WAGE DISPERSION AND SPORTS PERFORMANCE: DOES GENDER MATTER?

Author Details:

Margarita Arutiunova

National Research University Higher School of Economics; Saint Petersburg; Russian Federation.

Thadeu Gasparetto

Carnegie School of Sport; Leeds Beckett University; Leeds; United Kingdom.

Corresponding author: Thadeu Gasparetto

t.miranda-gasparetto@leedsbeckett.ac.uk

Acknowledgments (if applicable):

N/A

Biographical Details (if applicable):

N/A

Structured Abstract:

Purpose: Previous studies focused predominantly on wage dispersion within men' sports teams. The aim of this research is to reveal how the relationship between wage dispersion and team performance applies for women's sport as well. **Design/methodology/approach:** Our sample comprises 168 observations of four consecutive National Basketball Association (NBA) and Women's National Basketball Association (WNBA) regular seasons (from 2018 to 2021). Eight Ordinary Least Square regressions are performed for comparing the leagues. **Findings:** Our findings indicate that the wage dispersion within the squads affects the women's and men's basketball teams differently. Cohesiveness theory is applicable for WNBA teams, while NBA teams follow the tournament theory. **Originality:** To the best of our knowledge, this is the first paper which inspects the relationship between wage dispersion and team performance using data from women's sports. Further research may examine whether the differences found in sports also apply in different labour markets.

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Introduction

Workforce performance is a hot topic for managers of all levels, such as coaches, scholars, investors, and other beneficiaries (Vinué and Epifanio, 2017). Some psychological research is devoted to the pay dispersion within the labor groups (Shaw and Gupta, 2007; Rouen, 2020), as well as several managerial and economic studies evidence potential gender pay inequality in the workplace (Garbinti, Goupille-Lebret, Piketty, 2018; Stier and Yaish, 2014; Chen, Ge, Lai and Wan, 2013; Cohen, Huffman and Knauer, 2009).

Nonetheless, research exploring the intersection between wage dispersion, team performance and gender issues has not been found. Therefore, the current work aims to shed light on this issue. For that, we rely on sports data. Kahn (2000) argues that sports represent an optimal laboratory for labor market research as well as Fonti, Ross and Aversa (2023) claim that sports data is appropriate for management studies. Indeed, latest studies have been taking this into account (Bar-Eli, Krumer and Morgulev, 2020; Della Torre et al., 2018; Palacios-Huerta, 2014).

There are two dominant theories addressing the relationship between wage dispersion and performance: tournament and cohesiveness. The tournament theory states that the higher the wage difference within a team, better the performance (Lazear and Rosen, 1981; Connelly *et al.*, 2014). This theory posits that wage dispersion, or differences in pay between employees within an organization, can incentivize higher levels of effort among lower-paid employees, who would have the opportunity to compete for higher-paying positions. This mechanism, then, would lead to improved team performances. The cohesiveness theory, on the contrary, suggests that smaller dispersions are associated with an increase in teams' performance (Levine, 1991). This theory suggests that wage equity would provide higher social cohesion among team members as well as sense of collective identity and commitment to the team's goals, which would lead to greater team performances.

Economics and management research offers controversial findings for each of the theories mentioned above. For instance, DeVaro (2006), Heyman (2005) and Bloom and Michel (2002) show empirical evidence supporting the tournament theory. On the other hand, Tomaževič, Seljak and Aristovnik, (2014) and Hibbs Jr. and Locking (2000) indicate that larger wage dispersion is detrimental to workers performance – supporting cohesiveness theory – as well as Leete (2000) documents that wage equity would improve employee motivation, leading to better performances.

This debate is found on professional sports as well. For instance, Frick et al (2003) evidenced that greater salary dispersion is associated with better team performance, while Breunig *et al* (2014) suggest that wage disparity leads to a lower team performance. Moreover, Cyrenne (2018) argues that the salary distribution on a team has a mixed effect. This controversial debate can be observed in different sports disciplines, such as baseball (Hill *et al*, 2017; Richards and Guell,1998), tennis (Gilsdorf and Sukhatme, 2008), football (Gasparetto and Barajas, 2022), basketball (Katayama and Nuch, 2011), among others.

The purpose of the current study is to analyze the relationship between wage dispersion and performance, focusing on potential gender differences. For that, we examine the relationship between wage dispersion and team performance in the National Basketball Association (NBA) and Women's National Basketball Association (WNBA). Our empirical findings could contribute with the understanding on whether male and female teams behave similarly according to the wage dispersion, but they can also be helpful to professional basketball franchises regarding the managerial approach to payroll structuring. If significant differences between male and female teams are found, managers from traditional organizations and sport firms should be aware of them in order to maximize team performance.

This paper aims to answer the following research questions: Does wage dispersion impact the performance of male and female sports teams differently? If significant differences are uncovered, we will further investigate which theory – tournament or cohesiveness – explains better the behavior of players within teams of both genders and how this behavior might impact the teams' overall performance.

