

Market structure and value for money

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Introduction and policy context

Despite the growing interconnectedness of procurement activities across jurisdictions, global data collection for public procurement has always been faced with collective action challenges. The [ProACT: Procurement Anticorruption and Transparency platform](#) has provided a way to support this much-needed data aggregation and improve the evidence base for procurement decisions globally. ProACT allows users to visualize public procurement purchases micro-data for a large set of countries whose data are publicly available and download some key indicators at contract-level that can be used for advanced analysis.

This report presents one of these possible use cases and shows how the analysis and the data made available on ProACT can inform market and competition assessment. Specifically, we focus on Portugal and carry out a small-scale analysis to describe the market structure and competition in the country and the relationships between these factors and procurement outcomes such as prices.

The analysis looks at key features of market competition such as market concentration, number of bidders or the presence of foreign suppliers. To measure procurement prices, it uses relative prices which can be defined as the ratio of estimated prices to final prices for each contract. This report uses functionalities and visualizations available on ProACT for a brief overview of market structure, and the data downloadable on ProACT for a more advanced analysis on how prices are associated with changes in the number of bidders as well as the supplier market shares. ProACT allows limited download of filtered datasets, and also provides users information on the data sources, which can provide additional data or information, such as functionalities to access bulk datasets.

This report will contribute to the literature on the drivers of market efficiencies in public procurement, with a specific focus on prices and competition. It will demonstrate how ProACT can enable and facilitate this type of assessment, as well as the potential benefits that can be derived from complete and accurate public procurement data. While public procurement data are publicly accessible for an increasing group of countries, unit prices are yet not recorded in many e-GP systems, and this limits the spectrum of the type of analysis that can be done with public procurement data and, in turn, the potential of data analytics to provide policy-relevant insights.

Data

This analysis makes use of Portuguese public procurement data as it is one of the few countries in ProACT which has available quality information on losing bidders. The database used is restricted to the years between 2001 to 2019¹. For demonstrative purposes, in this report we present the analysis on the market of petroleum products, fuel, electricity and other sources of energy given the high standardization of products in this market.

Analysis

Using the ProACT portal, it is possible to gain a quick overview of the size and structure of the market and also to identify large players (buyers and suppliers). The below analysis and figures demonstrate these points in detail.

Market overview

Figure 1 shows selected procurement outcome scores for the market: an overall transparency score of 77 and integrity score of 50 with a total of 11,297 contracts. This suggests that the petroleum, fuel, electricity and other energy market in Portugal is relatively transparent while its integrity could improve.

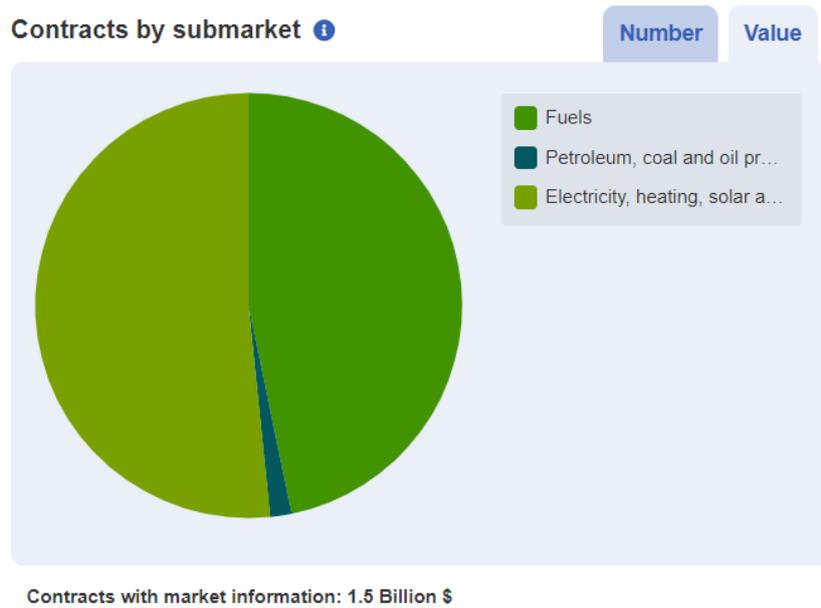
Figure 1: Overview of the market

| Market | Country | Transparency Score | Integrity Score | Nr. of Contracts |
|---|----------|--|--|------------------|
| Petroleum products, fuel, electricity and other sources of energy | Portugal |  77 |  50 | 11297 |

