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# Toward Value Co-Creation: Increasing Women's Presence in Management Positions through Competition against a Set Target

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**Abstract:** Despite empirical evidence that women's presence in management positions is a source of value co-creation for firms, these positions are still male-dominated. Some evidence from experimental economics suggests that one reason for this imbalance is that women shy away from competition. However, most of these studies have focused on competition systems that pit individuals against each other. We present an economic laboratory experiment that compares competition against others with competition against a set target. The crucial difference is that whereas the former involves competing against opponents, the latter does not. Our results show that significantly more women are willing to compete against a set target than against others. Furthermore, there is no reduction in men's participation and no general efficiency reduction. Our findings suggest that firms that aim at value co-creation and sustainability through a gender-neutral promotion mechanism should introduce competition against a set target and reduce competition against others. This paper contributes to dispelling stereotypes about women's reluctance to compete.

**Keywords:** behavior; competition; decision-making; experimental economics; gender; sustainability; value co-creation

## 1. Introduction

*It is often said that we should welcome women's presence in the workplace because it allows us to capitalize on the talents of our entire population, and this is certainly true. But it is also good business. A number of studies on how groups perform indicate that workforces that vary on dimensions such as gender, race, and ethnicity produce better decision-making processes and better outcomes. Evidence also suggests that women's work has positive spillovers to their family lives and to the success of their children, which in turn benefits all of society.*

Janet L. Yellen, 5 May 2017

So We All Can Succeed: 125 Years of Women's Participation in the Economy At "125 Years of Women at Brown Conference", sponsored by Brown University, Providence, Rhode Island

As U.S. Federal Reserve Chair Janet L. Yellen explains, women's presence in decision-making positions is an important source of value co-creation for firms. Value co-creation refers to the value that firms create for themselves and for the society and ecosystem in which they operate [1].

Despite advances in the last 30 years, business, political, and scientific leadership positions are still largely male-dominated. In 2016, only one in four senior roles in businesses worldwide was held

by women [2]. Although several countries have implemented gender equality policies, the results have often been disappointing [3].

Certain studies have suggested that the low presence of women in top positions in business, politics, and science owes partly to gender differences in the willingness to compete [4–14]. However, most of these studies have focused on testing a particular competition type against others, the winner-takes-all (WTA) competition. Decisions in WTA competition relate to key variables such as culture [9,15,16], gender identity (cooperative or non-cooperative [17]), self-confidence [18–21], risk/ambiguity attitudes [15,21], or combinations of these variables [20].

To find a more suitable competition system that appeals more to women, enables women to reach management positions, and consequently boosts sustainable value co-creation for firms, our research examines the willingness to compete (by gender) in the alternative competition environment of competition against a set target. The main difference between competition against others and competition against a set target is that the former involves competing against opponents, whereas the latter does not. We expect competition against a set target to relate less to influences such as culture and self-confidence. We compare willingness to compete by gender under these two competition scenarios. Competition against a set target is a promotion mechanism that is feasible and easy to implement for firms.

Additionally, recent studies have examined competition systems where each individual competes against his or her own previous score as a way of self-improvement. These studies have reported that the gender gap is not statistically significant [21–23]. However, some such studies have obtained a different result. In a lab-in-the-field experiment in Germany, Bönnte et al. [24] found that women are on average less likely to self-select into competition against their own previous scores than men are. This result was perhaps influenced by the identity priming effect of starting the experiment by asking subjects to indicate their gender.

A major advantage of competition against a set target, discussed herein, is that competition against oneself (self-improvement) potentially leads to ratchet effects, whereas competition against an external target does not. In dynamic labor markets, the ratchet effect describes situations where workers deliberately restrict their performance because they anticipate that firms will respond to higher performance by demanding even better results or by cutting future pay [25,26].

We designed an economic experiment with two treatments, each one under a different competition system. The first treatment gave subjects the choice to select payoffs from a piece-rate pay scheme or from competition against others. The second treatment gave subjects the choice to select payoffs from a piece-rate pay scheme or from competition against set targets that were exogenous and challenging. Economic experiments are especially well suited to testing individuals' decision-making and comparing different incentive mechanisms because of the strict control that the researcher can apply to the context. Indeed, economic laboratory results regarding competitiveness have proven to be good predictors of career choices and labor market outcomes [27–29].

The results of the economic experiment show that significantly more women enter into competition against a set target than competition against others. This increase in women's competitiveness due to the type of competition is accompanied by no reduction in men's participation and no general efficiency reduction.

