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Soccer Clubs and Diminishing Returns: The Case of Paris Saint-Germain

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Abstract

Paris Saint-Germain, one of France's top soccer clubs, was bought by Qatar Sports Investments (QSI) in 2011. Since then the club's expenditure has risen precipitously as have its victories. In this paper we ask whether this represents value for money. We find in fact, that the efficiency of PSG did not deteriorate following the takeover. However, while PSG operated close to the production frontier in terms of converting resources to points, it scored vastly more points than was necessary to win the league. We estimate that PSG spent €140m more than was necessary to win the French league in 2016/17. Since 2011, PSG is estimated to have overspent by up to €600m. This expenditure could be thought as being merely the price of creditable performance at a European Level. We show, however, that it has brought less success than would be expected.

Keywords: Sports Finance; Productivity.

JEL Codes: Z23; D24.

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1 Introduction

In 2011 Oryx Qatar Sports Investments (QSi), an investment arm of the Qatari Government, bought one of France's top soccer clubs, Paris Saint-Germain (PSG). In the wake of the takeover, PSG's operating expenditure increased dramatically. It also spent lavishly on signing players, including paying a world record fee of €222 million to sign Brazilian international Neymar from Barcelona in August 2017 (BBC Sport, 2017). PSG's on-field performances also improved markedly following the takeover with the club winning the French Ligue 1 in five of the six subsequent seasons, having previously won the championship on just two occasions over the previous 40 years. QSi's stated objective is "to take Paris Saint-Germain to the summits of the European game" (PSG, 2018), although Montague (2018) suggests that the real objective is a political one - to improve Qatar's international image.

It has also been claimed that such acquisitions will transform football into a competition between mega club brands which will either be owned or sponsored by resource-rich states like Qatar and the UAE (Thani & Heenan, 2017). Thus, the assumption that clubs are either profit or win/utility maximisers may not apply to PSG. The present paper analyses PSG's performance in order to assess whether or not PSG's on-field success following the QSi takeover represents value for money in order to shed some further light on this issue. This question is also of interest given that Vrooman (2007) found the link between expenditure and results to be weaker in Ligue 1 than in other major European leagues because larger French clubs tended to under-perform

The paper is structured as follows. Section 2 provides a brief review of the literature on sports teams' business objectives and considers the QSi acquisition of PSG in the context of this literature. Section 3 describes the key characteristics of the Stochastic Production Frontier models and provides results for Ligue 1 clubs. In section 4, we consider evidence of diminishing returns to expenditure. Arguably, however, it is also necessary to consider PSG's performance in the Champions' League and some evidence on this is presented in section 5. Section 6 concludes.

2 Sports Teams' Business Objectives

The business objectives of sports teams has been the subject of considerable debate in the literature (Noll, 2006). US sports teams are generally regarded as profit maximisers (Cairns, Sloane, & P.J., 1986; Fort & Quirk, 1995) fol-

lowing Rottenberg's seminal paper on sports economics (Rottenberg, 1956). Rottenberg's invariance principle states that if clubs were profit maximisers the law of diminishing returns would limit the incentive for richer clubs to sign all of the best players. Quirk and El-Hodiri (1974) question the assumption of profit maximisation in US team sports and suggest that owners might gain utility from winning matches.

Rottenberg (2000) also acknowledges that team owners and shareholders might derive psychic benefit from winning and thus might be prepared to accept financial losses. Sloane (1971) suggested that English soccer clubs were win or utility maximisers subject to a financial solvency constraint. The solvency constraint recognised that there were limits to the level of directors' benevolence. This view that clubs are win/utility maximisers subject to a budget constraint is generally seen to apply to European soccer clubs (Frick, 2007; Kesenne, 1996, 2007; Vrooman, 2007) although there may be exceptions. Kuper and Szymanski (2012) note that the then president of French club Lyon, which won seven successive French league titles between 2001/02 and 2007/08, claimed the club's objective was to make money. However, Andreff (2007) notes that the way Lyon disclosed their accounts made comparison with other French clubs difficult.

