaccuracies in the discussion of market concentration (Section 5), price regulation (Section 6), and comparability of offers (Section 7).

Given the BI's centrality in the Commission's strategy to improve and shape the implementation of EU energy policy, any flaws and omissions in the BI could have severe detrimental effects, misleading Member States to take wrong paths or make bad decisions. In our policy recommendations (Section 8), we reflect on how to address both indicator methodology and data reliability in relation to the BI. In order to contextualise the use of the BI, and our discussion on its added value, we first discuss existing literature on competitiveness and energy justice in retail energy markets, the use of indicators to determine this competitiveness, and the broader institutional and academic discussion on governance by indicators (Section 2).

2. Literature review

There is widespread agreement on the economic benefits of creating competitive wholesale markets (Joskow, 2005; Glachant, 2017; Meeus, 2020). In contrast, the benefits of creating retail competition for household consumers continue to be debated. The first layer of the literature debates whether retail markets should be competitive at all. Joskow (2000) sees a limited role of competition for retail energy markets to provide new value-added services considering the physical attributes to the electricity supply. In his response to Joskow, Littlechild (2000) argues that retail price competition is a necessary component for creating competition in wholesale markets, and the latter could not function properly without the former.

The second layer of the literature does not contest the importance and benefits of competitive retail markets in general but discusses the benefits of extending it to the household segment. Newberry (2006) upholds that retail competition must remain available only to large customers while residential and small commercial is supplied by a single company operating under regulated tariff. Littlechild (2003, 2014, 2016, 2019), however, has advocated for the opposite. Competition must be gradually expanded to households, although some limitations concerning demand or supply-side need to be considered by policymakers.

The economic reasoning behind the policy of expanding competition to the retail energy market, and more precisely to its household segment, is that a perfect competition could enable utility maximisation and, ultimately, consumer welfare (Esposito and de Almeida 2018). Similarly, a growing philosophical movement (Heffron et al., 2018) endorses energy justice as a foundation principle of energy law and policy, while others picture it as an ethical turn (McHarg, 2020). The existing literature divides energy justice into five core themes—procedural justice, restorative justice, recognition justice, cosmopolitan justice, and distributive justice (Jenkins et al., 2016; Heffron, 2022). The latter conveys the normative claim that energy systems should fairly disseminate both benefits and costs of the energy services (Sovacool et al., 2016), including distribution of benefits to consumers.

The third layer of literature concerns the normative and descriptive claims about the regulation that better fits for achieving certain policy goals (Sokolowski, 2016); or, in contrast, whether and why it fails to deliver a competitive and just retail energy market for consumers. Price (2018) argues that tariff regulation might not be the main barrier to having more competitive retail energy markets for households, drawing attention, for instance, to different forms of payments that consumers use to choose to pay their bills. Joskow and Tirole (2004) argue that consumers whose traditional meters do not allow or inform real-time consumption and price variation are not responsive and have less interest in switching suppliers. Wilson and Price (2010) go even further and question consumers' ability to choose the best supplier. CEER (2016) has published a work identifying not only one but five barriers to supplier switching in the EU retail energy market, namely insufficient economic benefits for consumers, lack of trust, complex switching procedures, consumer loyalty and unjustified early termination fees. In light of the CEER report, the BI Projects (2021) has been the most recent research effort to provide a holistic view of all possible barriers on the demand and supply side.

The abovementioned studies are devoted to identifying the causes of energy policy failure. By contrast, little work has been done to define and conceptualise policy failure itself. For Sokołowski and Heffron (2022), 'energy policy failure is any policy that does not meet local, national and international energy and climate goals' and 'where just outcomes are not delivered'. Thus, there is an important distinction between failures in designing energy policies that converge to energy justice's philosophical and normative purposes and, in contrast, failures

in planning and implementing energy policies that already aimed to deliver just outcomes (Nakamura and Smallwood, 1980). The BI Project (2021) refers to the latter. The Project aims to identify the barriers that preclude Member States to accomplish EU energy policies of ensuring a fair and competitive retail energy market for households. The present article looks neither at failures in designing policies nor their implementation, but rather identifies pitfalls in building indicators, like the BI project, which could mislead Member States in implementing EU energy policies.