Our results provide insights to help firms develop policies that aim to reduce the gender gap in management and thereby achieve sustainable value co-creation. Given the socioeconomic advantages of gender-balanced societies, this research advocates competition against a set target rather than competition against others as the recommended promotion mechanism for company and government employees. This research also contributes to disproving stereotypes regarding women's reluctance to compete.

This paper is organized as follows: Section 2 describes the experimental design and procedures; Section 3 presents the results; and Section 4 discusses the findings and conclusions.

## 2. Experimental Design and Procedures

To explore the effects that systems of competition exert on men and women's decisions to enter into competitive environments, we designed an economic laboratory experiment. The experiment had two treatments. Competition type was the only difference between treatments.

Treatment 1 (T1) was based on competition against others [12]. Subjects started Round 1 in T1 by summing sets of five two-digit numbers for five minutes under a piece-rate pay scheme (0.25 Euros per correct sum). In Round 2, subjects repeated the additions test under a pay scheme based on competition against others. The pay scheme was based on a tournament in groups. Two men and two women were randomly selected, and only the subject who solved the largest number of correct sums received payment (1 Euro per correct sum). Because three of the four subjects from each group received no payment, we defined this competition as competition against others. During Round 3 of T1, subjects repeated the additions test, choosing one of these two pay schemes. Finally, as a control variable between treatments, Round 4 of T1 consisted of the same test under a new competitive pay scheme, namely the scheme we introduced in Treatment 2 (T2).

T2 introduced a new competition format: competition against a set target. Target setting is a way for individuals to compete independently. It is up to each individual, and only that individual, to meet these targets. Table 1 illustrates the difference between the two treatments and the order of rounds. As Table 1 shows, T2 repeated the additions test and rounds in T1, with the exception of introducing competition against a set target in Round 2. In Round 3, subjects thus chose between piece-rate pay (0.25 euros per correct sum) and the pay scheme based on competition against set targets. As a control variable between treatments, Round 4 of T2 consisted of the additions test under the pay scheme based on competition against others.

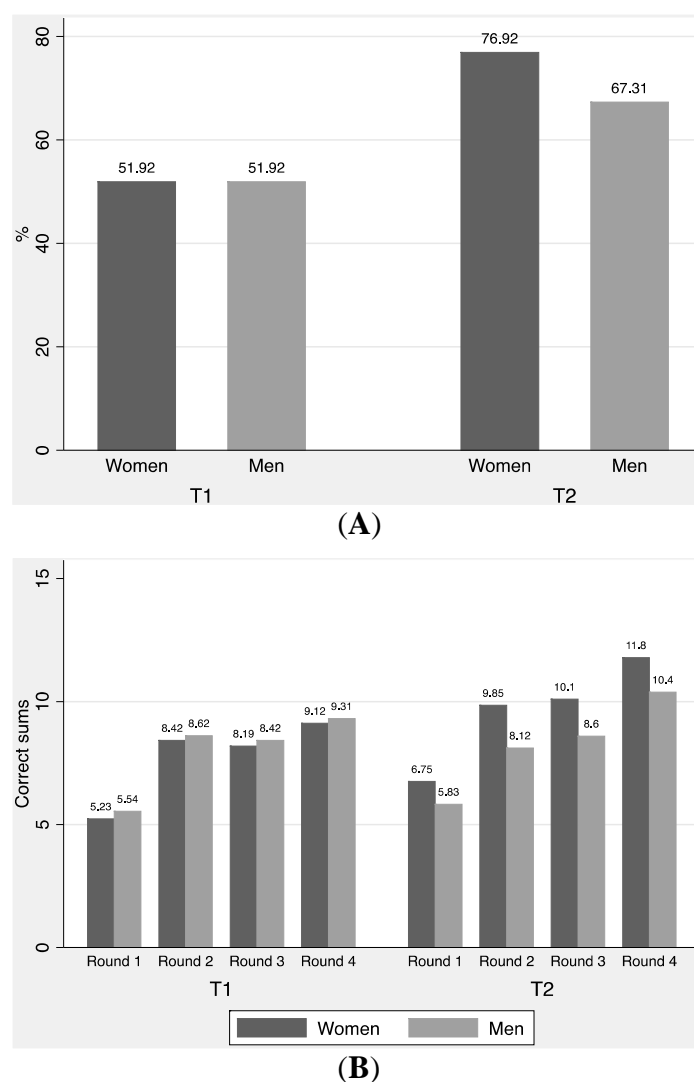
**Table 1.** Description of the Task 1 in the two experimental treatments and their expected payoffs.

