Appendix A. Instructions, comprehension test, experimental screenshots and post-experiment questionnaire

A.1. Instructions

These instructions are for the treatment with positively correlated costs and have been translated from Spanish. The instructions for the other three treatments are analogous.

INSTRUCTIONS

You are about to participate in an economic experiment. Your profits depend on your decisions and on the decisions of other participants. Read the instructions carefully. You can click on the links at the bottom of each page to move forward or backward. Before starting the experiment, we will give a summary of the instructions and there will be two trial rounds.

THE EXPERIMENT

You will earn 5 Euros for participating in the experiment regardless of your performance in the game. You will gain (lose) points during the experiment. At the end of the experiment, points are exchanged for euros. 10,000 points are equivalent to 1 Euro. Each player will start with an initial capital of 50,000 points. Gains (losses) that you accumulate during the experiment will be added (subtracted) to the initial capital. Players who have accumulated losses at the end of

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the experiment will receive 5 Euros for participating. Players with gains will receive their gains converted to Euros plus the 5 Euro participation fee.

The experiment will last 25 rounds. In the experiment you will participate in a market. You will be a seller of a fictitious good. Each market will have 3 sellers. Market participants will change randomly from round to round. At any given time, no one knows who she is matched with. We guarantee anonymity. The buying decisions will be made by the computer and not a participant of the experiment. In each round and market, the computer will buy exactly 100 units of the good.

YOUR PROFITS

In each round, your profits are calculated as shown in the figure below:

Your profits are equal to the income you receive from selling units minus total costs (consisting of production and transaction costs).

Some details to keep in mind: you only pay the total costs of the units that you sell. If you sell zero units in a round, your profits will also be zero in this round. You can make losses when your income is less than the total costs (production and transaction). The cumulative profits are the sum of the profits (losses) on each round. Losses will be deducted from the accumulated profits. Throughout the experiment, a window in the upper left corner of your screen will show the current round and accumulated profits.

YOUR DECISION

In each round, you have to decide the minimum price that you are willing to sell each unit for. We call these Ask Prices.
THE MARKET PRICE

Once the three sellers in a given market have entered and confirmed their decisions, the computer calculates the market price as follows.

1. In each market, the computer observes the 300 Ask Prices introduced by the sellers of your market.
2. The computer ranks the 300 Ask Prices from the lowest to the highest.
3. The computer starts buying the cheapest unit, then it buys the next unit, etc. until it has purchased exactly 100 units. At this time the computer stops.
4. The Ask Price of the 100th unit purchased by the computer is the market price (the price of the last unit purchased by the computer).

The market price is the same for all units sold in a market. In other words, a seller receives a payment, which is equal to the market price for each unit she sells. If more than one unit is offered at the market price, the computer calculates the difference:

Units Remaining = 100 - Units that are offered at prices below the market price.

The Units Remaining are then split proportionally among the sellers that have offered them at an Ask Price equal to the market price.

UNITS SOLD

In each round and market, the three sellers offer a total of 300 units. The computer purchases the 100 cheapest units. Each seller sells those units that are offered at lower Ask Prices than the market price. Note that those units that are offered at higher Ask Prices than the market price are not sold. Those units offered at an Ask Price which is equal to the market price will be divided proportionally among the sellers that have offered them.

MARKET RULES

In each round and market, the computer buys exactly 100 units of the good at a price not exceeding 3.600. In order to simplify the task of entering all Ask Prices in each round, we request that you to enter:

- Ask Price for Unit 1
- Ask Price for Unit 2

Ask Prices can be different for different units. To find Ask Prices for the other units, we will join the Ask Price for Unit 1 and the Ask Price for Unit 2 by a straight line. In this way, we find the Ask Prices for all the 100 units. In the experiment, you will be able to see this graphically and try different values until you are satisfied with your decision.
We apply the following five market rules.

1. You must offer all the 100 units for sale.

2. Your Ask Price for one unit must always be greater than or equal to the Ask Price of the previous unit. Therefore, the Ask Price for the second unit cannot be less than the Ask Price for the first unit. You can only enter integers for your decisions.