Breaking the market down into smaller submarkets uncover important dimensions of market structure: figure 2 shows a more detailed overview by total spending in each of the 3 submarkets. The electricity, heating, solar and nuclear energy submarket has the highest total spending among submarkets, with around 816 million USD, even though it only has 1,911 contracts, a lot fewer than in the Fuels submarket (6,728 contracts). This difference in the submarket rankings by total spending and contract number sheds light on the concentration of spending in a few high value contracts (electricity, heating, solar and nuclear energy submarket) as opposed to many smaller contracts (Fuels submarket). The smallest submarket both by total spending and number of contracts is the Petroleum, coal and oil products market with around 25 million USD worth of spending and 796 contracts awarded. Additional breakdown of even smaller submarkets can be obtained in ProACT by clicking on the desired market to delve deeper into each subsequent market.

¹ For figures coming from the ProACT portal, there are some observations from early 2020, predating the first wave of COVID-19 pandemic, making the data largely consistent over time.

Figure 2: Total spending by submarket



The ProACT portal also provides a breakdown of the number of contracts as well as total spending by year, offering insights into how spending evolved over time. Figure 3 depicts the number of contracts per year, highlighting that the highest number of contracts of around 1,200 were in 2014, 2018 and 2019. Figure 4 displays the total spending per year, revealing a rather different picture of steadily increasing spending (2020 data is incomplete). In 2018, total spending amounted to almost 293 million USD, sharply increasing by 58% as compared to 2017. 2019 shows the most spending of approximately 333 million USD.

Figure 3: Number of contracts by year

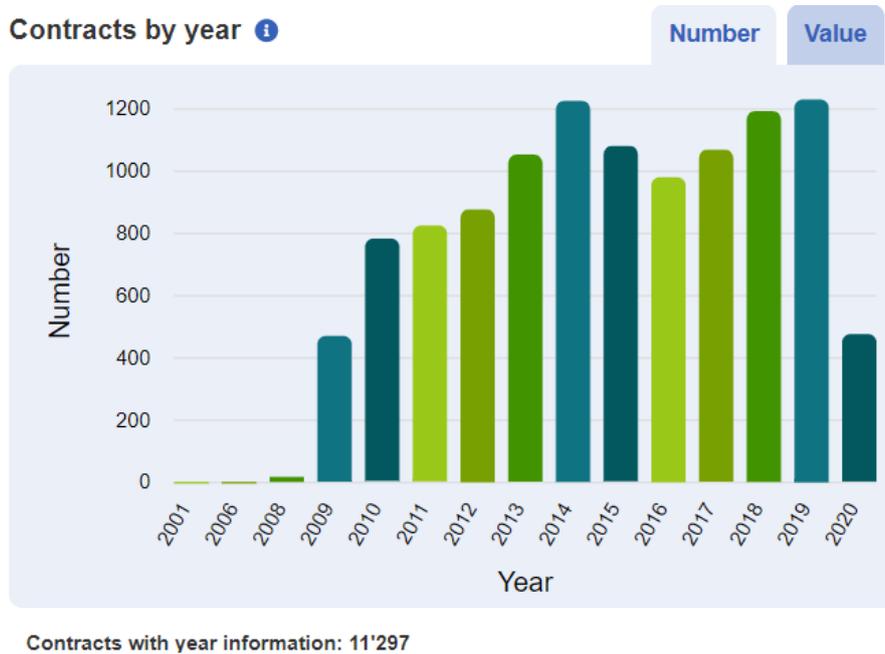
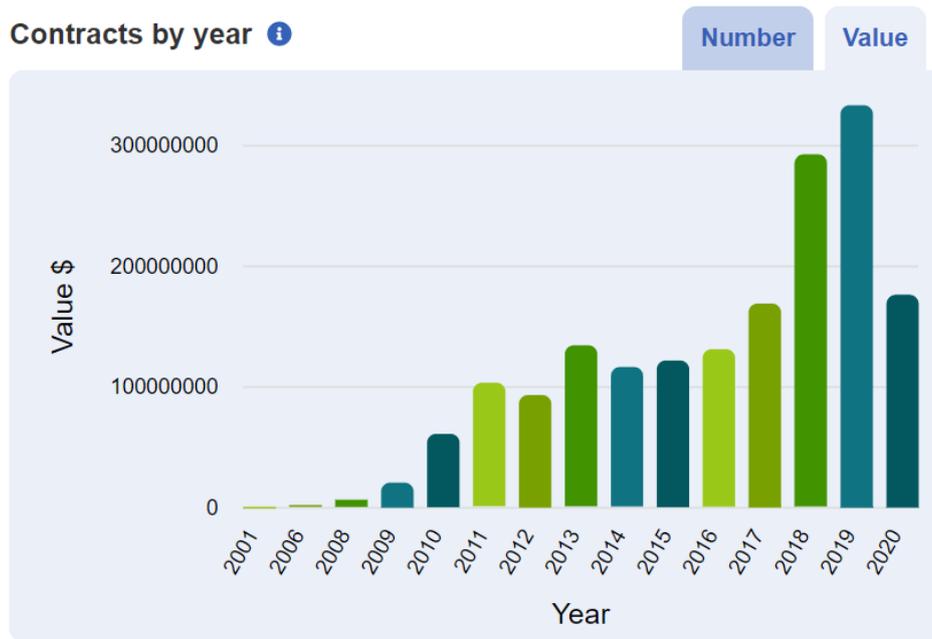