A strand of literature relevant to our research relates to governance by indicators; a process that simplifies raw data about complex social phenomena through quantification in order to condense the information in easily comparable, highly concentrated indexes (see, generally, Davis et al., 2012a,b, Supiot and Brown, 2017; Malito et al., 2018). In this regard, a highly influential research program builds on the seminal 'law and finance' papers by La Porta et al. (1998). One famous and controversial claim supported by this literature is the tendency of common law countries to provide a more friendly environment for economic development compared to civil law ones. Over time, this line of inquiry has evolved beyond the initial scope of La Porta and his co-authors' investigation, becoming known as legal origins (Oto-Peralías and Romero-Ávila, 2017). The 'law and finance' and 'legal origin' scholarships have been criticised for methodological over-simplifications, leading to misleading results; However, the critics recognise the value of the research program and try to explain how to improve its foundations and avoid its pitfalls (Siems, 2007; Deakin, 2015).

Among policymakers, governance by indicators has become increasingly popular. The most well-known example of this is the Doing Business Report series by the World Bank (2020). Similarly, the OECD (2018) has supported governance through indicators within the broader framework of evidence-based policy-making. In the EU, the Commission's Better Regulation agenda (2015a, 2015b) incorporates some of these elements by focusing on 'best available evidence'. The institutionalisation of governance by indicators – while popular in practice – has been criticised by academic commentators (Trevor et al., 2013; McCormack, 2018; Holden and Pekmezovi, 2020; Esposito and Sibony, 2021).

The EB Project attempts to support policymakers in fostering competitive retail energy markets by providing tools for governance by indicators. As this literature review shows, this policy objective is extremely complex and challenging. At the same time, the lasting appeal of supporting governance with indicators goes hand in hand with methodological, accuracy and, ultimately, reliability concerns. Against this background, this article investigates the EB Project and, in particular, the Barrier Index it has developed.

3. The European Barrier index in Retail Energy Market Project: methodological validity

The Barrier Index (BI) was created under the umbrella of the European Barriers in Retail Energy Market Project (the EB Project). The European Commission started the EB Project in order to assess the competitiveness of European retail electricity and gas markets, specifically the residential market segment. The EB Project covers the 27 EU Member States, Great Britain, Norway and Switzerland.

The results of the EB Project were published in February 2021, in the form of two general reports – one targeted at a general audience (Final Report 2021) and one containing the detailed methodology adopted for the index and the country rankings (Index Report 2021) – supplemented by 28 lengthy national reports. Its findings are based on a literature review of over 100 public reports and surveys, as well as interviews with nearly all relevant national regulatory authorities (NRAs), around 150 suppliers and many other stakeholders across all Europe. In addition, the Project synthesised expert knowledge, and data gathering to collect market metrics, market processes and index values (Final Report 2021, Index Report 2021).

The Barrier Index was an important deliverable within the EB Project. The Index provides a tool that allows for scoring across eight indicators, which in turn give a seemingly straightforward method for comparing country performance. For each indicator, the BI scores European countries between 0 and 100. Barriers to entry increase with the score, i.e. a score of "0" means no barriers at all, a score of "100" means it is impossible to enter. This scoring allows for ranking: the country with the best overall BI for the electricity sector is Norway (16), the country with the worst score is Cyprus (84).

Many of the best-known indicators fall into the category that Ravallion (2010) refers to as "mashup" indexes, where the compiler has substantial discretion in choosing what specific indicators to include, how to weight them or to smooth over data unavailability (also Davis et al., 2012a,b). This is the reason why the EB Project declares to have partially followed the methodological recommendations given in the Handbook on Constructing Composite Indicators by the Organization for Economic Cooperation and Development and the Commission's Joint Research Center (OECD and JCR, 2008), which was later refined by the Composite Index Research Group (Becker et al., 2019). The OECD-JRC Handbook was written to improve indicator methodologies through a ten-step process related to design, development and dissemination, much of which the EB project explicitly claims to have incorporated in its methodology.

There are three-step processes related to creating the BI subjected to methodological validity—identifying indicators, selecting and categorising them, and normalisation. In line with the OECD-JRC Handbook, the EB Project starts by establishing a theoretical framework encompassing the concept of barriers, the structure of the Index, and the selection criteria of indicators. The Project adopts a twofold definition of barriers: barriers to entry and barriers to compete. This broad reading of the concept of barriers significantly increases the complexity of the BI. Upon the explicit request of the Commission, the EB project, therefore, narrowed its focus to barriers which are (i) energy sector-specific, (ii) undue or illegitimate,[1] and (iii) solvable through regulation. Nonetheless, the EB project compiles a long list of forty-five individual barriers, which are then divided into sub-groups, resulting in four barrier blocks, which in turn are divided into nine sub-groups of barriers categories. The four barrier blocks – regulatory disincentivisation; market inequality; operational and procedural hindrances; customer inertia – and their respective categories and individual barriers are summarised in Table 1.