The paper is organized as follows: Literature Review, Methods, Results, Discussion, and Conclusion. In the Literature Review section, we discuss key empirical studies regarding workforce performance and the potential impact of wage dispersion on team performance. The Methods section provides a detailed explanation of our data collection process, econometric methodology, and the variables used in our analysis. Subsequently, we present our Results. The Discussion section analyzes our empirical findings, highlights limitations of our study, and suggests avenues for further research. Finally, in the Conclusion, we offer our main conclusions based on our research.

Literature review

Overview of previous workforce performance studies

Many papers stated that pay dispersion influences workforce performance differently. Larkin et al. (2012) suggest that the social comparisons factor, as a person's evaluation of his/her efficiency and payment concerning peers, can affect the individual's work efforts. Individual efforts contribute to team performance, as it is joint work (Bloom, 1999). Shaw, Gupta and Delery (2002) indicate that pay dispersion may be associated with higher levels of workforce performance when accompanied by formal individual incentive systems and independent work. Nonetheless, pay compression would be desirable in the absence of individual incentive systems and in situations where work is interdependent.

One of the common ways to examine the pay dispersion phenomenon is researching teams (Bucciol, Foss and Piovesan, 2014). Professional team sports are helpful here as they deliver publicly observed, verifiable, and wide performance measures for the athletes (Simmons and Berri, 2011). Della Torre *et al.* (2014) suggests that both absolute and relative pay levels, as well as pay dispersion, positively influence individual performance in organizational team settings. However, when absolute and relative pay levels are analyzed together, only the impact of relative pay is found to be significant. Moreover, pay dispersion is found to partially substitute the effect of pay levels on individual performance.

Regarding gender differences, research generally suggests that men and women perform differently in a competitive environment (Ors, Palomino and Peyrache, 2013; Gill and Prowse, 2014). However, several factors such as entry barriers, discrimination practices or lack of access to resources could potentially explain some differences and, under similar or identical circumstances, no significant differences should be observed (Fischer, Reuber and Dyke, 1993). However, there are some signs that certain elements could affect them differently, such as stress or job satisfaction (Babin and Boles, 1998) as well as different responses under pressure (Cohen-Zada, Krumer, Rosenboim and Shapir, 2017).

The intersection between wage dispersion, team performance and gender differences has not been addressed and our goal is to offer empirical evidence in this regard. Therefore, the current study aims to find the connection between wage dispersion and team performance in the NBA and WNBA and reveal whether there are differences. We consider the professional basketball industry as an appropriate setting because the performance of teams depends mostly on cohesion among participants (Sáenz-López *et al*, 2021). However, controversial conclusions concerning the relationship between NBA team performance and internal salary dispersion exist (Katayama and Nuch, 2011) are also found. Therefore, our goal is to determine if any association exists and whether it is different for male and female teams.

A comparable dataset for both genders is an advantage of this research. One can notice that the WNBA and NBA provide the same in-game indicators for every franchise (Basketball-Reference, 2022) as the general game principles, rules, and data follow the same standards for both NBA and WNBA (The Washington Post, 2022). Then, that would be appropriate to examine how to wage dispersion affects the team's performance from the gender influence angle, considering characteristics with identical standards and requirements.

Wage dispersion and sport team performance: findings from previous studies

The research on wage dispersion and its impact of firm performance is not a new topic in management and economics literature. Indeed, relevant research published decades ago were already addressing this matter (e.g., Hartog, 1981; Petersen, 1992; Rowthorn, 1992). Nonetheless, the use of sports data for such analysis is more recent and has been gaining importance over the years.

In a nutshell, these studies mostly rely on secondary data from official sports statistics sources, implementing econometric techniques to investigate the data. As a dependent variable, most of them use seasonal winning percentage as a proxy of team performance, but there is research which used total points achieved by teams or total wins. Few recent works have been inspecting match-level data as well.

The wage-dispersion variable varies among papers. Some authors consider the Herfindahl–Hirschman Index (HHI) as a wage dispersion measure (DeBrock *et al*, 2004), while Kahane (2012) used the standard deviation and inter-quantile range. Many scholars prefer the Gini index and its modifications (Simmons and Berri, 2011). Bucciol (2014) provided information that Gini substituted Theil Index and emphasized the quantitative side of the study's results. Authors also used several wage dispersion proxies such as Gini, Theil, Coefficient of variation (CV), their squared forms, etc. (Cyrenne, 2018; Bykova and Coates, 2020; Gasparetto and Barajas, 2022). Bloom (1999) discussed the choice of the wage dispersion measurement. He noticed that the pay distribution theory does not provide any statements on whether one pay dispersion method is better than others. Many studies used different wage dispersion proxies and their combinations and evidenced no significant changes in their models' results there (Franck and Nüesch, 2011).