3. Both Ask Prices must be zero or positive.

4. The buyer will not purchase any unit at a price above the price cap of 3,600.

5. The Ask Price for some units may be lower your unit cost, since unit costs are unknown at the time when you decide the Ask Prices. You may have losses.

**EXAMPLE**

This example is illustrative and irrelevant to the experiment itself. We give the example on paper. Here you can see how the computer determines the market price and units sold by each seller in a market.

**UNIT COST**

In each round the unit cost is random and unknown to you at the time of the decision. The unit cost is independent of previous and future round. Your unit cost is different from the unit cost of other participants. However, your unit cost is related to the unit costs of the other market participants. Below we explain how unit costs are related and we give a figure and explanation of the possible values of unit costs and their associated frequencies. This figure is the same for all sellers and all round.
The horizontal displays the unit cost while the vertical axis shows the frequency with which each unit cost occurs (probability). This frequency is indicated by the length of the corresponding bar.

In the figure you can see that the most frequent unit cost is 1,000. We obtain 1,000 as unit cost with a frequency of 0.35%. In general terms, we would obtain a unit cost of 1,000 in 35 of 1,000 cases.

In 50% of the cases (50 of 100 cases), the unit cost will be between 933 and 1,067.
In 75% of the cases (75 of 100 cases), the unit cost will be between 885 and 1,115.
In 95% of the cases (95 of 100 cases), the unit cost will be between 804 and 1,196.

There is a very small chance that the unit cost is less than 700. This can occur in 1 of 1,000 cases approximately. Similarly, there is a very small chance that the unit cost is greater than 1,300. This occurs can occur in 1 of 1,000 cases, approximately.

For participants with knowledge of statistics: the unit cost is normally distributed with mean 1,000 and standard deviation 100.

INFORMATION ABOUT YOUR UNIT COST (YOUR SIGNAL)

In each round, each participant receives information on her unit costs. This information is not fully precise. The signal that you receive is equal to:

\[ \text{Signal} = \text{UnitCost} + \text{Error} \]

The error is independent of your unit cost, it is also independent from the unit costs of other participants and it is independent from past and future errors. The following figure describes the possible values of the error term and an indication of how likely each error is likely to occur. This graph is the same for all sellers and rounds.
On the horizontal axis you can observe the possible values of the error terms. On the vertical axis, you can observe the frequency with which each error occurs (probability). This frequency is indicated by the length of the corresponding bar.

In the figure you can see that the most common error is 0. The frequency of error 0 is 0.66%. In general terms, this means that in approximately 66 of 10,000 cases you would get an error equal to 0.

In 50% of the cases (50 of 100 cases), the error term is between -40 and 40.
In 75% of the cases (75 of 100 cases), the error is between -69 and 69.
In 95% of the cases (95 of 100 cases), the error is between -118 and 118.

There is a very small chance that the error is less than -200. This occurs in 4 out of 10,000 cases. Similarly, there is a very small probability that the error is greater than 200. This occurs in 4 out of 10,000 cases.

For participants with knowledge of statistics: the error has a normal distribution with mean 0 and standard deviation 60.

HOW YOUR COST IS RELATED TO THE COSTS OF THE OTHER SELLERS

The unit cost is different for each seller and your unit cost is related to the unit cost of the other sellers in your market. The association between your unit cost and unit cost of another seller in your market follows the trend:

- The higher your unit cost, the higher will be the unit cost of the other sellers.
- The lower your unit cost, the lower the unit cost of the other sellers.
The strength of the association between your unit cost and unit cost of another seller is measured on a 0 to 1 scale. The strength of the association between your unit cost and unit cost of the other seller is +0.6.

Graphically we can see the relationship between your unit cost (horizontal axis) and the unit cost of another seller (vertical axis) for some strengths of association. The figure that has a red frame corresponds to an intensity of association of +0.6.

For participants with knowledge of statistics: the correlation between your unit cost and unit cost of any other player is +0.6.

END OF ROUND FEEDBACK

At the end of each round, we will give you information about:

- Your profits (losses) and its components (Revenue-Cost of Production - Cost of transaction)
- Market price
- Your units sold
• Other market participants feedback: decisions; profits and unit costs.