Even though the identification and categorisation of barriers cast a wide net, these variables do not represent an exhaustive, or uncontroversial, list. The Report neither discloses nor explains the basis for listing and selecting the individual barriers that set the grounds for building the BI composite indicators. Instead, it provides the source of information and data collection in more general terms, namely a number of literature reviews of public reports, surveys and interviews with national regulatory authorities (NRAs), suppliers and other stakeholders (Final Report 2021, Index Report 2021). The length of the resulting list of individual barriers does not indicate comprehensiveness in coverage: for example, in 2015, ACER issued the results of a composite index with a similar purpose to the BI (ACER and CEER, 2015), the ACER Retail Competiton Index (ARCI). Despite using fewer indicators, ARCI's indicators relied on

[1] It is unclear what the report means with an undue or illegitimate barrier, considering the example given refers to 'high standards of consumers protection and system operation, and for which are no better alternatives' (Index Report 2021, p. 20). There seems to be an imprecision on the meaning of illegitimate barrier as long as the example is misleading. We reject the proposition that establishing a higher standard of consumer protection by the Member States is unlawful, as suggested by the BI Report Index, unless the higher protective measure violates the principle 2of the European Union Treaties such a the preclusion of the internal market.

[2] Information based on Final Report (2021, p 44).

Table 1
Individual barrier categorisation[2].

BARRIER BLOCKS	BARRIER CATEGORIES	INDIVIDUAL BARRIERS
Regulatory disincentivisation	Price regulation	Price regulation discriminates against certain suppliers
		High penetration of price regulation
		Low margin of regulated offer (margin squeeze)
	Burden sharing	Obligation to collect tariffs unrelated to energy on behalf of others.
		Obligation to keep a minimum-security stock as a gas reserve
	Regulatory unpredictability	Suppliers face uncertainty because of a newly liberalised regulatory environment or uncertain future development of the regulatory framework
		Uncertainty caused by industry actors influencing legislation
		Attitude of authorities hinders development of the market
		Uncertainty regarding environmental obligations and non-renewable generation capacity
	Access to innovation	Data protection issues
		Lack of incentivisation for novel pilot projects or post-pilot market rollout
		Lack of data for innovative product development
		No fit between new business models and existing regulation/ obligations
		Missing flexibility in tariff structures
		Market structures do not incentivise novel products (missing perceived value)
Marquet inequality	Unbundling and market power	Lack of brand unbundling
		Discriminating, strategic behaviour of incumbent, and obstruction by other market players
		Strategic, unfair advantage of vertically integrated market players and lack of transparency
		Limited or biased access to production.
		Discrimination against new and small market players in capacity and ancillary services markets.
	Equal access to and maturity of wholesale market	Discriminatory market platform access (standards, guarantees, etc.)
		Low liquidity in the wholesale market
		High price or volume risk in energy procurement
Operational and procedural hindrances	Sign-up and operations compliance	Poor availability of information for market entrants and active participants
		Heavy administrative process for entry (registration/licensing)
		High financial requirements (incl. long working capital cycles) and forced risk during operations
		Excessive reporting requirements during operations
		Excessive information requirements around billing and energy labelling
		Highly complex or country-specific systems and processes
		Regional differences or differences between DSOs within a country
		Cumbersome or biased switching process
		Unduly burdensome environmental obligations
		Unduly burdensome or insufficiently regulated market exit
	Data access and processes	Lack of data hub
		Complex, heterogenous IT infrastructure and/or low level of digitalisation
		Missing access or poor quality of operations-critical data
Customer inertia	Customer orientation	Lack of information regarding available offers and switching possibilities
		Low customer awareness or interest makes it difficult to attract customers
		Insufficient price signals for end-users
		Changing supplier is cumbersome or has little pay-off for the customer
		Consumers prefer the status quo
		Lack of trust in new or foreign suppliers and new technology

more quantitative and comparable data such as the number of offers per supplier, number of household consumers switching suppliers, and tariff change. In contrast, the BI composite indicators have a more qualitative approach, such as the perception of how changing suppliers is cumbersome. For instance, it is unclear whether the BI takes into account contract termination fees or switching-related fees as reference data to compose the indicator, despite those being indicated as the main contractual barrier to switching suppliers in the retail market (CEER, 2016).[3]

The second-step process of creating indicators that deserve attention is the selection and categorisation of individual barriers, which are the foundation for indicator and sub-indicator selection. The Project considers five indicator selection criteria: the extent to which an individual barrier is solvable by regulation; relevance; ease of interpretation by the target audience; reliability; and availability. Each barrier is scored +++/++/+/− for each selection criterion, and none of them scores below +. The process of selecting and categorising individual barriers narrowed down the number of forty-five individual barriers to eight indicators and subindicators, which are summarised in Table 2.