The empirical findings, as mentioned in the introduction, are also diverse. Indeed, there are empirical support for both tournament and cohesiveness theory, as well as some settings where none of them showed significant association between wage dispersion and performance. The explanations of the findings also depend on the context. For instance, Simmons and Berri (2011) suggest that team wage dispersion could affect the win percentage due to a collective effort effect. Berri and Jewell (2004) analyzed team performance considering team's talent level, team chemistry, and coaching ability, while Bykova and Coates (2020) examined coaches' direct and indirect influence on teams' performance. As an example of how this research field evolves, earlier research, as Depken II (2000), suggested a common behavior for all clubs, where a higher level of teams' total payroll would improve performance, while recent ones, such as Gasparetto and Barajas (2022), suggest that equal levels of dispersion could impact differently according to the club's financial capacity total payroll. Nonetheless, to the best of our knowledge, none has compared male and female differences by the date.

Methods

Data collection

We would like to highlight that the data collection process connected with women's sports usually has some limitations. Unfortunately, the available financial information for female sports teams is not as extensive as for males – it may justify the current lack of papers about wage dispersion and performance comparing genders observed in the literature. However, we managed to scrape comprehensive wage data on women's professional basketball league in the United States (WNBA) allowing the development of this research.

We used players' and coaches' secondary data from four consecutive regular seasons (2018-2021). The data has been collected from professional statistical databases as Spotrac (Spotrac, 2022) and Basketball Reference (Basketball-Reference. (2022). Both data on the NBA and WNBA teams were taken from these sources. Our dataset comprises the following information: rosters' characteristics, playing characteristics, head coaches' characteristics, and wage-related data.

Firstly, we collected data on teams' and coaches' characteristics indicators in a leading online source for NBA, the Basketball-Reference.com website. Some scholars of previous studies in our research field used this information portal as a reliable and up-to-date source (Katayama and Nuch, 2011; Miguel *et al*, 2021). The fact that it contains both NBA and WNBA's metrics makes the process of data collection easier and reliable. The data is updated every day and standardized for both leagues equally. We then work with the same indicators for both genders.

The dataset comprises 12 WNBA and 30 NBA teams. This difference is due to the total number of franchises in each league. We acknowledge that a balanced sample could be potentially better (e.g., identical number of clubs from each league), but we would like to emphasize that we have worked with the whole *universe* of clubs. Moreover, since we aim to check whether intra-team wage dispersion impact team performance instead of intra-league level, we believe the difference of clubs does not constitute an issue. The explanatory variables are divided into 4 groups: Roasters' Characteristics; Playing Characteristics; Head Coaches Characteristics; Qualitative Variables; Wage-Related Variables. Tables 1 and 2 show the variables and their explanations.

[ADD TABLES 1 AND 2 HERE]

The first group, the Rosters' characteristics, consists of one variable only, used for comparative purpose. Such characteristics as weight, height and others could not be in the same category for both leagues. The playing characteristics group consists of 31 team performance indicators, which were collected from the Basketball-Reference (2022). They describe overall performance and actions per regular season in each league (Table 1).

The following group of variables comprises the coaches' experience as the head coach in the league, as well as for the concrete club in the particular season. This group of eleven coaches' indicators was added to the first one mentioned above into the single dataset for each league.

The last group of variables includes individual players' wages. We collected all players' wages from all clubs in both leagues for the four regular seasons from 2018 to 2021 from Spotrac.com. This data was used for the wage-related variables' construction.

In total, we scraped 48 variables – one dependent and forty-six explanatories. Table 3 provides key numbers of the data collected.

[ADD TABLE 3 HERE]

Variables' operationalization

The data collection was divided into two steps. The first one identifies the main features and picks the statistical information that can affect basketball teams' performance. The second part relates to the wage-related variables' operationalization and the definition of the dependent and independent variables.

The general operationalization in our research concerns the wage-related variables. The general idea was to construct separate variables reflecting the wage dispersion, average wage, and total payroll within clubs per each regular season in the chosen time range.

We calculated the total and average payrolls per club per season, adding them to our datasets. Later, we calculated the wage dispersion within the squads. This is the variable of interest which will indicate whether the wage dispersion impact male and female teams and if there are differences between them. For this purpose, we downloaded the individual players' base wages from the Spotrac for NBA and WNBA from the 2018 to 2021 regular seasons – 2434 individual players' wages observations were collected.

We use Gini as the wage dispersion index, once it commonly used in previous works (Gasparetto and Barajas, 2022; Katayama, and Nuch, 2011; Simmons and Berri, 2011; Frick *et al*, 2003). We calculated it for every club on each season (2018 to 2021) for both leagues. The following formula for Gini index inequality by Cowell (2011):

$$Gini = \frac{1}{2n^2\bar{y}\sum_i \sum_j \left|y_i - y_j\right|} \qquad (1)$$

Where: y – is an individual player's wage in a team j, $\bar{y}$ – is the mean level of wage in the team, n – is a number of players in the team j. The more Gini outcomes closer to 1, the more inequality presents in the data. The 0 is absolute equality, while 1 is an absolute inequality, respectively.

Data treatment and analysis methods

As the econometric approach, we chose the Ordinary Least Square (OLS) models, likewise previous research (Frick *et al*, 2003; Berri and Jewell, 2004; Katayama and Nuch, 2011). For the implementation of multiple linear regressions, the following assumptions should be met: no or little multicollinearity; the distribution of variables should be close to normal; a linear relationships between dependent and independent variables should exist; and homoscedasticity should be presented in the data.