(a) Description of the Two Experimental Treatments							
Treatment 1				Treatment 2			
Round 1	Round 2	Round 3	Round 4	Round 1	Round 2	Round 3	Round 4
Piece-rate pay	Competition against others	Choice of payment type 1 or 2	Competition against a set target	Piece-rate pay	Competition against a set target	Choice of payment type 1 or 2	Competition against others
(b) Expected Payoff Depending on Competition Type and Number of Correct Sums							
Number of Correct Sums	Piece-Rate Pay (1)	Competition against Others (2)	Competition against a Set Target (3)				
7	1.75	$P_s \times 7$	0				
8	2	$P_s \times 8$	0				
9	2.25	$P_s \times 9$	0				
10	2.5	$P_s \times 10$	5				
11	2.75	$P_s \times 11$	8.25				
12	3	$P_s \times 12$	12				

(2)  $P_s$  = subjective probability of being the best in the group of four, given the number of correct sums  $s$ .

The lower part of Table 1 shows the pay scheme of competition against a set target. Correctly summing 10 sets of numbers paid 0.50 euros, correctly summing 11 sets paid 0.75 euros, correctly summing 12 sets paid 1 euro, and so on. As Table 1 shows, subjects had to sum at least 10 sets of numbers correctly to receive any payment.

For the purposes of comparison between treatments, 12 correct sums paid 1 euro in the competition against a set target. Similarly, 12 correct sums give a subjective probability  $P_{12}$  equal to 1 to the individuals in the competition against others, consequently paying 1 euro per sum. Given that 8.5 was the average number of correct sums in T1 Round 2 (see Figure 1), 11 correct sums gave subjective probability  $P_{11}$  of close to 1 in the competition against others, consequently paying 1 euro per sum, too.



**Figure 1.** Percentage of men and women that entered into competition by treatment (A) and average number of correct sums by treatment, round, and gender (B).

The experiment was designed to control for variables that are presented in the literature as potential influencers of the decision to enter into competition. These variables are self-confidence, cooperativeness, risk aversion, experience in competitive sports, and experience in competitive games. To test for self-confidence, subjects did not receive feedback on the number of correct sums until after the four rounds (here, our experiment differs from [12]). Before receiving this information, subjects answered an incentivized question on their expected relative performance (within the group of four). The comparison between answers regarding each subject's relative performance and actual position within the group measured each subject's self-confidence.

After the four rounds of additions, the subjects started a second task. The Task 2 consisted of an incentivized, decomposed game that tested for cooperative or non-cooperative behavior [30–33]. After this game, a third incentivized task measured attitudes to risk. Following the procedure described in [34], subjects made choices in nine lottery pairs based on [35]. At the end of the experiment, subjects answered a social questionnaire that included questions about experience in competitive videogames and sports.

The 208 subjects (104 men and 104 women) were students enrolled in Economics, Business, International Business, and Finance and Accounting programs at the University of Valencia.

We selected students from these programs to ensure a consistent level of math across the sample. Consequently, there was no expected difference in math level between men and women in this sample. All students passed a national exam requiring a high level of math to enroll in these programs.

The computerized between-subjects experiment was run during the 2014/15 academic year, in October 2014 (T1) and June 2015 (T2), at the Laboratory for Research in Experimental Economics (LINEEX). The experiment was run using z-Tree [36]. Each treatment lasted approximately one hour. During the experiment, subjects could not use calculators, although they were allowed to use pen and paper, nor were they permitted to communicate with other subjects. They received no feedback on their performance until the end of the experiment, when they received their payoffs (19.5 euros on average). Payoffs were calculated by adding payoffs from each incentivized task. Only one of the rounds of Task 1 was randomly selected at the end of the experiment for inclusion in the payoffs.

### 3. Results

Figure 1A shows the percentage of men and women who decided to enter into competition (i.e., who decided to take payment type 2) in Round 3 of Task 1 for each treatment. Results show that competition against a set target (T2) was more attractive to both men and women: 67.31% of men entered into competition against a set target, whereas only 51.92% entered into competition against others (T1); 76.92% of women entered into competition against a set target, whereas only 51.92% entered into competition against others. Table 2 (Panel A) shows that this difference between treatments was significant ( $p = 0.003$ ). Women significantly preferred competition against a set target to competition against others ( $p = 0.008$ ).

Notably, no gender differences in math ability drove to the above result. As shown in the second part of Figure 1 (Figure 1B) and as expected when selecting students from economics and business degree programs in Spain, there were no significant gender differences in math ability in terms of number of correct sums in Round 1 ( $p = 0.539$ , see Table 2 (Panel B)).