Questions also arise regarding the extent to which European football clubs are bound by a solvency constraint as Sloane (1971) suggested. Andreff (2007) suggests that French clubs at least were subject to a "soft-budget" constraint as they had successfully persuaded non-profit seeking investors to finance their ongoing losses over a prolonged period. Andreff (2018) notes that Ligue 1 clubs generally sought to cover operating deficits with a net surplus on transfers, although not always successfully. Dermit-Richard, Scelles, and Morrow (2017) point out that the financial control regime introduced in French soccer in 1990 does not require clubs to break even as long as shareholders are able and willing to cover their losses by cancelling debts, advancing new loans and/or equity injections. They report that shareholders' net cumulative contribution to French soccer clubs over the period from 2006/07 to 2014/15 exceeded €1 billion with 74% of this going to cover club losses. The 2016/17 Annual Financial Report for French Football notes that Ligue 1 clubs recorded combined losses of €101 million but observed:

> "The arrival of new investors confirms the attractiveness of French professional football. This brought with it extensive investment." (Direction Nationale du Controle de Gestion (DNCG), 2017, p.3).

Thus, there may be limits to the benevolence of an individual director or shareholder but, it appears that, in France at least, there will be others

willing to take their place and bail clubs out.[1]

The impact of measures such as revenue sharing, salary caps, player drafts and restrictions on players changing clubs depend on whether clubs are profit or win maximisers. Hence the question of whether such assumptions are applicable to a PSG situation is of some significance.

PSG's website described the impact of the QSi acquisition as "changing stratosphere" (PSG, 2018). PSG's total expenditure increased from €130 million in 2010/11 to €533 million in 2016/17. The average expenditure of the remaining 19 teams in Ligue 1 for 2016/17 was just €71 million. PSG accounted for 30% of total operating expenditure of all Ligue 1 clubs and 29% of the total wage bill. PSG accounted for 37% of total Ligue 1 revenue and 56% of total sponsorship/advertising/marketing revenue. It needs to be borne in mind, however, that Ligue 1 has more small market clubs than the other major European leagues (Andreff, 2007). In 2016/17 only four other Ligue 1 clubs had a budget in excess of €100 million while 11 clubs had a budget of less than €50 million (DNCG, 2017).

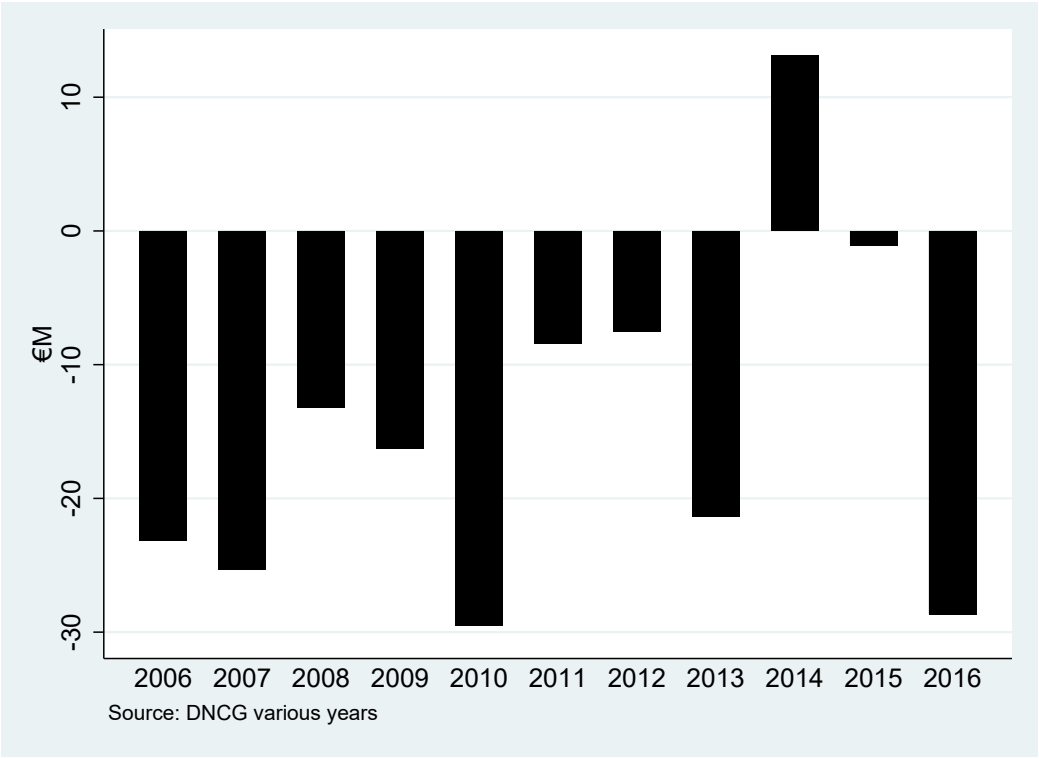
Figure 1 shows that PSG recorded operating losses for every season bar one from 2008/9 to 2016/17. These figures do not fully illustrate the extent of PSG's "soft" budget constraint. PSG received €200 million per annum in sponsorship revenue from the Qatar Tourism Authority (QTA) which is related to its owner QSi. Under its financial fair play (FFP) rules, UEFA judged that the "fair value" of the sponsoring agreement was €100 million and that the remaining €100 million should be regarded as an equity contribution from a related party rather than sponsorship revenue. Thus Dermit-Richard et al. (2017) estimated that PSG shareholders' cumulative contribution to the club over the period 2006/07 to 2014/15 amounted to €355 million. PSG is thus, subject to an extremely "soft" budget constraint.