At first, we built correlation matrices to look at whether NBA and WNBA data show highly correlated variables (Figure 1).

[ADD FIGURE 1 HERE]

Figure 1 represents the correlation within the data collected for NBA and WNBA datasets in the hierarchical cluster order. Most of the variables are numerical. We have only the Coach switching variable, which we constructed as categorical. We have some strong correlation among few variables, as we see in Figure 1.

The common practice of data treatment to avoid multicollinearity is omitting variables that cause it using different statistical tests (Cardella and Roomets ,2022; Ulas, 2021). We used iteratively dropping correlation regressors by descending order based on Individual Multicollinearity Diagnostics, including variance inflation factor analysis and other tests, as Ullah et al (2019) advised. This method helps to retain essential variables in the model. We ran different preliminary OLS models for the NBA and WNBA to get the unified model with no multicollinearity. We also excluded the playoff games in the head coach's experience variable from the model in NBA training case. It is not only suspicious as do not replies to common logic, but also Erkol and Radicchi (2021) provided argumentation that attempts to compare coaches based on counted indicators such as wins or number of trophies could not be completely fair. The scholars state that individual events' values can differ from season to season, particularly over extended periods. As this variable proved to be non-related to the wage dispersion, it is not essential for current study purposes.

Thus, we eliminated non-significant coefficients and got unified model 2 for the NBA and WNBA league clubs:

$$\frac{W}{L}\% = \beta_0 + \beta_1 * Gini + \beta_2 * Finish + \beta_3 * DRtg + \beta_4 * \text{"2Pper"} + \beta_5 * FT + \beta_6 * TOV + \in \quad (2)$$

Where:

β_0 – the intercept;

$\beta_1 - \beta_6$ – represent the regression coefficients of independent variables;

$\frac{W}{L}\%$ – Win to Losses Percentage, where W – Wins, L – Losses;

Gini – wage dispersion measure;

Finish – Regular season finish (within division, if applicable);

DRtg – Defensive Rating;

"2Pper" – 2-Point Field Goal Percentage;

FT – Free Throws;

TOV – number of Turnovers;

$\in$ – the error term.

The second condition for linear regressions is the variables' distribution, which should be close to normal. In that regard, Q-Q plots were built (Figure 2). The plots do not show any deviations from the normal distribution. It means that, for instance, no logarithms transformation would be needed. Third, the linear relationships between dependent and independent variables should exist. It has also been detected from our data.

[ADD FIGURE 2 HERE]

Lastly, data homoscedasticity is another essential assumption for the linear regression models. To check it, we ran the Breusch-Pagan test. The test shows value of 7.589, and the corresponding p-value is 0.2698 for the NBA model and 4.7455 with a p-value equal to 0.5768 for the WNBA, respectively. Since the p-values of both models are not less than 0.05, we do not have sufficient evidence to say that heteroscedasticity is present in the regression model.

We could than determine that our data for NBA and WNBA hold the assumptions to run multiple linear regressions based on the analysis above, which indicates the appropriate usage of multiple OLS in our case.

Modelling

We got the unified model for the NBA and WNBA to run after the data pre-processing. After this, we got results and plotted the distribution of variables. It was close to normal. We noticed linear relationships between dependent and independent variables from the graphs. Then we ran the Breusch-Pagan test, and the p-values were greater than 0.05. It was evidence of data homoscedasticity. That means we can proceed to interpret the output of the original regressions.

However, we need to notice that several researchers got evidence that total payroll, average age, and average wage could affect the team's performance and wage dispersion. Previously we dropped the team payroll, as well as the average wage, age levels, and their logarithmical variations from the models as they have insignificant coefficients and inappropriate p-statistics.

Some scholars used the logarithm of the total wage expenditures within the teams (Depken II, 2000; Franck and Nüesch, 2011). Forrest and Simmons (2002) noticed the positive effect of the log of the higher teams' annual wage bill on the teams' performance. They proposed that the more talented, and therefore more expensive, players are the key to the teams' success.

We also decided to consider the possible moderation effect of total payroll, average age, and average wage on the wage dispersion influence on the teams' performance. Simmons and Berri (2011) provided strong argumentation in the favor of age consideration, while Katayama and Nuch (2011) highlighted average wage as the important variable in the sense of teams' performance. Based on the previous findings, we ran some variations of the models we got in the previous section for testing our suggestions. We employed the interaction variables method to consider the possibility of a moderation effect in our statistical models.