You can also check your historical performance in a window in the upper right corner of your screen. During the experiment the computer performs mathematical operations to calculate the market price, units sold, Ask Prices for intermediate units, etc. For these calculation we use all available decimals. However, we show all the variables rounded to whole numbers, except from the market price.

THE END

This brings us to the end of the instructions. You can take your time to re-read the instructions by pressing the BACK button. When you understand the instructions you can indicate it to us by pressing the OK button at the bottom of the screen. Next you have to answer a questionnaire about the instructions, unit cost distributions and signals. When all participants have taken the questionnaire and indicated OK, we will start the practice rounds. Your profits or losses of the practice rounds will not be added or subtracted to your earnings during the experiment.

A.2. Comprehension test

Questions. Answer True or False.

1. The unit cost has the same value for each of the participants in your market.
2. The unit cost is not the same in each round.
3. If my unit cost is high, it is rather likely that the unit cost of another seller is high.
4. Unit costs between 1000 and 1200 occur with the same frequency than unit costs between 1000 and 700.
5. Unit costs larger than 1000 occur with the same frequency as unit costs smaller than 1000.
6. Errors larger than 0 occur more frequently than errors smaller than 0.
7. An error of 5 is the most frequent error.
8. The seller who sells most units will always have the highest profit.
9. If my unit cost is low, it is rather likely that the unit cost of another seller is high.
10. The market price is the same for all units and sellers.

Answers (True (T) and False (F)): Q1. F Q2. T Q3. T (treatment 0.6); F (treatment 0) Q4. F Q5. T Q6. F Q7. F Q8. F Q9. F Q10. T
Notes: These notes appeared on the screen if a participant answered wrongly any of the previous questions.

Q1. Treatment 0.6: Your unit cost is different from the unit cost of other participants but it is related. Treatment 0: Your unit cost is different from the unit cost of other participants. There is no relation between your unit cost and that of other participants.

Q2. In each round, the unit cost is random and independent from the unit cost of past and future rounds.

Q3. Treatment 0.6: The higher your unit cost, the higher the unit cost of the other sellers will tend to be. Treatment 0: There is no relation between your unit cost and that of other participants. Therefore, if my unit cost is high, I can not deduce anything from the unit cost of the other participants.

Q4. Unit costs between 1000 and 1200 occur with higher frequency than unit costs between 1000 and 700.

Q5. The unit cost of 1000 is the most frequent one. Unit costs larger than 1000 occur with the same frequency as unit costs smaller than 1000.

Q6. Errors larger than 0 occur with the same frequency as errors smaller than 0.

Q7. An error of 0 is the most frequent error.

Q8. Profit does not only depend on the number of units sold. Remember that: \[ Profit = (MarketPrice - UnitCost)\text{UnitsSold} - 1.5\text{UnitsSold}^2. \]

Q9. Treatment 0.6: The lower your unit cost, the lower the unit cost of the other sellers will tend to be. Treatment 0: There is no relation between your unit cost and that of other participants. Therefore, if my unit cost is high, I can not deduce anything about the unit cost of the other participants.

Q10. The market price is the same for all units and sellers in a market.

A.3. Screenshots

The screens have been translated from Spanish to English.
Screen 1: signal screen

This signal gives you additional information about your unit cost. Remember that this information is not entirely precise and can contain an error. Remember that the signal which you receive is equal to:

\[
\text{Signal} = \text{Unit Cost} + \text{Error}
\]

On paper, we give you the figures and explanations of the distribution of the unit cost and of the error contained in the signal.

In this round your signal is equal to 1019

Screen 2a: decision screen before entering Offer Prices

Introduction and Confirmation of the Offer Prices

Remember: in this round your signal is equal to: 1019

Offer Price: the minimum price at which you are prepared to sell one unit.

Offer Price of Unit 1:

Offer Price of Unit 2:

See Graph  Confirm

Graphic representation of the Offer Prices for all units from 0 to 100.