That PSG has received a huge injection of funds from its Qatari owners is not in doubt. Figure 2 (left pane) shows the salary expenditure per annum by PSG and the average of all the other clubs in Ligue 1. As can be seen from the graph, PSG always spent more than the average of all other teams in Ligue 1. But, its payroll (and also its total expenditure) grew explosively following the Qatari takeover.

The right pane of figure 2 shows the effect on performance. This bar chart shows the number of times that teams have appeared in the top 3 of the league since 2002. Separating the performance of PSG before and after 2011, we see that this measure of performance did not improve after

[1]Soft-budget constraints are not unique to French football. Ascari and Gagnepain (2006) argue that the owners of Barcelona and Real Madrid knew that banks would never allow them to go bankrupt.

Figure 1: PSG Operating Profit/Loss €M



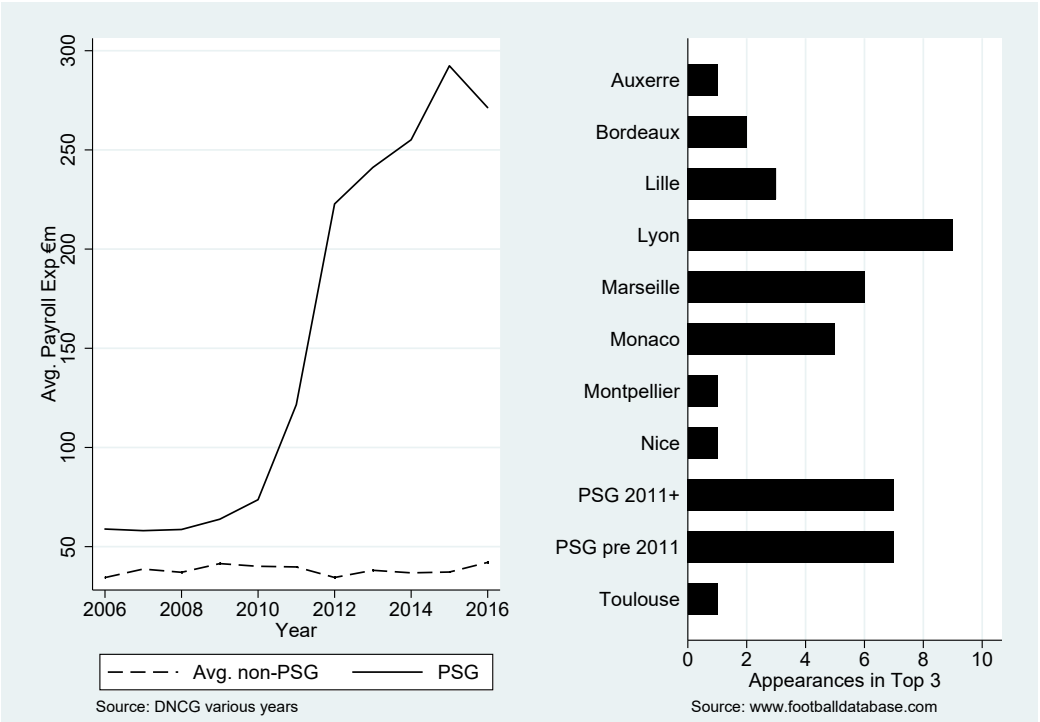
2011. This is surprising as there is considerable evidence of a positive link between expenditure particularly player wage expenditure and results in team sports (Szymanski, 2003, 2009). Vrooman (2007) however, points out that historically this link was weaker in Ligue 1 than in the other major European leagues due in part to the fact that PSG and other big city teams historically underperformed. Furthermore Gerrard (2006) cautions that the win-wage relationship may be more complex than is often claimed. On the face of it, however, performance did not improve by as much as we might have expected from the rise in expenditure.