We got the following models:

$$\frac{W}{L}\% = \beta_0 + \beta_1 * Gini * \log(\text{“}Total\ Payroll\text{”}) + \beta_2 * Finish + \beta_3 * DRtg + \beta_4 * \text{”2Pper”} + \beta_5 * FT + \beta_6 * TOV + \in (3)$$

$$\frac{W}{L}\% = \beta_0 + \beta_1 * Gini * \log(\text{“}Average\ wage\text{”}) + \beta_2 * Finish + \beta_3 * DRtg + \beta_4 * \text{”2Pper”} + \beta_5 * FT + \beta_6 * TOV + \in (4)$$

$$\frac{W}{L}\% = \beta_0 + \beta_1 * Gini * \log(\text{“}Average\ age\text{”}) + \beta_2 * Finish + \beta_3 * DRtg + \beta_4 * \text{”2Pper”} + \beta_5 * FT + \beta_6 * TOV + \in (5)$$

Where:

β_0 – the intercept;

$\beta_1 - \beta_6$ – represent the regression coefficients of independent variables;

$\frac{W}{L}\%$ – Win to Losses Percentage, where W – Wins, L – Losses;

Gini – wage dispersion measure;

Log (“Total Payroll”), Log (“Average wage”), Log (“Average age”) – logarithms of Total Payroll, Average wage and Average age within the clubs per regular season respectively;

Finish – Regular season finish (within division, if applicable);

DRtg – Defensive Rating;

`2Pper` – 2-Point Field Goal Percentage;

FT – Free Throws;

TOV – number of turnovers;

∈ - the error term.

Firstly, we have added the interaction term between wage dispersion proxy and total payroll in our model with the conditions we described above (3). Then we used the average wage instead of the total payroll (4). At last, we replaced the average wage with an average age (5). We also used logarithms for total payroll, average wage, and average age, as scholars used, in the interactions variables to emphasize statistics (Depken II, 2000; Franck and Nüesch, 2011).

Despite the Gini, we also excluded total payroll, average wage and average age variables from the models 3,4 and 5, aiming to avoid the multicollinearity issues and get reliable results. However, we tried to run models without separate components of interaction variables exclusion. These models had no significant coefficients, not for the interaction constructs and their components. We had the same insignificant effect when we also tried to run the models with several interaction variables.

Thus, we got four multiple OLS regression models for the considered datasets of NBA and WNBA. Three of them include interaction terms with significant coefficients and reliable statistical characteristics, as well as one without interaction terms. The results of the models constructed above are described in the following sections of this paper.

Results

To answer the research questions, we ran multiple OLS regressions in several ways to determine the best option with the highest level of predictive power.

The data collected offered plenty of independent variables that might influence the basketball team's performance. To get a first feeling for the data and possible relationships to the dependent variable and among the independent variables, we first grouped all variables that are meaningful for our research purposes. The four groups of variables were built in such a way that the variables we expected to be correlated to each other mostly ended up in one group.

That allowed for further investigation and avoided building models that end up having strongly correlated independent variables, which makes the coefficient not interpretable anymore. As the result of data treatment and modelling analysis, we got eight multiple OLS regressions: four models for the NBA dataset and the same four for the WNBA dataset.

The eight models we built consisted of the numeric variables from the play characteristics group and one from the wage-related variables group, namely, the wage dispersion variable represented by the Gini coefficient. Six out of eight models ran also included interaction variables reflecting the moderation effect of total payroll, average age, and average wage on the wage dispersion regarding its influence on the teams' performance (Table 4).

According to the results represented in Table 4, we got a positive sign of the Gini coefficient in the models with no interaction effects for NBA teams and negative for the WNBA. All models' coefficients are significant. Therefore, we can state the significant positive effect of wage dispersion on the male teams' performance and the significant negative effect on the female teams' performance with a 95% probability.

However, as we see results for models' statistics, the moderation effect of wage dispersion and Total Payroll exists, as well as the moderation effect of wage dispersion and Average wage, and the moderation effect of wage dispersion and Average age. The interaction variables are significant, and they show that despite the moderation effects, the higher wage dispersion increases male teams' performance, while the female teams' performance is decreasing (Table 4).

[ADD TABLE 4 HERE]

The coefficients of all wage-dispersion variables used in the models above (Table 4) offer empirical evidence that the wage dispersion within the squads affects the women's and men's basketball teams' performance differently. Thus, we get the evidence that the smaller dispersion among the wages increases female teams' performance according to the cohesiveness theory, and the more wage difference within a team, the better performance of male teams according to the tournament theory.

As for the other variables included in the multiple OLS regressions we ran, all of them are signed with a minimum probability of 95%, and most of the coefficients have 99% confidence. We summarized the effects of influence on the teams' performance for both NBA and WNBA leagues in Table 5 as all the models provide equal signs for each variable.

[ADD TABLE 5 HERE]

We see from the coefficients' signs that all the models prove the following statements for both leagues' teams:

- The latter team finishes the regular season within the division with the worse performance.
- The higher defensive rating decreases teams' performance.
- The higher the 2-Point Field Goal Percentage, the better teams' performance
- More Free Throws increase teams' performance
- More turnovers decrease teams' performance
- The constant is positive, but that has no practical sense because of its statistical nature.

Therefore, we offer empirical evidence that male and female teams perform differently depending on the wage dispersion within teams on the NBA and WNBA squads' example. A male sport team tend to perform better based on the tournament theory, while a women's one tends to worsen their performance when wage dispersion is larger, following, then, the cohesiveness theory.