Despite the EB Project's claim that it follows the methodological guidelines of OECD-JRC Handbook (2019), it divergences from the Handbook in relation to the consideration of the selection criteria. Drawing on the IMF, Eurostat, and OECD guidelines, indicators selection should consider basic data quality measures; namely, relevance, accuracy, credibility, timeliness, accessibility, interpretability, and coherence. The OECD-JCR Handbook also makes explicit reference to principles of the European Statistics Code of Practice, which includes

[3] Although Article 12(2) of Directive 2019/944 on common rules for the internal energy market imposes on member states the obligation of ensuring that at least household customers are not paying switching fees, Article2(3) grants derogation suppliers negotiating fixed-price electricity supply contracts. This means that contract termination fees will continue to be a barrier to suppliers competing with traditional incumbents effectively.

[4] Source of information: Final Report (2021, p. 43), and Index Report (2021, p. 30).

Table 2
Individual indicators and sub-indicators categorisation[4].

BARRIER BLOCKS	INDICATORS	SUBINDICATORS
Regulatory disincentivi-sation	Market foreclosure by price regulation	1A: Penetration of price regulation 1B: Mark-up of the regulated offer
	Regulatory burdens and unpredictability	2A: Regulatory burdens 2B: Regulatory unpredictability
Market inequality	Competitive advantage of vertically integrated suppliers	3A: Market share of vertically integrated suppliers 3B: Strictness of DSO unbundling
	Unequal access to wholesale markets	4: Liquidity of the wholesale market
Operational and procedural hindrances	Length of licensing procedure	5: Time to get a supplier license
	Quality of data access	6: Quality of data access
Customer inertia	Comparability of offers	7A: Consumer's inability to compare offers 7B: Availability of comparison websites
	Perceived difficulties of switching	8: Perceived difficulties of switching

comparability as a quality dimension of data selection (EUROSTAT, 2017). Comparing the EB Project selection criteria and the guidelines of the OECD-JRC Handbook, the latter has been minimalist, excluding criteria like accuracy, timeliness, and comparability of data without providing a proper justification reason for that.

The third-step process related to creating the BI is normalisation. Indicators are the core of the BI, and are the parameters for any normalisation of data. Through normalisation, a set of data is transformed into different measurement units (OECD-JRC 2019). This means that all BI indicators range between 1 and 10 or 0–100%. The collection and normalisation of data are explained in the national reports, which justifies the choice of two case studies to test the reliability of the BI to that matter.

4. National reports: case studies of Portugal and Netherlands

An analysis of all indicators goes beyond the scope of this article. Nevertheless, one methodological gap needs to be highlighted: in the national reports for each barrier block, only suppliers' concerns are discussed with respect to policy proposals. This is neither explained – or justified – by the BI Report. Moreover, one would expect some explanation of how the analysis of the identified barriers is quantified and turned into one of the indicators of the BI. However, nothing of this kind can be found in the national reports. These reasons alone would justify an in-depth investigation of the national reports.

We decided to focus our inquiry on two Member States, Portugal and the Netherlands, and consider three indicators: market foreclosure by price regulation; competitive advantage of vertically integrated suppliers; and comparability of offers. Our decision to focus on these national reports and indicators is based on the following considerations.

First, in terms of similarities, Portugal and the Netherlands are of similar size, and their energy market liberalisation processes started at the same time. Moreover, according to the BI, both countries have relatively low barriers to entry and competition: 31.2 for Portugal and 24.8 for the Netherlands – 7th and 4th place, respectively in the BI ranking. However, according to the ACER and CEER's HHI, Portugal is significantly more concentrated than the Netherlands (about 6,000 points versus about 2,000 points). This divergence raises important questions as to the BI's methodology and data selection.