You can try different OFFER PRICES until you are satisfied with your decision. When you are ready, you should confirm your choice. The experiment will not continue until all the sellers have confirmed their decisions.
Screen 2b: example of a decision screen after entering Offer Prices

Screen 3: feedback about a seller’s own performance

During the experiment the computer performs mathematical operations to calculate revenue, production costs, transaction costs and profits. For these calculation we use all available decimals. However, we show all the variables rounded to whole numbers, except from $1.5\text{UnitsSold}$. 

\textsuperscript{1}During the experiment the computer performs mathematical operations to calculate revenue, production costs, transaction costs and profits. For these calculation we use all available decimals. However, we show all the variables rounded to whole numbers, except from $1.5\text{UnitsSold}$. 

11
A.4 Post-experiment questionnaire

In the all the treatments, after the rounds were completed, we asked for 3 demographic questions: age, gender and degree studying. We then asked the following additional questions regarding understanding of the game.
1. Do you think that a high market price generally means GOOD/MIXED/BAD news about the level of your costs?
2. Explain your answer.
3. Do you think that the other sellers have answered the same as you to the previous question?
4. Explain your answer.

In the supplementary treatments TUH and TCH, we also asked students for their University Access Test score and asked them to complete the Cognitive Reflection Test. See Online Appendix D.2.

B. Calculations of the main indicators of market power: theoretical and empirical

Here we discuss the theoretical indicators of behavior and market power.
The supply function has the form $X(s_i, p) = b - as_i + cp$. Vives (2011) shows that the model described in Section 2 has a unique symmetric linear supply function equilibrium (SFE), where the equilibrium supply function slope is:

$$c = \frac{n - 2 - M}{\lambda(n - 1)(1 + M)},$$

where $M = \frac{\rho n \sigma^2}{(1 - \rho)((1 + (n-1)\rho)\sigma^2 + \sigma^2)}$ represents an index of adverse selection, and

$$a = \frac{(1 - \rho)\sigma^2_\theta}{(1 - \rho)\sigma^2_\theta + \sigma^2_\epsilon} (d + \lambda)^{-1},$$

where $d = \frac{1}{(n-1)c}$, and

$$b = \frac{1}{1 + M} \left( \frac{qM}{n} - \frac{\sigma^2_\theta (d + \lambda)^{-1}}{(1 + (n-1)\rho)\sigma^2_\theta + \sigma^2_\epsilon} \right).$$

Price impact at the SFE is:

$$d = \frac{\lambda(1 + M)}{(n - 2 - M)}.$$

The Lerner index (interim) is calculated at the market level and it corresponds to formula (3) in the main text. At the SFE:

$$L = d \left( \frac{q}{np} \right)$$

The expected market price is equal to:

$$E[p] = \mu + \frac{(d + \lambda)q}{n}.$$

The ex ante expected average profits in equilibrium are:

$$E[\tilde{\pi}] = (d + \frac{\lambda}{2}) \left( \frac{q^2}{n^2} + \frac{(1 - \rho)^2(n - 1)\sigma^4_\theta}{n(\sigma^2_\epsilon + \sigma^2_\theta(1 - \rho))(d + \lambda)^2} \right),$$

where $\tilde{\pi}(t; d) = \frac{1}{n} \sum_i \pi_i(t; d)$, $t = (E[\theta_1 | s], E[\theta_2 | s], ..., E[\theta_n | s])$, and $s = (s_1, s_2, ..., s_n)$. The first term of (7) corresponds to expected profits at the average quantity, and the second term is related to the dispersion of the predicted values.

These indicators were empirically implemented as follows to analyze the results of the experiment.

From any participant’s two-dimensional choice, we can infer the (inverse) supply function parameters: $\text{SlopePQ} = \text{AskPrice2} - \text{AskPrice1}$, and $\text{InterceptPQ} = \text{AskPrice1} - \text{SlopePQ}$.

The empirical counterpart of price impact takes into account that subjects may submit different supply functions from rivals. At a given round, for each subject $i$, we compute the
inverse of the sum of the supply function slopes of a subject’s rivals in a given market, that is, price impact is equal to:

\[ d_i = \frac{1}{c_j + c_k}, \]  

(8)

where \( c_j \) is the supply function slope of rival \( j \) and \( c_k \) is the supply function slope of rival \( k \).