Discussion

Our research extends the debate around the relationship between wage dispersion and team performance. More precisely, we show, for the first time, whether one theory or another holds true from the gender angle. Our empirical evidence suggests a significant different behavior between male and female players in respect of wage dispersion and performance – where males tend to increase their team performance when wage dispersion levels are grater, while females would get significant increase in performance under lower levels of wage dispersion. In this sense, the tournament theory holds for male basketball players (NBA) and the cohesiveness theory is supported by female basketball players (WNBA).

Previous strategical management research has shown contradictory results on this topic. There are empirical findings that suggest that wage dispersion is detrimental to firm performance (Grund and Westergaard-Nielsen, 2008), but the opposite effect – where an increase in wage dispersion would be beneficial to performance – is also found (Lalleman, Plasman and Rycx, 2004). The same controversy is observed using sports data as well, since Frick et al (2003) shows positive association between wage dispersion and team performance and Breunig *et al* (2014) indicates the opposite.

However, it is important to emphasize that our empirical results do not close this discussion. Previous works show that a comparison between leagues evidence differences between them, although all are played by male players. For instance, Frick et al. (2003) have found no effect of wage dispersion on the performance of NFL and NHL teams, but a significant positive impact of wage dispersion on team performance in the NBA, and a significant negative association in the MLB.

Additionally, a same setting may also show different results over the time. For example, Yamamura (2015) indicates that wage dispersion was negatively associated with team performance in the early stage of the Japanese professional football league, but it had no impact in the developed stage. Furthermore, Sommers (1998), Marchand et al. (2006), and Frick et al. (2003) analyzed the NHL, but their findings are controverse: they indicate the wage dispersion effect on team performance as negative, positive, and none, respectively.

Even though our research has offered empirical evidence about these significant differences between male and female basketball players in the United States, the mechanisms that explain the differences remain to be investigated. Our hypotheses lie on the general theories from Lazear and Rosen (1981) and Levine (1991), where larger wage dispersion levels would act as an incentive for male basketball players to perform better, but, on the other hand, wage equity would intensify cohesion within female basketball teams, improving team performance. Nonetheless, further research addressing these mechanisms more extensively are encouraged.

Moreover, we cannot claim that the effect observed here is constant for every labor market. The relationship between pay dispersion and team performance may be affected by within-job dimensions (Martins, 2021) as well as according to the job characteristics (Kang and Hwang, 2022). In this sense, further research can observe whether these factors are also impacted or moderated by the gender of the employees.

One of the current research's limitations is the substantial gap between male and female wages in professional basketball. We observed the range of 4,737 – 45,780,966 $ per year in the NBA individual wages and 1,391 – 221,450 $ per year individual wages range for WNBA in our data. Further research addressing the potential differences between male and female workers could also take this point into account. Despite of this limitation, we believe that it does not constitute an issue here. We assume that a player would compare his/her salary among his/her peers. In other words, a player tends to compare his/her salary with players from his/her same club and league on a regular basis. Therefore, the wage gap between NBA and WNBA should not affect the analysis performed here. In any case, it remains as an interesting topic for future research.

Conclusion

This paper offers empirical evidence on the intersection between wage dispersion, team performance and gender issues. According to our empirical findings, the tournament theory (Lazear and Rosen, 1981) works for the professional men's basketball teams, while cohesiveness (Levine, 1991) explains better the women's behavior.

From a practical perspective, our empirical findings can help managers of sports teams adjust their approach to the payroll structuring within basketball squads. The main managerial implication would be having in mind that a higher wage equity tends to be beneficial for female teams, while bigger wage dispersion tends to improve teams' performance in men's sports. In this particular setting – US professional basketball – clubs' managers can use our empirical findings in order to maximize team performances. Nonetheless, similar results may be observed in different settings as well and, therefore, managers should be aware that male and female employees can react differently according to financial incentives.

This research offers scientific contributions as well. Firstly, and most notable, is the investigation of potential differences between man and woman regarding wage dispersion and teams' performance for the first time. The results obtained here indicate a new avenue for further research on the topic. Moreover, since the current research is not able to determine the reasons that why male and female behave differently according to financial incentives, additional research addressing these potential mechanisms are also encouraged. Lastly, some other incentives – financial or not – can also play an important role in this equation and could be investigated further.

It is crucial to emphasize that most of the previous research has exclusively focused on male sport teams. We do acknowledge that economics and management research has reduced the focus on a single-gender analysis to broader investigations over the years, but not every research field is at the same stage. In this sense, additional research using data from women' sport leagues are highly recommended once several assumptions may not apply for women's workers as well as numerous unrevealed aspects could emerge from it.

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Table 1. Variables Abbreviations and Full Names.