Figure 4: Total spending by year



Contracts with year information: 1.7 Billion \$

Note: data for 2020 is incomplete

Supplier and buyer market shares

ProACT allows users to quickly assess the biggest suppliers and buyers in a market. In Figure 5, Panel 1, we can see the largest suppliers according to the total value of contracts received. The largest company in this respect is Endesa Energia, S. A. – Sucursal em Portugal with around 83 million USD worth of contracts won (4.74% of the total spending on the market), which indicates a low level of concentration in the market. Figure 5, Panel 2, shows that the entity with the largest spending in this market is Ventominho — Energias Renováveis, SA., which awarded contracts worth a total of 18 million USD. This corresponds to 1.02% of the total, indicating that there are many purchasing entities operating in this market.

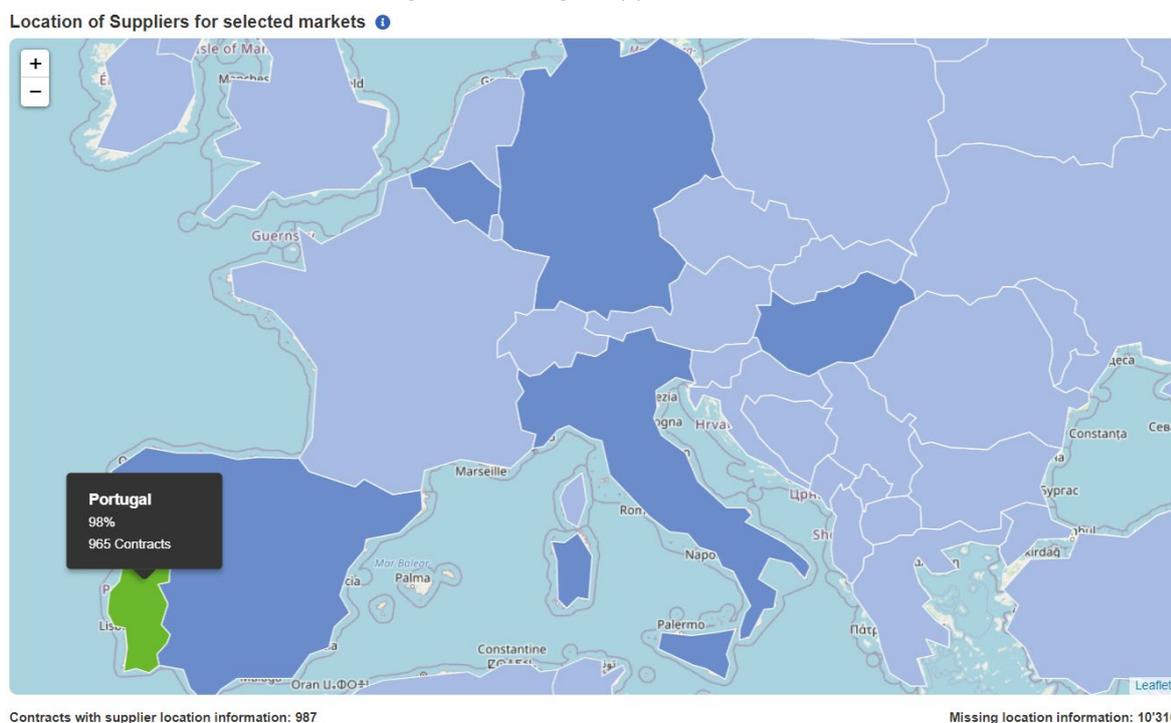
Figure 5: Market concentration in terms of contract value