The market price is computed by solving the following equation: \( q = \sum_{i=1}^{n} X(s_i, p) \), where \( X(s_i, p) \) are the supply functions submitted by the subjects during the experiment.

In a given market, the empirical Lerner index is computed using the realised values of \( \theta_i \) as follows:

\[ L = \frac{p - \frac{1}{n} \sum_{i}^{n} \theta_i - \lambda(q/n)}{p}. \]  

(9)

Profits are calculated ex-post using: \( \pi_i = (p - \theta_i)x_i - \frac{\lambda}{2}x_i^2 \).

Appendix C. Additional empirical results

This section includes the analysis of all the rounds of the experiment (C.1), time trends (C.2), results of the panel regressions (C.3), and details of the heterogeneity of behaviour and mixture models (C.4).

C.1. Analysis of all the rounds of the experiment

Here we analyse behavior and market power in all the rounds of the principal treatments [1,25]. Note that in the main text we only present rounds [1,18] for comparability with the supplementary treatments TUH and TCH, which only had 18 rounds.
Table 1: Average market power during the last 5 rounds in each treatment.

<table>
<thead>
<tr>
<th></th>
<th>TUL</th>
<th></th>
<th>TCL</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (s.d.)</td>
<td>Median</td>
<td>Mean (s.d.)</td>
<td>Median</td>
</tr>
<tr>
<td>Supply function</td>
<td>p=950.11+6.05X</td>
<td>p=973+5X</td>
<td>p=899.25+7.79X</td>
<td>P=964+5X</td>
</tr>
<tr>
<td></td>
<td>(207.73) (5.32)</td>
<td></td>
<td>(291.11) (6.98)</td>
<td></td>
</tr>
<tr>
<td>Price impact</td>
<td>2.60 (1.95)</td>
<td>2.22</td>
<td>3.35 (2.76)</td>
<td>2.73</td>
</tr>
<tr>
<td>Lerner index</td>
<td>-0.0089 (0.35)</td>
<td>0.017</td>
<td>0.0091 (0.12)</td>
<td>0.019</td>
</tr>
<tr>
<td>Market price</td>
<td>1,110.38 (117.36)</td>
<td>1,120.00</td>
<td>1,123.73 (130.27)</td>
<td>1,132.00</td>
</tr>
<tr>
<td>Profit</td>
<td>2,255.35 (7,191.77)</td>
<td>1,541.17</td>
<td>1,937.81 (5,620.92)</td>
<td>1,655.68</td>
</tr>
</tbody>
</table>

Note. The second row after each variable in brackets and italics is the standard deviation (s.d.). The unit of analysis for price impact, supply function and profit is the individual choice in each round (there are 1,800 observations in each treatment except for price impact since it is not defined for 54 observations in the TUL and 45 in the TCL because of a null denominator). For the Lerner index and market price, the unit of analysis is the market with 600 in each treatment (in the TUL the Lerner index is not defined for 1 observation that as a market price equal to zero).

We obtain the same conclusions as in the paper when testing for equality of the various indicators of market power between both treatments using all the 25 rounds: price impact (p-value=0.423); Lerner index (p-value=0.873); supply function slope (p-value=0.337); supply function intercept (p-value=0.749); market price (p-value=0.749); and profits (p-value=0.522). The table and the tests show we cannot reject that average market power is the same in TUL and TCL. These results confirm the previous findings presented in the paper with all periods.

C.2. Time trends

The following graph shows the time trends in price impact and the Lerner index in both treatments.
In terms of price impact, we observe that market power is greatest in TCL compared to TUL in all periods, and that there is a slight downward trend over time (perhaps reflecting the fact that subjects are adapting their behavior to the average behavior of others). In terms of the Lerner index, in TUL there are two rounds with very low Lerner indices (both in the first five rounds). This is because there are subjects that bid very low in the beginning as part of their learning process. For the other rounds, there does not seem to be much difference in the Lerner index between rounds and treatments.