Variable's abbreviation	Full name
W	Wins
L	Losses
W/L%	Win-Loss Percentage
Finish	Regular season finish (within division, if applicable)
SRS	Simple Rating System
Pace	Pace Factor
ORtg	Offensive Rating
DRtg	Defensive Rating
G	Games
MP	Minutes Played
FG	Field Goals
FGA	Field Goals Attempts
FG%	Field Goal Percentage
3P	3-Point Field Goals

3PA	3-Point Field Goal Attempts
3P%	3-Point Field Goal Percentage
2P	2-Point Field Goals
2PA	2--Point Field Goal Attempts
2P%	2-Point Field Goal Percentage
FT	Free Throws
FTA	Free Throws Attempts
FT%	Free Throws Percentage
ORB	Offensive Rebounds
DRB	Defensive Rebounds
TRB	Total Rebounds
AST	Assists
STL	Steals
BLK	Blocks
TOV	Turnovers
PF	Personal Fouls
PTS	Points
Playoffs_G	Games in the playoff
From	Year, the head coaching start
To	Year, the head coaching end or the present time
Playoffs_W/L%	Playoffs Wins to Losses percentage
Playoffs_W	Wins in the playoffs
Playoffs_L	Losses in the playoffs

(**Source**: Author's own creation)

Table 2. The groups of variables collected for the current research.

Rosters' characteristics	Average age				
Playing characteristics	W	L	W/L%	Finish	SRS
	Pace	ORtg	DRtg	G	MP
	FG	FGA	FG%	3P	3PA
	3P%	2P	2PA	2P%	FT
	FTA	FT%	ORB	DRB	TRB
	AST	STL	BLK	TOV	PF
	PTS				
Head coaches' characteristics	Playoffs_G	From	To	Years of experience	G
	W	L	W/L%	Playoffs_W/L%	Playoffs_W
	Playoffs_L				
Qualitative	Regular season	Team name	Team name abbreviation	Coaches' names	
Wage-related	Individual players' wages				

(**Source**: Author's own creation)

Table 3. Data collected for current research key numbers.

Total Data collected categories:	Number:
Clubs per league:	42
NBA	30
WNBA	12
Indicators	47
Rosters'	1
Teams'	31
Coaches'	11
Qualitative	4
Individual players' wages	2434
Observations per clubs in each season	168

(**Source**: Author's own creation. Processed with secondary data.)

Table 4. The multiple OLS regression results for all current study's models

	Dependent variable							
	Win to Losses percentage							
	Baseline (NBA)	Baseline (WNBA)	Total Payroll as moderator (NBA)	Total Payroll as moderator (WNBA)	Average Wage as moderator (NBA)	Average Wage as moderator (WNBA)	Average Age as moderator (NBA)	Average Age as moderator (WNBA)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gini Index	0.173** (0.056, 0.289)	-0.437** (-0.760,-0.115)						
Regular season finish within division	-0.037*** (-0.047, -0.028)	-0.029*** (-0.044, -0.013)	-0.037*** (-0.047, -0.028)	-0.029*** (-0.044, -0.013)	-0.037*** (-0.047, -0.028)	-0.029*** (-0.044, -0.013)	-0.037*** (-0.047, -0.028)	-0.028*** (-0.044, -0.013)

Defensive Rating	-0.020*** (-0.024, -0.016)	-0.023*** (-0.028, -0.018)	-0.020*** (-0.024, -0.016)	-0.023*** (-0.028, -0.018)	-0.020*** (-0.024, -0.016)	-0.023*** (-0.028, -0.018)	-0.020*** (-0.024, -0.016)	-0.023*** (-0.028, -0.018)
2-Point Field Goal Percentage	2.163*** (1.680, 2.646)	2.564*** (1.795, 3.333)	2.142*** (1.659, 2.625)	2.538*** (1.770, 3.305)	2.131*** (1.647, 2.615)	2.569*** (1.803, 3.336)	2.132*** (1.646, 2.618)	2.588*** (1.817, 3.359)
Free Throws	0.0002*** (0.0001, 0.0002)	0.001*** (0.0004, 0.001)	0.0002*** (0.0001, 0.0002)	0.001*** (0.0004, 0.001)	0.0002*** (0.0001, 0.0002)	0.001*** (0.0004, 0.001)	0.0002*** (0.0001, 0.0002)	0.001*** (0.0004, 0.001)
Turnovers	-0.0003*** (-0.0004, -0.0002)	-0.001*** (-0.001, -0.0004)	-0.0003*** (-0.0004, -0.0002)	-0.001*** (-0.001, -0.0004)	-0.0003*** (-0.0004, -0.0002)	-0.001*** (-0.001, -0.0004)	-0.0003*** (-0.0004, -0.0002)	-0.001*** (-0.001, -0.0004)
Gini : log(Total Payroll)			0.010** (0.003, 0.016)	-0.029** (-0.051,-0.007)				
Gini : log(Average Wage)					0.011** (0.004, 0.019)	-0.038** (-0.065, -0.011)		
Gini : log(Average Age)							0.053** (0.018, 0.088)	-0.133** (-0.229, -0.037)
Constant	1.761*** (1.274, 2.248)	1.858*** (1.304, 2.412)	1.762*** (1.276, 2.247)	1.873*** (1.314, 2.433)	1.759*** (1.274, 2.244)	1.867*** (1.314, 2.421)	1.757*** (1.270, 2.245)	1.863*** (1.310, 2.415)
AIC	-341.0	-115.3	-341.6	-115.0	-341.8	-115.6	-341.1	-115.6
BIC	-318.7	-100.3	-319.3	-100.3	-319.5	-100.6	-318.8	-100.6
Observations	120	48	120	48	120	48	120	48
R2	0.858	0.891	0.858	0.890	0.859	0.891	0.858	0.891
Adjusted R2	0.850	0.875	0.851	0.874	0.851	0.875	0.850	0.875

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(**Source**: Author's own creation. Processed with secondary data.)