Since it is not feasible to contrast all indicators, we focus our analysis on the indicators where the differential between the points scored by the Netherlands and Portugal is the highest in absolute value. This leads us to four indicators: market foreclosure by price regulation (0 vs 2.9), regulatory burdens and unpredictability (2.2 vs 5.9), competitive advantage of vertically integrated suppliers (0 vs 4.6), comparability of offers (4.1 vs 1.8). Among these four, we excluded the indicator' regulatory burdens and unpredictability', as this indicator has little bearing on the issue of market concentration in a liberalised industry.

5. Market concentration

We begin our in-depth analysis of the BI by focusing on the discrepancy between the ACER/CEER HHI and the BI for Portugal and the Netherlands.

The EB Project does not calculate the HHI. This omission is puzzling since the HHI is normally considered a relevant index for understanding how concentrated a market is. An HHI higher than 2,000 is normally taken as an indicator that a market is concentrated (ACER/CEER 2019, p. 43; European Commission 2004).[5] The HHI ranges from 0 to 10,000: if a market is occupied by a large number of firms with a small market share, the HHI will approach 0; in case of a monopoly – a market controlled by a single firm – it will reach 10,000. The HHI increases when the number of firms in a market decreases or if the disparity in size between those firms increases.

ACER's (2019) Market Monitoring Report found that only eight out of twenty-four Member States' retail energy markets had an HHI below 2,000 during 2018 and 2019. Between 2018 and 2019, the HHI for the Netherlands has neighbored the threshold of 2,000, moving from slightly below to slightly above this value. Portugal, instead, finds itself at a very different quote. Portugal's HHI has slightly decreased from 2018 to 2019 but has remained above the alarming threshold of 6,000 points. Only four countries are ranked worse than Portugal in the EU. The data about Portugal are essentially corroborated by the 2019 annual report published by ERSE – the Portuguese NRA. According to ERSE (2019, p. 75, Fig. 3–33), the HHI for the household sector in Portugal has moved from 6,000 points in 2018 to a bit less than 6,000 points in 2019.

This HHI is particularly relevant for contextualising data about the barriers that have to do with market inequality and, in particular, with the BI indicator 'unbundling and market power'. For this to work properly, the relevant market needs to be correctly identified. The ACER/CEER HHI proves useful in two additional ways. On the one hand, comparing the ACER/CEER HHI with the BI raises doubts about the latter's plausibility; it would therefore have been advisable for the BI Report to explain its choice not to refer to the HHI. On the other hand, the ACER/CEER HHI help show that the data used in the national reports do not refer to the household market, as they should.

The BI Report states that its scope is "the residential segment of the retail energy markets" (Index Report, p. 19).[6] The term "residential" does not have clear meaning within EU electricity law; however, common sense suggests that the term is meant to refer to household customers, defined by Article 2(4) of Directive 2019/944 as "a customer who purchases electricity for the customer's own household consumption, excluding commercial or professional activities". This view is supported by the fact that both national reports open with a discussion of the average electricity consumption by household customers and their aggregate number (Dutch Report, p. 16 and Portuguese Report, p. 15).

The situation is complicated by the fact that all national reports include standard information about the EB Project in general. The reports describe the focus of the project as "retail (supply) … especially relating to the household segment customers (in some markets households and smaller SMEs may be difficult to distinguish)" (Dutch Report and Portuguese Report, p. 6). Under this framing, the project focuses

[5] Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings (2004/C 31/3).

[6] This scope is repeated throughout the BI Report (pp. 20, 23, and 38).

specifically, but not exclusively, on household customers. The inability to identify a coherent understanding of the relevant market between the BI Report and the national reports opens the door to inconsistencies in analysis between countries, undermining both the coherence of national reports and their comparability.

The Dutch national report indicates that there are 8,000,000 "household customers" in the Netherlands (Dutch Report, p. 16). In describing the supply side, the report states: "[t]he market situation is moderately concentrated, the largest supplier in the country is the incumbent Essent/Energiedirect (3.1m), followed by Eneco (2.4m) and Nuon (2.1m). Together they hold 7.6 million customers making them the dominant suppliers in the country" (Dutch Report, p. 17). Notably, this information is taken from statista.com, and it is unclear whether it focuses only on household customers or includes also other types of consumers. Nonetheless, the Report cites data from CEER immediately after, according to which the three largest companies in the household market have a market share of about 70%.