C.3. Panel regressions

Table 2 reports the results of the regressions accompanying the results of Section 5.2 and 6.1 of the paper, and Table 3 the corresponding ones for Section 5.3. They report the results of two random effects panel regression with the dependent variables price impact and Lerner index on a constant, the treatment dummy ($D_{TCL}$ is 1 in TCL, and 0 in TUL), the private signal ($Signal$), and the round number ($Round$). The unit of analysis for the price impact regression is the participant across rounds, while for the Lerner index it is a given market across rounds. We cluster standard errors at the independent group level.
Table 2: Panel regressions of the indicators of market power on a the treatment dummy and controls

<table>
<thead>
<tr>
<th></th>
<th>Price impact (1)</th>
<th>Lerner index (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.96***</td>
<td>0.013</td>
</tr>
<tr>
<td></td>
<td>(0.43)</td>
<td>(0.12)</td>
</tr>
<tr>
<td>D_TCL</td>
<td>0.64</td>
<td>0.064</td>
</tr>
<tr>
<td></td>
<td>(0.49)</td>
<td>(0.061)</td>
</tr>
<tr>
<td>Signal</td>
<td>0.00030</td>
<td>-0.000041</td>
</tr>
<tr>
<td></td>
<td>(0.00037)</td>
<td>(0.000051)</td>
</tr>
<tr>
<td>Round</td>
<td>-0.055***</td>
<td>-0.0029</td>
</tr>
<tr>
<td></td>
<td>(0.11)</td>
<td>(0.0038)</td>
</tr>
<tr>
<td>Observations</td>
<td>2,516</td>
<td>863</td>
</tr>
<tr>
<td>R²</td>
<td>0.0302</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Notes. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively. Results of the panel regressions correspond to random effects with robust standard errors are clustered at the independent group level and are given in parentheses.

To obtain the p-values presented in Tables 4 and 7 of the paper, we conduct post-estimation t-tests of the equality of the regression coefficient (the “constant” for TUL and “constant +D_TCL” for TCL) with the prediction hypothesized by the SFE (shown in Table 2 of the paper) or by the alternative benchmarks (shown in Table 6 of the paper), respectively.

Table 3 reports the results of the regressions supporting the result in Section 5.3. We present the result of random effects panel regressions where the unit of analysis is the individual across rounds. We cluster standard errors at the independent group level. We run two regressions with two dependent variables: SlopePQ and InterceptPQ in columns (1) and (2), respectively. The explanatory variables are a treatment dummy (D_TCH is 1 in TCL, and 0 in TUL), and the private signal (Signal).

Table 3: Sensitivity of the supply function slope and intercept to the private signal.

<table>
<thead>
<tr>
<th></th>
<th>SlopePQ (1)</th>
<th>InterceptPQ (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>5.24***</td>
<td>226.82***</td>
</tr>
<tr>
<td></td>
<td>(1.31)</td>
<td>(44.09)</td>
</tr>
<tr>
<td>D_TCL</td>
<td>1.54</td>
<td>-47.95</td>
</tr>
<tr>
<td></td>
<td>(1.14)</td>
<td>(50.88)</td>
</tr>
<tr>
<td>Signal</td>
<td>0.0011</td>
<td>0.720***</td>
</tr>
<tr>
<td></td>
<td>(0.0013)</td>
<td>(0.032)</td>
</tr>
<tr>
<td>Observations</td>
<td>2,592</td>
<td>2,592</td>
</tr>
<tr>
<td>R²</td>
<td>0.015</td>
<td>0.12</td>
</tr>
</tbody>
</table>

Notes. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively. Results of the panel regressions correspond to random effects with robust standard errors are clustered at the independent group level and are given in parentheses.
The results are explained in Section 5.3 of the text. We ran additional regressions with the interaction term between the signal and the treatment dummy and these are non-significant in none of the regressions.

Table 2 reports the results of the regressions accompanying the results of Section 5.2 and 6.1. They report the results of two random effects panel regression with the dependent variables price impact and Lerner index on a constant, the treatment dummy \( D_{TCL} \) is 1 in TCL, and 0 in TUL, the private signal \( \text{Signal} \), and the round number \( \text{Round} \). The unit of analysis for the price impact regression is the participant across rounds, while for the Lerner index it is a given market across rounds. We cluster standard errors at the independent group level.