Table 2 presents the detailed data collected in the experiment by treatment (Table 2 (Panel A)) and by gender (Table 2 (Panel B)). Table 2 (Panel A) shows that the number of subjects who decided to enter into competition was the only significant difference between the treatments (T1: competition against others; and T2: competition against set targets). As commented earlier, significantly more subjects chose competitive payment when competing against a set target (T2) ( $p = 0.003$ , see Table 2 (Panel A)). No other control variable, besides the (slightly significant) better ability of Treatment 2's subjects ( $p = 0.025$ ), significantly differed between treatments. This finding is important for comparative purposes. Whereas men were not significantly sensitive to the change in competition system ( $p = 0.110$ ), women responded positively to the change from competition against others to competition against a set target ( $p = 0.008$ ). This finding is consistent with the findings of [21–23], who studied another type of independent competition (i.e., competition against each subject's own previous score as a way of self-improvement).

Interestingly, Table 2 (Panel B) shows that no gender differences in competition preferences were found when individuals competed against a set target ( $p = 0.274$  in T2). Men and women were equally competitive when competing against a set target. Similar findings regarding the gender balance in competitive decisions have been reported in studies of different systems of independent competition [21–23]. These studies addressed competitions where individuals competed against their own previous scores as a way of self-improvement, reporting that the gender gap was not statistically significant.

Our experiment did not test competition against one's own past performance. Instead, it tested competition against targets that were external and challenging. This system of competition is a promotion mechanism that is feasible, productive, and easy to implement for most companies. In addition, competition against external targets, unlike competition against oneself (self-improvement), does not lead to ratchet effects. Our results show that by introducing competition against a set target instead of the more common form of competition against others, women are

significantly more willing to participate in competitive environments, while men's willingness to compete does not differ significantly.

Table 2 (Panel B) provides further insight into gender differences. For instance, we observed significant gender differences in self-confidence ( $p = 0.029$ ). These differences owed to lower self-confidence among women in T2 ( $p = 0.077$ ), despite the higher number of correct sums by women in Round 1. This result has been observed on numerous occasions in the primary and secondary experimental literature [18,20,37,38].

**Table 2.** Frequencies and  $p$ -values by treatment and gender.

Panel A. Differences by Treatment						
	Men		Women		Men + Women	
	T1	T2	T1	T2	T1	T2
<b>H<sub>0</sub>: T1 = T2</b>						
Correct sums Round 1	5.54	5.83	5.23	6.75	5.39	6.23
Mann-Whitney test	$p = 0.566$		$p = 0.013$		$p = 0.025$	
Enter competition	51.92%	67.31%	51.92%	76.92%	51.92%	72.12%
Proportion test	$p = 0.110$		$p = 0.008$		$p = 0.003$	
Self-confidence	32.69%	34.62%	21.15%	19.23%	26.92%	26.92%
Proportion test *	$p = 0.836$		$p = 0.807$		$p = 0.100$	
Cooperative	48.08%	34.62%	42.31%	38.46%	45.19%	36.54%
Proportion test *	$p = 0.163$		$p = 0.689$		$p = 0.204$	
Risk averse	77.42%	77.42%	72.97%	56.41%	75.00%	65.71%
Proportion test *	$p = 1.000$		$p = 0.132$		$p = 0.233$	
Sports	67.31%	65.38%	94.23%	88.46%	80.77%	76.92%
Proportion test *	$p = 0.836$		$p = 0.295$		$p = 0.497$	
Games	44.23%	28.85%	80.77%	84.62%	62.50%	56.73%
Proportion test *	$p = 0.103$		$p = 0.604$		$p = 0.397$	
Panel B. Differences by Gender						
	T1		T2		T1 + T2	
	M	W	M	W	M	W
<b>H<sub>0</sub>: Men = Women</b>						
Correct sums Round 1	5.54	5.23	5.83	6.75	5.68	5.99
Mann-Whitney test	$p = 0.498$		$p = 0.145$		$p = 0.539$	
Enter competition	51.92%	51.92%	67.31%	76.92%	59.62%	64.42%
Proportion test *	$p = 1.000$		$p = 0.274$		$p = 0.475$	
Self-confidence	32.69%	21.15%	34.62%	19.23%	33.65%	20.19%
Proportion test *	$p = 0.185$		$p = 0.077$		$p = 0.029$	
Cooperative	48.08%	42.31%	34.62%	38.46%	41.35%	40.38%
Proportion test *	$p = 0.554$		$p = 0.684$		$p = 0.888$	
Risk averse	77.42%	72.97%	77.42%	56.41%	77.42%	64.47%
Proportion test *	$p = 0.673$		$p = 0.066$		$p = 0.098$	
Sports	67.31%	94.23%	65.38%	88.46%	66.35%	91.35%
Proportion test *	$p = 0.000$		$p = 0.005$		$p = 0.000$	
Games	44.23%	80.77%	28.85%	84.62%	36.54%	82.69%
Proportion test *	$p = 0.000$		$p = 0.000$		$p = 0.000$	

\* Two-sided  $t$ -test of proportions.