It is not easy to reconcile these two datasets. If we look at the first dataset and assume that it focuses on household customers, we reach the conclusion that the three largest suppliers have a 95% market share, associated with an HHI of more than 3,000 points. However, there is nothing on statista.com corroborating the view that we are dealing with data related to the household market only. The second dataset, combined with the fact that the ACER/CEER HHI for the household segment in the Netherlands is around 2,000, suggests that the first dataset is not focused exclusively on the household segment. However, this conclusion cannot be corroborated. Furthermore, and more fundamentally, the point remains that the report fails to provide a clear picture of basic information such as the relevant market. The data collected is not clearly explained and the BI ignores important and reliable data published by ACER and CEER, without explaining why.

The pitfalls in the Portuguese national report are essentially the same. The national report includes a table describing market shares between 2014 and 2018. The graph shows that the incumbent, EDP Comercial, had a market share between 40 and 45% in the period. In the year 2018, the second and third largest providers (Iberdrola and Endesse) had market shares close to 20%, while the fourth retailer (Gelo Power) had about 10% of market share, with all the other retailers contending the remaining crumbles. If we calculate an HHI on the basis of this data, we get close to 3,000 points.[7] Critically, the ACER/CEER HHI was around 6,000 points.

This is a significant discrepancy. Since the national report does not include a source for the data, the explanation that we provide for this discrepancy is tentative. The table in the national report (Portuguese Report, p. 23), despite no reference a source, is essentially identical to Fig. 3–29 in the ERSE (2020) annual report. The design, and in particular the colors chosen for each retailer, are the same in both tables. The problem is that Fig. 3–29 in the 2018 ERSE annual report is not about market shares in the retail household market. Instead, this table focuses more generally on the market shares in the retail electricity market in general, thereby including larger customers, industries and small businesses in addition to household customers. At this point, it should be noted that none of the official reports available provides us with a clear breakdown of the distribution or marketshares in the Portuguese retail market. However, the ACER/CEER HHI, which is higher than 5,500 points, leads to conclude that the incumbent has a marketshare close to 70%.[8]

In light of the above, the analysis of market concentration in the EB Project shall be considered unreliable. The lack of consideration of the ACER/CEER HHI is unjustified. Moreover, the data considered to calculate market shares are incorrect.

6. Indicator on price regulation

This section focuses on the presence, or absence, of price regulation. The EB Project defines price regulation as "regulation or control of end-users' prices by a public authority, usually the National Regulatory Authority (NRA). Price regulation can take different forms, such as setting or approval of prices, price caps or various elements of these" (Dutch Report, p. 24). This is a quite broad and encompassing definition of price regulation. The EB Project attributes the best possible score, namely 0, to the Netherlands and a score of 2.9 to Portugal, a significant difference.

The Dutch report states that "[n]o barriers around price regulation were identified" (Dutch Report, p. 26). This conclusion is surprising given that the same report, a few pages earlier, mentions the existence of a so-called "safety net" in energy retail markets: "[t]he regulator surveys all new retail prices before market introduction in order to prevent unreasonable retail prices" (Dutch Report, p. 19). This description is not entirely correct. In fact, the Dutch regulator does not limit itself to analyse prices; rather, it performs a general overview of the reasonableness of the contractual conditions, including prices. It is apparent that such a mechanism cannot be ignored when describing the existence of price regulation barriers in the Netherlands, especially since the effect of this regulatory oversight on market performance is ambiguous (Mulder and Willems, 2018). Without entering into details that could not be properly analysed in this context, it is at least possible to conclude that the Report's analysis of price regulation in the Netherlands has been superficial. Moreover, since the impact of this price regulation mechanism is ambiguous, the "0" score at least required further contextualisation.

The analysis of price regulation in the Portuguese market is strikingly different. Portugal received a score of 2.9 on the indicator 'market foreclosure by price regulation'. The national report mentions the phasing out of regulated tariffs in the country. However, it fails to consider the fact that 87.1% of households have already opted to join the liberalised market (ERSE, 2019, p. 74, Fig. 3–32). The implication of this data is that the existence of regulated tariffs appears to be marginal. Additional concerns are raised by the fact that the report presents as a national issue the existence of "approximately 1 Million customers under price regulation segment (Supplier of Last Resort)" (Portuguese Report, p. 32). The report notes that the Supplier of Last Resort has multiple responsibilities, including the one of universal service operator who supplies electricity to "customers that were supplied by a supplier that went into bankruptcy" or living "in places where there are no offers from other suppliers" (Portuguese Report, p. 21); additionally, the Supplier of Last Resort serves "certain end-consumers (such as consumers who have not yet moved to the liberalised market in the transitory period prior to full liberalisation)" and "economically vulnerable consumers" (ibidem).