C.4. Heterogeneity of behaviour and mixture model

In this sub-section, we use price impact as measure of market power for analysing the heterogeneity in individual choices. To go one step further in our analysis of heterogeneity, we estimate a finite mixture model. We use the individual measure of price impact in each treatment, and assume that they are i.i.d. and generated by a normal distribution with mean \( \gamma_{jt} \) which is equal to the prediction of a particular benchmark \( j \) at round \( t \), and variance \( \sigma_j \), which is a free parameter.

The theoretical benchmarks that we use to estimate the mixture model are the SFE, IN, PT and PTIN, which have been discussed in Section 6.1. A finite mixture model allows each seller to use one of the benchmarks just described. Denote \( P_j \) the probability that any seller uses the \( j \) benchmark, where \( j \in \{ \text{SFE, IN, PT, PTIN} \} \) benchmark, such that \( \sum_j P_j = 1 \). The likelihood contribution for subject \( i \) is

\[
L_i = \sum_j P_j \prod_{t=1}^{18} f(d_{it}|j),
\]

where \( f(d_{it}|j) \) is the conditional probability that subject \( i \) in round \( t \) chooses \( d_{it} \) given that it follows benchmark \( j \). Recall that for the uncorrelated costs treatment, the PT and SFE are identical to the PTIN and IN respectively.

The sample log-likelihood in each treatment is then

\[
\log L = \sum_i^n \log(L_i).
\]

Table 4 reports the maximum likelihood results for the general mixture model in each treatment. In addition to estimating the general model for each treatment, we have tested whether any of the possible nested models might provide a more parsimonious representation of the heterogeneity of our choices. Results of likelihood ratio tests (at the 1% level) favour the most general model which allows all benchmarks to be present in each treatment.
Table 4: Maximum likelihood estimation for the general mixture models in each of the principal treatments.

<table>
<thead>
<tr>
<th>Model</th>
<th>TUL</th>
<th>Model</th>
<th>TUL</th>
</tr>
</thead>
<tbody>
<tr>
<td>-log L</td>
<td>35,764.47</td>
<td>-log L</td>
<td>36,841.61</td>
</tr>
<tr>
<td>$\sigma_{\text{PT}}$</td>
<td>0.95</td>
<td>$\sigma_{\text{PT}}$</td>
<td>0.93</td>
</tr>
<tr>
<td>$\sigma_{\text{SFE}}$</td>
<td>1.96</td>
<td>$\sigma_{\text{IN}}$</td>
<td>3.08</td>
</tr>
<tr>
<td>$p_{\text{PT}}$</td>
<td>0.089</td>
<td>$\sigma_{\text{SFE}}$</td>
<td>9.34</td>
</tr>
<tr>
<td>$p_{\text{SFE}}$</td>
<td>0.91</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes. The likelihood is computed using price impact for periods [1,18] for all participants in each treatment, thus there are 1,296 observations in each treatment.

The results of the previous table are explained in the main text at the end of Section 6.1.

Appendix D. Analysis of participants’ demographic and cognitive information

D.1. Demographics

We briefly analyse the demographics of participants in each treatment (72 subjects)- age and gender, where gender is equal to 1 if the subject is a male and 0 if female. In addition, for TUH and TCH, we asked participants to report their percentage score on the Spanish University Access Test.

Table 5: Demographics in each treatment.

<table>
<thead>
<tr>
<th>TUL</th>
<th>TUH</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.542</td>
<td>20.514</td>
<td>Age</td>
</tr>
<tr>
<td>0.514</td>
<td>0.486</td>
<td>Gender</td>
</tr>
<tr>
<td>-</td>
<td>0.757</td>
<td>University Access Test</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TCL</th>
<th>TCH</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>21.264</td>
<td>20.736</td>
<td>Age</td>
</tr>
<tr>
<td>0.514</td>
<td>0.542</td>
<td>Gender</td>
</tr>
<tr>
<td>-</td>
<td>0.733</td>
<td>University Access Test</td>
</tr>
</tbody>
</table>

Note. The number of participants in each treatment is equal to 72.