Perhaps a better way to gauge performance is to look at the number of league points obtained. Figure 3 (left pane) shows a scatter plot of the (log) of points scored on the (log) of salary expenditure for every team in Ligue 1 over the period 2006/7-2016/7. PSG is represented by the "x" symbol.[2] Unsurprisingly PSG is mostly in the top right of the diagram (high expenditure and high points). Also, PSG observations are below but close to the regression line suggesting that PSG is slightly less efficient than the average club in turning resources into points. The differences seem small due to the log scale. We can see this in the right pane of 3. Here we plot the fitted values generated by the regression implicit in the left pane, together with confidence interval and the actual scores of PSG. The regression sample excludes PSG, so the dotted black line can be interpreted as what PSG would have scored had they performed at the same rate as the average of other clubs. As can be seen, PSG appears to have performed systematically worse than the average of other clubs. In 2014 the difference is almost 15%. In other words, taking these results at face value, in 2014 PSG should have scored 15% more points than it did, if it had been as efficient at turning cash resources into performance as were clubs on average. The sheer volume of resources available to PSG served to hide this fact.

This preliminary analysis suggests that PSG was not making the best use of resources. However, from figure 3 its is not clear if the difference is statistically significant. Furthermore, it is possible that negative residuals identified in figures 3 result from some other source such as an idiosyncratic effect and not any fundamental inefficiency. In order to tease out this possibility, we present a more formal econometric model in the next section.

[2]Club expenditure was obtained from DNCG annual reports for various years and points data is from www.footballdatabase.com. Expenditure data is adjusted for inflation using the average annual CPI for France from the FRED database.