Without a deeper analysis of how many customers would be able to operate on the liberalised market, it is impossible to assess the actual significance of this barrier. The national report does not include data in this regard. However, as seen above, 87.1% of the Portuguese household consumers have opted for the liberalised market; a number that has been increasing over the years (71.8% in 2015). It should also be pointed out that since 2018, household customers who have opted for the liberalised market can move back to the Supplier of Last Resort. However, ERSE (2019, p. 74, Fig. 3–32) notes that this option has not been used by consumers (ERSE, 2019, p. 5). It follows that the constraint imposed by the existence of this mechanism on competitiveness appears limited.

The findings of this section are particularly unsettling once one notes that according to the BI Report, the data available for evaluating the barrier represented by price regulation were of good quality under all parameters (EB Project 2021, p. 23).

[7] HHI = 45^2+2x20^2+10^2 = 2925.

[8] For example an incumbent with a 70% market share, counts 4900 points in the HHI index. If the second and third largest companies have 15% and 10% respectively, the final HHI index cannot be higher than 5250.

7. Indicator on comparability of offers

In both Portugal and the Netherlands, the household retail energy market is quite concentrated despite the high number of retailers. This means that, whatever the barriers to entry, a satisfactory number of retailers has successfully entered the market. The problem is that they are failing to increase their customer portfolio. For this reason, customer inertia represents a central barrier in both countries. In this regard, the comparability of offers is a regulatory variable of primary importance and the EB Project rightly investigated customer inertia in more detail.

Customer inertia is measured on the basis of two indicators: comparability of offers and perceived cost of switching. For the indicator 'comparability of offers', the Netherlands receive a score of 4.1, while Portugal receives a score of 1.8. This means that offers are clearly easier to compare in Portugal than in the Netherlands. For the indicator 'perceived cost of switching,' the Netherlands received a score of 4.3 and Portugal a score of 4.1.

As explained in Section 4, the difference in the indicator 'comparability of offers' warrants an investigation. The comparability of offers is measured by two sub-indicators. The first sub-indicator consists of consumer perception and is measured through an opinion survey. The second sub-indicator focuses on comparison websites. Notably, the national reports do not provide meaningful information about these sub-indicators.

The first sub-indicator is unreliable as recognised by the BI Report. This indicator receives only one +, meaning collecting additional evidence is necessary. An analysis of the primary source of the data used shows the extent to which this sub-indicator is actually reliable, up to the point that it is questionable whether it should have been considered at all. The data used for this sub-indicator are taken by the "Market Performance Index published by DG Justice and Consumers" (Index Report. p. 29). The Market Performance Index is calculated by the European Commission on the basis of the data collected in the Market Monitoring Survey. The EB Project does not mention specifically to which Market Monitoring Survey it is referring. Accordingly, we consider the data collected in the survey conducted between 2016 and 2017 and those conducted between 2019 and 2020 (2018 MMS and 2020 MMS, respectively).

It is not possible to identify the source of the data considered by the EB Project. If we look at the Netherlands, in fact, the 2018 MMS presents the comparability of offers in electricity services as within the European average (European Commission 2018, p. 83). When we look at the 2020 MMS, we find that 59% of European consumers were satisfied with the comparability of offers. Crucially, the satisfaction rate of consumers in the Dutch market reaches the remarkable height of 81% (European Commission, 2020a, p. 4). Let us now look at Portugal. In the 2018 MMS, comparability in electricity services was below the European average (European Commission 2018, p. 95). It follows that Portugal could hardly be considered the best country on the basis of this data. In the 2020 MMS, instead, the situation has improved. Contrary to the European average of 59%, 68% of Portuguese consumers are satisfied (European Commission, 2020b, p. 4). However, as seen, the percentage of satisfied consumers in the Dutch market is significantly higher. The present analysis shows that it is extremely difficult to understand what is the reasoning that leads the EB Project to consider the Netherlands as performing worse than Portugal under this sub-indicator. Moreover, whatever this reasoning might be, it is in contradiction with data collected by the Commission and the failure to explain this discrepancy negatively affects the reliability of the BI Index.

The second sub-indicator is similarly plagued with serious data-related problems. Here, the EB Project relies explicitly on data collected by ACER and CEER (2020). This dataset does not include any information with regard to comparison websites in the Netherlands (ACER and CEER, 2020, p. 56). However, the Dutch Report (p. 45) mentions six websites. The way they have been identified is unknown. With regard to Portugal, the dataset declares that between five and nine comparison websites exist. Neither report explains how the available data are used to attribute the best score in Europe (1.8) to Portugal, and a score of 4.1 to the Netherlands. This makes a critical comparison of the indicator scores impossible.