Foreign suppliers

In the Petroleum products, fuel, electricity and other sources of energy market in Portugal, competition appears to be largely domestic with 98% of contracts going to domestic suppliers (Figure 6). This might indicate relatively low openness to foreign competition in this market which may well be due to most products on this market being common use items which are less attractive for foreign bidders. It must also be noted that the high number of domestic winners could also be explained by missing location data. Foreign suppliers largely come from other European countries such as Spain, Italy, Belgium, Germany, and Hungary.

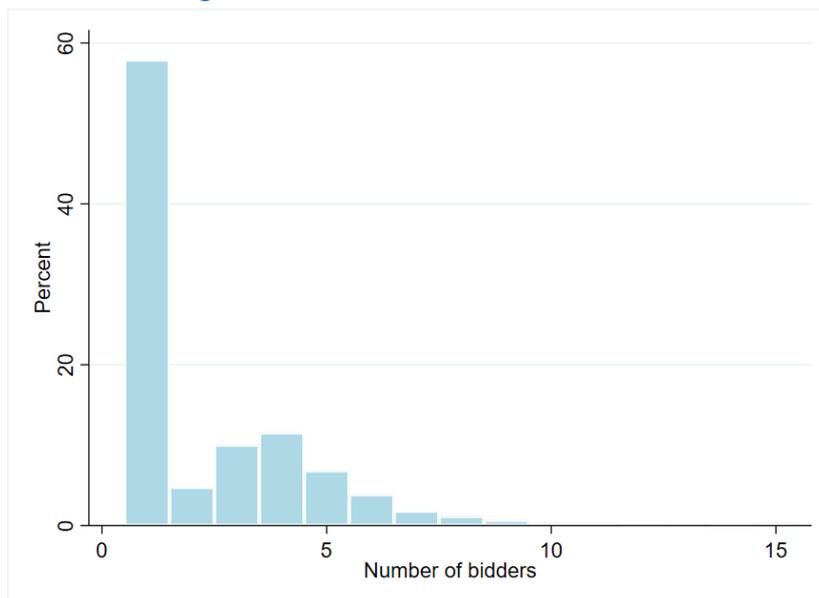
Figure 6: Foreign supplier distribution



Number of bidders

When looking at the distribution of bidders using public procurement data, Figure 7 shows the number of contracts with one bidder to be very high (57.92%) with an average number of bidders of around 2.4 per contract. Together with Figure 6, this evidence indicates a relatively low level of openness and competition in the Petroleum products, fuel, electricity and other sources of energy market in Portugal.

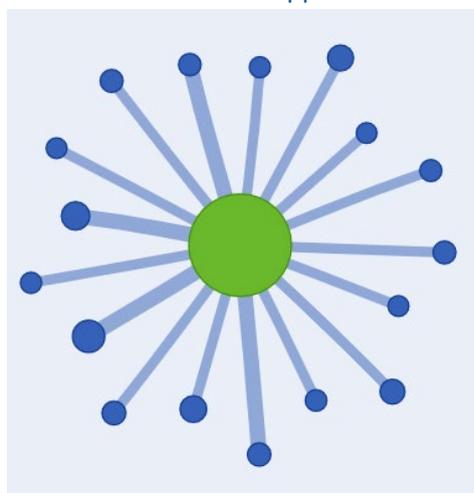
Figure 7: Number of bidders distribution



Supplier with its buyer network

ProACT allows users to visualize the relationships between buyers and suppliers. For example, looking at the network of a randomly selected supplier, BP Portugal - Comércio de Combustíveis e Lubrificantes, S. A., we can see that it has a relatively evenly spread income among its 17 different buyers (Figure 8). This analysis studies the network dimension of market concentration and, in this case, it reveals that there appears to be no particular buyer dominating this specific supplier.