Figure 2: Big Spender, Big Finisher



3 Productive Efficiency

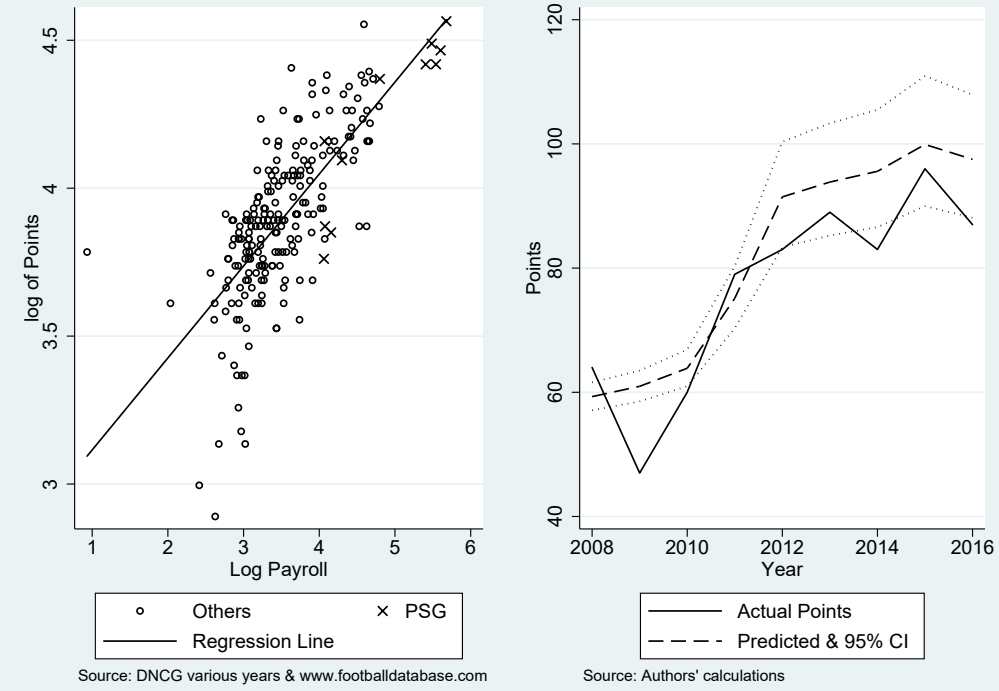
The idea of sports teams' having a production function was first proposed by Rottenberg (1956). The Stochastic Production Function (SPF) is an econometric procedure designed to measure the efficiency with which production units use their resources. The SPF has been widely used in a number of contexts including sports economics (see Lee, 2014, for a survey). Specifically, in the case of soccer, the SPF has been used to measure the efficiency of English Premier League (Dawson, Dobson, & Gerrard, 2000) and Spanish La Liga (Barros, Garcia-del-Barrio, & Leach, 2009) clubs. Barros, Bertrand, Botti, and Tainsky (2014) report that French rugby clubs with the largest budgets were not the most efficient.

The classic SPF is represented by equation (1). This states that the output (points scored) of any unit in time is assumed to be a log-linear function of some inputs.[3]

$$y_{it} = \alpha_i + \beta' x_{it} + v_{it} - u_{it} \tag{1}$$

[3]Points scored could potentially be zero. However this did not occur in our data.

Figure 3: Points vs. Payroll



We can see that equation (1) is, in effect, a generalisation of the regression implicit in figure 3 where we decompose the usual OLS residual into three components. The first component α_i represents the individual heterogeneity that is particular to each team. In the SPF literature this is often thought of as representing firm specific technology. The second component, v_{it}, is the "ordinary" econometric residual that incorporates measurement error and other random variation. Finally, there is the inefficiency term, u_{it} which may or may not vary across time. By definition this term must be positive i.e. production cannot be above its maximum determined by resources (x_{it}) and technology (α_i). In essence, the question we ask in this paper is whether the residual identified in the last section is due to PSG being inefficient (a large value of u_{it}), having an inferior technology of some sort (low α_i) or just bad luck (a series of negative draws of v_{it}).

Obviously, we cannot distinguish any three residuals from each other without further identifying assumptions – of which there are many to choose from.[4] We follow Greene (2005a, 2005b) who proposed the True Random Effects model. This model explicitly allows for team heterogeneity for reasons

[4]See Belotti, Daidone, Ilardi, and Atella (2013) for a survey.

other than inefficiency ($\alpha_i \neq \alpha$). This unobserved heterogeneity is treated as a random effect across teams (but constant in time).[5] Green argues that genuine inefficiency can be distinguished from other heterogeneity because the former will change over time. Or to put it another way, the portion of measured team"inefficiency" which does not change is more correctly thought of as being a firm specific technical effect.

We apply the TRE model to the data that was used earlier. The DNCG annual reports provide a breakdown of total expenditure into its pay and non-pay components. The payroll data cover the salaries of all staff, not just players, although this figure would be dominated by the players salary bill. The performance data is publicly available via footballdatabase.com. We deflate the financial data by the French CPI. Table 1 presents the summary statistics broken down by time before and after the takeover separately for PSG and all other clubs. The table confirms the message of section 2 that PSG expenditure and performance is higher than other clubs before and after the takeover, with the gap becoming even larger after the takeover.