This analysis shows the EB's process to be unreliability and opacity, which undermines its conclusion that the Netherlands performs significantly worse than Portugal in terms of comparability of offers. At times, the data source is undisclosed and the finding conflicts with data collected by reliable sources, but no discussion of this discrepancy is offered. In relation to the availability of comparison websites, the Netherlands receives a low score that is hard to justify, especially considering Portugal's outstanding result.

8. Conclusions and policy implications

Governance by indicators is embraced in the EU as a means of ensuring that policy-making is evidence-based and, therefore, efficient and effective. Regulatory decision-making based on scientific evidence is a guiding principle of the European Commission's Better Regulation agenda. Indicators are also important tools to guide national regulators at the transposition phase. Electricity suppliers rely on indicators as well to make business decisions about expanding their operations to the other Member States. We have no intention of discouraging the use of indicators to guide energy policies. However, the endorsement of indicators by public institutions has a multiplying effect on their impact. This endorsement shall go hand-in-hand with best governance practices and, above all, accountability measures applied to indicator builders. Cassese and Lorenzo (2012) have raised the question of whether indicators should be subject to regulation. We add to this by asking to what extent indicator builders should be held accountable for faulty decisions adopted by relying on indicators.

In the context of the BI, our analysis identifies several pitfalls in the methodology for the construction of the BI, and in its data collection. Specifically, we find obscurity on how the collected data are quantified in order to build the Barrier Index (Section 3); unexplained cherry-picking of relevant data about market concentration (the HHI) (Section 5); misleading reporting of data (on market concentration and price regulation—Sections 5 and 6) and the use of data from unclear origins (consumer perception of comparability and existence of comparison websites in the Netherlands—Section 7).

The pitfalls found in the methodology, data collection, and choice of data compromise the reliability of the policy recommendations formulated by the EB Project, specifically in the national reports of the Netherlands and for Portugal. Given the fundamental nature of the methodological issues and data errors that were identified, it is entirely plausible that they are not limited to the Dutch and Portuguese reports. Based on these case studies, policymakers must therefore make sure to verify the data used in national reports, and not rely on these reports without verification.

We propose two layers of accountability for these pitfalls which may result in higher reliability of the BI and prevent faulty policy decisions.

First and foremost, governance by indicators must be transparent. Cassese and Lorenzo, 2012 support the view that neither the producer nor the indicator needs to be subject to regulation, but rather, the process by which the indicators are produced must be. Ratings are protected by free speech and, in the case of indicators produced or commissioned by public institutions, general principles of administrative law ensure accountability. For instance, disclosing information about how the EB Project built the BI has been sufficient to test the methodology validity and point out its flaws in this article. In this context, administrative law principles can be very helpful—such as transparency, access, participation, and review. We understand transparency as the duty of index builders to disclose all the meaningful choices made while building an index. In particular, the following decisions must be made explicit: selection of indicators, selection and non-selection of data, and normalisation of data. The importance of these choices has already been

emphasised by the OECD and JCR, 2008 Handbook on the process of designing and developing indicators.

Second, we must consider the legal responses when the pitfalls in the indicators are caused by the misrepresentation of data, or reliance on data that is known to be incomplete. Here, liability under private law shall be used to improve an indicator's quality. In this regard, we shall set aside the complex road that leads to a tort claim for the damages caused to third parties by a poorly designed indicator. Such a claim is not only difficult to ground, but also jurisdictional dependent, making the topic untractable here. We submit that the straightforward way ahead is contractual. An indicator that is not transparent or is based on mistakes and inaccuracies is unreliable. This unreliability ultimately boils down to issues of contractual performance and breach of contract when indicators are built by external consultancies, which is often the case. Their services have contractual bases, and these contracts shall include clear liability provisions, including penalty clauses and—more tentatively—duties to publish proven quality issues at the consultants' expenses. A wise contractual design can c6reate the threat of financial and reputational damage, thereby motivating careful and transparent indicator design and data normalisation.

CRediT authorship contribution statement

Lucila de Almeida: Conceptualization, Methodology, Data curation, Writing – original draft, Writing – review & editing. **Fabrizio Esposito:** Conceptualization, Methodology, Data curation, Writing – original draft, Writing – review & editing. **Josephine van Zeben:** Conceptualization, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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