Table 5. Summary of coefficients' signs from all models of the current study

Independent variables	Coefficients' signs	
	For NBA models:	For WNBA models:
Gini Index	+	-
Gini : log(Total Payroll)	+	-
Gini : log(Average Wage)	+	-
Gini : log(Average Age)	+	-
Regular season finish within division	-	-
Defensive Rating	-	-
2-Point Field Goal Percentage	+	+
Free Throws	+	+

Turnovers	-	-
Constant	+	+

(**Source**: Author's own creation.)

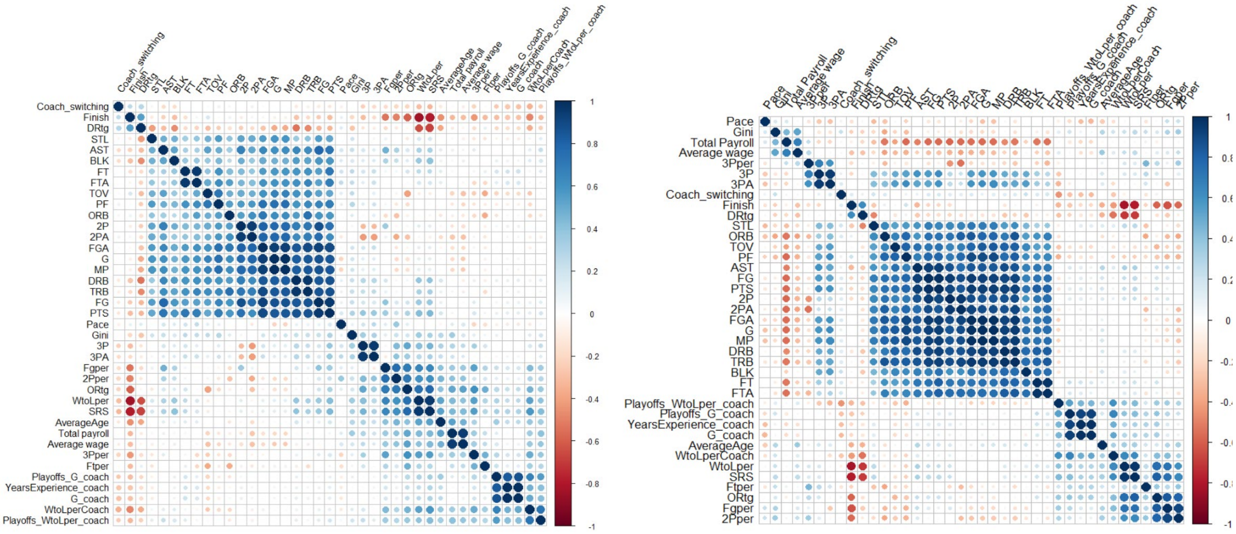

Figure 1. Correlation matrices for the NBA (in the left) and WNBA (in the right)

(**Source**: Author's own creation. Processed with secondary data.)

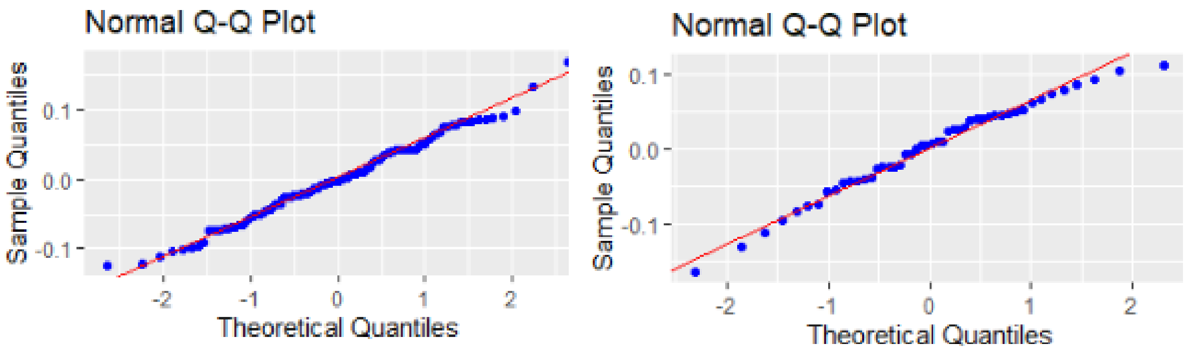

Figure 2. Normal Q-Q Plots for NBA dataset's model (in the left) and WNBA dataset's model (in the right)

(**Source**: Author's own creation. Processed with secondary data.)