Table 1: Summary Statistics

	< 2011			≥ 2011		
	All	PSG	Others	All	PSG	Others
Total Exp. (€m 2015)	66.89	117.37	64.23	83.50	446.32	64.40
	(42.71)	(13.20)	(42.08)	(99.15)	(119.5)	(48.62)
Payroll (€m 2015)	39.56	62.63	38.35	47.87	234.05	38.07
	(23.70)	(6.598)	(23.67)	(50.72)	(60.11)	(24.73)
Points	51.29	52.40	51.23	51.85	86.17	50.04
	(12.85)	(9.072)	(13.05)	(14.96)	(5.947)	(12.98)
Position	10.50	10.80	10.48	10.50	1.33	10.98
	(5.795)	(5.450)	(5.840)	(5.790)	(0.516)	(5.532)
Observations	100	5	95	120	6	114

Group means and standard deviations (in parentheses).

Finacial data from DNCG deflated by CPI.

Performance data from www.footballdatabase.com

Table 2 shows the results of applying the TRE model to this data in table 1. Team heterogeneity, α_i, is modelled as being normally distributed across

[5]He calls these models "True" Fixed and Random Effects in order to distinguish them from the usual fixed and random effects models which made no distinction between inefficiency and other firm level unobserved effects.

teams with mean α and variance of θ^2 but fixed in time. The remaining (time-varying) heterogeneity is attributed to inefficiency (u_{it}) which is assumed to follow a half normal distribution.[6] The first half of the table presents the results using total expenditure as the measure of input (x_{it}), while the second half of the table show the estimates with payroll as the input variable. Within each half of the table, the first column shows the results for the entire sample period, while the subsequent two columns show the results for the sub-sample before and after the takeover respectively. This allows for the possibility that any observed change in PSG's efficiency after the takeover was simple coincidence and the result of a general changes that affected all clubs. As can be seen, the input measure is statistically significant in all cases and the coefficient is of similar magnitude regardless of which expenditure measure is used.[7] The variability of the estimated inefficiency (u_{it}) across teams is summarized by the estimated parameter σ_u and is significantly different from zero.[8]

Taking the estimates using the total expenditure first, we find that there was a marked decrease in the elasticity of expenditure after 2011. This is however, statistically insignificant.[9] We could use these estimates to calculate a measure of inefficiency for each team. However, as Dawson et al. (2000) point out, sports teams engage in a widely varying degrees of non-sport expenditure activity. Thus measures of inefficiency generated using total expenditure could be biased.[10] To counter this, we also estimate the model using salary expenditure as the input variable. These estimates are shown in the second half of the table. The elasticity coefficient is similar to that of total expenditure model. In contrast to the total expenditure measures, however, the elasticity here rises after the takeover.[11]

We can use the estimates of the TRE model to calculate the level of

[6]Green allows u_{it} to follow, alternatively, an exponential distribution, a truncated normal, half normal or gamma distribution. We present only the half normal case as the other cases produced very similar results.

[7]This is not surprising as the two measures are highly correlated with a regression of (log) total expenditure on (log) payroll producing an R^2 of 0.9 and a coefficient close to unity. Payroll is consistently 60% of total expenditure.

[8]Current expenditure could be regarded as endogenous if, for example, player and coach in-season bonuses were affected by in-season performance. In fact DNCG data show that bonus payments account for only 8% of payroll expenditure. Nevertheless, in order to check the viability of our estimates, we re-estimated the model using lagged expenditures. The coefficients were not much different from those is Table 2 but with higher standard errors due to the observations lost due to the lag. These estimates are available upon request.

[9]An LR test of the null of the equality of *all* parameters produces a p-value of 0.18.

[10]We thank and anonymous referee for this suggestion.

[11]An LR test of the null of the equality of *all* parameters produces a p-value of 0.043.