Despite their lower self-confidence, however, women did enter into competition against a set target. Cultural aspects such as gender-specific beliefs about one's own skills or others' skills, are not influential in decisions to enter into competition against set targets. Subjects in competitions against others must deal with their own (subjective) chances of being good enough and with the (subjective) chances of encountering someone in the group who is better. This finding reinforces the gender neutrality of competition against a set target as a promotion mechanism for firms.

In this experiment, more women than men reported having experience in competitive sports ( $p = 0.000$ ) and competitive games ( $p = 0.000$ ). There were also slightly significant gender differences in risk aversion ( $p = 0.098$ ).

Table 3 shows the Logit regression with the experimental data, where the decision to enter into competition in Round 3 of Task 1 is the dependent variable.

**Table 3.** Logit regression for entering into competition in Round 3 of Task 1.

Variables	Overall				Women		Men	
	(a)		(b)		(c)		(d)	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Constant	−2.66	0.78 ***	−2.54	1.02 **	−2.68	1.13 **	−2.54	1.10 **
Gender	0.05	0.35	−0.38	0.46				
Treatment	0.83	0.32 **	1.07	0.40 **	1.03	0.47 **	0.59	0.45
Correct sums R1	0.22	0.07 ***	0.28	0.09 **	0.19	0.09 **	0.29	0.11 ***
Self-confidence	−0.29	0.36	−0.31	0.48	−0.35	0.56	−0.02	0.50
Cooperative	0.78	0.32	−0.24	0.40	0.86	0.48 *	−0.66	0.46
Risk averse			−0.15	0.45				
Sports	0.98	0.40 **	0.67	0.50	0.49	0.79	1.17	0.49 **
Games	−0.09	0.36	−0.31	0.44	0.02	0.59	−0.70	0.48
N	208		138		104		104	
Prob. > $X^2$	<0.001		0.001		0.007		0.002	
Pseudo $R^2$	0.116		0.148		0.132		0.145	

\*, \*\* and \*\*\* significant at 10%, 5% and 1% level; N, number of subjects.

Treatment was significant. Differences between treatments owed to the significant difference in women's decisions to compete depending on the competition system. Comparing model (b) with model (a) illustrates that including risk aversion did not substantially affect the treatment difference. Please note that model (a) was estimated with the 208 subjects of the experiment, while model (b) was estimated with only the 138 subjects that made consistent choices in Task 3, which was designed to elicit the subject's risk attitudes (nine lottery pairs based on [35]). As expected, another variable that differentiated decisions to enter into competition was subjects' ability (correct sums in Round 1). Thus, for value co-creation purposes, firms may consider altering promotion mechanisms such that they emphasize targets rather than direct competition with others. Our results show that while men are not sensitive to this change, women respond positively (treatment is significant in model (c) and not significant in model (d)).

#### 4. Discussion and Conclusions

Empirical evidence has shown that ensuring a gender balance in management is a source of sustainable value co-creation for firms. Nevertheless, in 2016, decision-making positions within firms were still largely male-dominated.

We sought to identify a promotion mechanism that encourages more women to compete for decision-making positions. Accordingly, we experimentally compared willingness to compete by gender across two systems of competition: competition against others and competition against a set target. Competition against a set target emphasizes goals rather than direct competition against others.

This competition system is easy to implement in corporations, at least at low- and mid-level promotion stages, which give individuals a platform to reach top positions.

Our results imply that women are more willing to compete against a set target than against others, even when they lack self-confidence. Women low self-confidence has been generally found in empirical and experimental literature. For example, women low self-confidence has been found to account for the majority of the gender difference in entrepreneurial propensity [39–41]. Another interesting finding is that competition against a set target does not reduce productivity, yet it does offer a gender-neutral incentive mechanism. Competition against a set target provides an alternative to removing competitive features of the environment. This alternative is therefore attractive because competitive features have been shown to boost performance. Moreover, competition against a set target, unlike competition against oneself (self-improvement), does not lead to ratchet effects.

Our findings support the implementation of promotion policies that depend heavily on work done and that do not require direct, interpersonal competition. Our findings have implications regarding sustainable value co-creation, especially given potential positive spillovers to the domains of children and family life. An interesting example of such a policy is the university faculty promotion mechanism that was introduced by the Spanish government in 2005. A set of targets must be reached and centrally evaluated for candidates to achieve promotion to full professor. In nine years, the percentage of women full professors has increased from 13.7% to 20.8%.

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