Figure 8: Network of the supplier's main buyers



Relative price analysis

While ProACT does not allow for conducting explanatory analysis such as linear regressions, its underlying data is readily amenable for such analysis. Two particularly salient features of market competition stand out from the previous exploratory analysis: the

low number of bidders and the low supplier market share. Market realities - such as a very localized market for these product groups - may explain the low number of bidders, and low market concentration. When markets are fragmented or localised, either by geographical location or by product sub-groups, low competition at the level of individual transactions can co-occur with low overall market concentration because each local market is small supporting only a handful of companies neither of which can obtain a high share of total spending on the market .

Using regression analysis (for full regression results see the annex) we can explore the relationship between these market features and prices, measured as the ratio between contract value and estimated price (smaller ratios mean contracts cheaper than estimated). The regression analysis controls for buyer location and type, contract size, supply type (goods, works, services), year, and main product sub-market (3-digit CPV codes), which means that the correlations will not be driven by these factors. Figure 10 shows that according to our regression models, relative prices decrease as the number of bidders increases. Similarly, Figure 11 shows that relative prices increase as the supplier’s market share increases, in particular for the highest market share suppliers. Both relationships are statistically significant. In addition, the two relationships remain largely the same even if we estimate them together, within the same regression model, indicating that the number of bidders and the supplier’s market share represent two independent features of the market, and both are relevant drivers of relative prices.

Figure 10: Number of bidders marginsplot with 95% CI

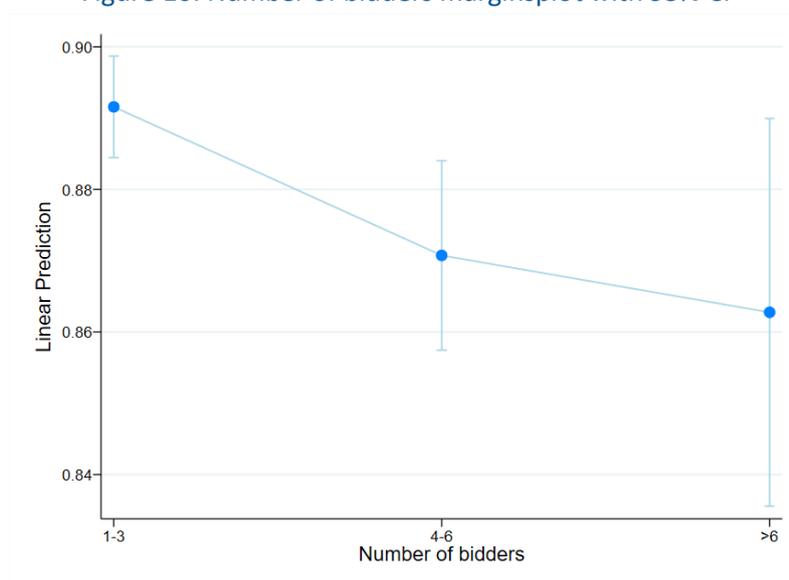
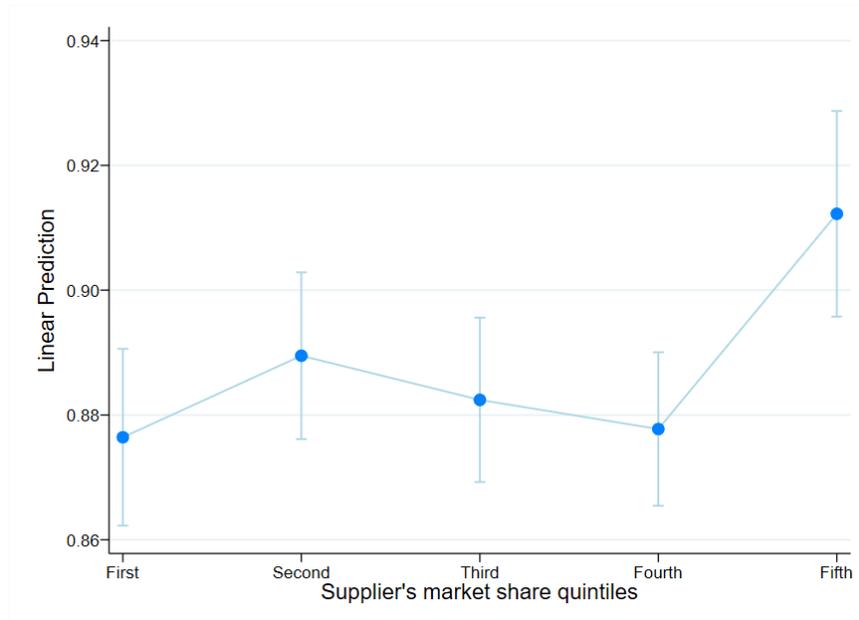