Table 2: Stochastic Production Function

	Total Exp.			Payroll		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	< 2011	≥ 2011	All	< 2011	≥ 2011
Dep. var.: Log Points						
Log Total Exp.	0.299***	0.327***	0.288***			
	(0.023)	(0.051)	(0.024)			
Log Payroll				0.288***	0.231***	0.319***
				(0.020)	(0.048)	(0.026)
α	2.874***	2.760***	2.897***	3.067***	3.263***	2.936***
	(0.099)	(0.224)	(0.103)	(0.079)	(0.199)	(0.098)
θ	-0.0451*	0.105**	0.0489	0.00358	0.0985	0.0598*
	(0.022)	(0.035)	(0.028)	(0.069)	(0.051)	(0.024)
σ_u	0.23***	0.24***	0.21***	0.23***	0.24***	0.22***
	(0.03)	(0.06)	(0.04)	(0.03)	(0.07)	(0.03)
σ_v	0.11***	0.09***	0.11***	0.13***	0.11***	0.10***
	(0.02)	(0.04)	(0.02)	(0.01)	(0.04)	(0.02)
Obs.	220	100	120	220	100	120

Standard errors in parentheses.

Finacial data from DNCG deflated by CPI.

Performance data from www.footballdatabase.com

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

inefficiency (u_i) for each team and each time period. We follow Jondrow, Lovell, Materov, and Schmidt (1982) and calculate inefficiency of team i to be $E[u_i|v_{it}, \alpha_i]$. Given the potential problems from using total expenditure, we use the payroll estimates. Given the inequality of the coefficients across time, we use the estimates of column 5 and 6 of table 2 to calculate the estimated inefficiency separately for each period.

Table 3 shows the resulting average inefficiency score for all teams that were in Ligue 1 from 2011. From equation (1), the measured inefficiency can be interpreted as the average deviation for each team from the maximal possible score conditional on its resources. Thus, for example, taking Bordeaux before 2011, we get a score of 0.10. This implies that Bordeaux was operating at 10% below maximum efficiency during the period. Specifically given its inputs (payroll expenditure) Bordeaux should have scored 10% more points if it had made efficient use of its available resources.

Table 3 shows that some teams experienced an increase in efficiency (decline in inefficiency) after 2011, some the opposite. PSG's measured efficiency seemed to improve after the takeover. Nevertheless PSG was not the most efficient club either before or after the takeover, with an inefficiency of around 20%.[12]

However, it turns out that these apparent patterns are not statistically significant. Figure 4 plots the inefficiency score (as calculated above) and its 95% confidence interval, for each year and for each team in the sub-sample of teams that have ever appeared in the top 3. There is considerable variation in the point estimate of inefficiency across time and teams. In the case of PSG, a slight down trend in the point estimate seems to be present. However, given the confidence intervals, it is difficult to reject the null that PSG operated at the same level of efficiency before and after the takeover. Furthermore, any difference between it and other teams is not statistically significant.[13]

[12]Collier, Johnson, and Ruggiero (2011) shows that standard production function measure produces estimates of inefficiency that are biased upwards due to correlation in the inefficiency terms across teams. Specifically, if a team losses a match that it should have won, conditional on its resources, then necessarily some other team must win a match that it should have lost. However, as PSG won most games and clearly had vast financial resources, the bias should be less for PSG. Given the vast differences in resources the only reason for PSG to lose any game is inefficiency. But this fact will induce a bias in the teams that do beat PSG. Their inefficiency will be underestimated as they win games that they should have lost.