We find that there are no differences among treatments in age and gender and found no
statistical difference (Pearson $\chi^2$ tests: p-value=0.833 for age, and p-value=0.931 for gender), and also we cannot reject that there are no differences in the scores for the university access test between treatments TUH and TCH (t-test, p-value=0.236).

D.2. Cognitive Reflection Test in TUH and TCH

In order to disentangle whether there were differences in subjects’ cognitive abilities between treatments, we conducted the cognitive reflection test (Frederick, 2005), hereafter CRT, at the end of the experiment for treatments TUH and TCH. The question of the CRT are as follows: (1) A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost? _____ cents; (2) If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? _____ minutes; (3) In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? _____ days. We incentivised participants with 0.5 Euros per correct answer.

Table 6: Results of the CRT in each of the two treatments.

<table>
<thead>
<tr>
<th></th>
<th>TUH</th>
<th>TCH</th>
<th>Number of Correct answers in the CRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>44</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>16</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>7</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>0.847</td>
<td>0.625</td>
<td>Average</td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>72</td>
<td>Observations</td>
<td></td>
</tr>
</tbody>
</table>

With a two-sample t-test, we find that we cannot reject the hypothesis that the mean of the CRT is the same in the two treatments (p-value=0.166). In addition, we conducted regressions of market power on the number of correct answers in the CRT test in each treatment. We found that, in each of the two treatments, the number of correct answers in the CRT is not a predictor of price impact (p-value=0.733 in the TUH, p-value=0.589 in the TCH) or the supply function slope (p-value=0.646 in the TUH, p-value=0.869 in the TCH).

Appendix E. Further analysis of the noisiness of the private signal

In an additional treatment we investigate whether an extreme increase in the noisiness of the private signal in relation to the noisiness of the fundamental affects the competitiveness of

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Footnote: In treatments TUL and TCL we did not collect data for the CRT.
markets. We conducted a treatment with correlation $\rho = 0.175$ and $\phi = 3600$ (hereafter TCHH), in which the private signal is practically uninformative. Treatment TCHH can be then easily compared with treatment TCH (that has $\rho = 0.175$ and $\phi = 36$). The SFE predicts that the TCHH is slightly less competitive than treatment TCH, with a theoretical price impact of $d^{SFE} = 13.49$ (an increase of 0.97 in price impact due to an increase in the variance ratio by a factor of 100). We ran the TCHH treatment with 72 participants, which had 6 independent groups of 12 sellers each. The experimental procedures were identical to those of the main experiment, described in Section 5. Table 7 displays the market power and information friction results in the TCHH treatment.

Table 7: Market power and information frictions in the TCHH treatment, and comparisons.

<table>
<thead>
<tr>
<th>Supply function</th>
<th>TCH</th>
<th>TCHH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean (s.d.)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price impact</td>
<td>$4.89$ (2.80)</td>
<td>$5.34$ (3.11)</td>
</tr>
<tr>
<td>Lerner index</td>
<td>$0.036$ (0.088)</td>
<td>$0.048$ (0.096)</td>
</tr>
<tr>
<td>Market price</td>
<td>$1,149.31$ (99.15)</td>
<td>$1,165.28$ (105.75)</td>
</tr>
<tr>
<td>Profit</td>
<td>$2,983.52$ (3,974.92)</td>
<td>$3,540.21$ (4,385.66)</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td>$4.52$</td>
<td>$4.82$</td>
</tr>
<tr>
<td><strong>Note.</strong></td>
<td>The first row shows the average, while the second in brackets and italics is the standard deviation (s.d.). The number of observations in each treatment is 1,800.</td>
<td></td>
</tr>
</tbody>
</table>

We find that average market power is slightly larger in the TCHH treatment than in the TCH treatment, however, when tested formally, we find that the two treatments have the same degree of market power ($p = 0.200$, Mann-Whitney rank-sum test where the unit of observation is the independent group).

References