Figure 11: Share of suppliers in total market value marginsplot with 95% CI



Conclusion

One of the goals of ProACT is to facilitate the analysis of public procurement open data and demonstrate the potential of evidence-based decision-making using public procurement micro-data. When it comes to analyzing the impact of competition on procurement efficiency, the report demonstrates the importance of two types of data that are often unavailable in eGP systems in structured and open formats: more granular data on prices and losing/winning bidders. Unit price information, when available, can generate more insight on further cost savings while anonymized yet trackable unique data for suppliers across different procurement transactions can unveil more sophisticated patterns or observations on competition.

Furthermore, the analysis finds that for Portugal, increased competition - that is, more bidders and a less concentrated market - has a positive impact on value for money, at least on lower prices. Therefore, increased attention may be required on policies and indicators that measure number of bidders for procurement activities, and on policies that support access to markets and reducing barriers for firm entry, especially for high-volume categories of public goods, works, and services (e.g., fuel).

Other possible research questions that could be addressed using an approach similar to the one taken in this report are on: effects of supplier characteristics (i.e., foreign vs. domestic, SME, supplier locality vs. contract location) on procurement outcomes (i.e., competition and prices). More extensive research on procurement performance, such as procurement effectiveness (e.g., quality of delivery or timeliness) can be further studied alongside supplier data if additional quality data on these dimensions become available in public procurement datasets.

In the chosen market in this report, most of the sub-markets (fossil fuels, electricity etc.) are common use items, for which the buying power of the state compared to the total market volume is small. At a general level, public procurement will have a limited impact on shaping the market in this example. Also, the differences in unit prices for such items, even in countries where the market is completely open is small. Therefore, a similar analysis can be done for a market where the number of players is large and products are also standardized (office products, IT products etc.) to understand more how data can unearth the specificities of different types of markets.

Annex

Table 1: Full regression results

| Dependent variable | Relative price | Relative price | Relative price |
|-----------------------------------|-----------------------|-------------------------|------------------------|
| Model | 1 | 2 | 3 |
| Supplier's market share quintiles | | | |
| 2nd quintile | 0.0133 (0.00995) | | 0.0131 (0.00994) |
| 3rd quintile | 0.00601 (0.0101) | | 0.00599 (0.0100) |
| 4th quintile | 0.00241 (0.00988) | | 0.00132 (0.00992) |
| 5th quintile | 0.0382*** (0.0112) | | 0.0358*** (0.0112) |
| Number of bidders quintiles | | | |
| 4-6 bidders | | -0.0208*** (0.00794) | -0.0192** (0.00793) |
| >6 bidders | | -0.0288** (0.0145) | -0.0260* (0.0146) |
| Buyer NUTS categories | | | |
| Log contract value | YES | YES | YES |
| Buyer type dummies | YES | YES | YES |
| Buyer supply type dummies | YES | YES | YES |

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| | | | |
|---------------------|----------------------|----------------------|----------------------|
| Years dummies | YES | YES | YES |
| 3-digit CPV dummies | YES | YES | YES |
| Constant | 0.806*** (0.0714) | 0.808*** (0.0711) | 0.813*** (0.0713) |
| Observations | 1,654 | 1,654 | 1,654 |
| Adjusted R-squared | 0.076 | 0.074 | 0.079 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

ⁱ The team is grateful to Vinay Sharma and Alexandra M Habershon of the World Bank for their feedback and guidance on this research report.