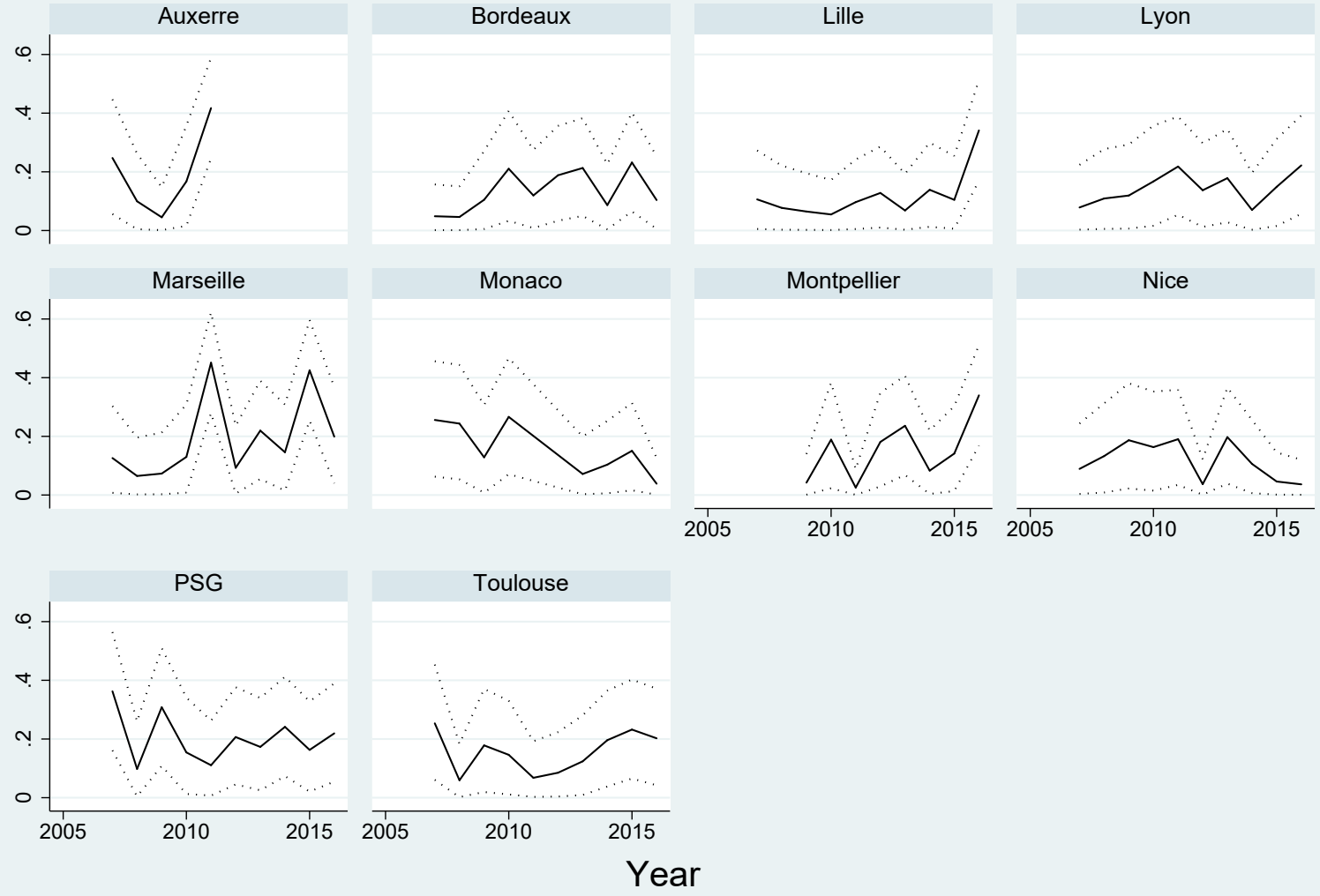
[13]Formal tests of these hypotheses can be carried out by re-estimating the model over the entire period with dummy variables indicating PSG and the time period interacted with the expenditure variable and the variance of the distribution of inefficiency (σ_u). A Wald test of the null that efficiency of PSG is the same after 2011 produces a p value of 0.07. The test of the null that PSG's inefficiency is the same as the others' produces a p-value of 0.85.

Table 3: Inefficiency Scores from TRE Model

Team	< 2011	≥ 2011
AC Ajaccio	-	0.25
Angers	-	0.07
Auxerre	0.13	0.42
Bordeaux	0.10	0.16
Dijon	-	0.21
Evian	-	0.15
FC Metz	0.63	0.26
GFC Ajaccio	-	0.06
Guingamp	-	0.11
Lens	0.30	0.44
Lille	0.10	0.15
Lorient	0.11	0.16
Lyon	0.11	0.16
Marseille	0.10	0.26
Monaco	0.22	0.09
Montbeliard	0.18	0.20
Montpellier	0.12	0.17
Nancy	0.16	0.21
Nantes	0.41	0.09
Nice	0.15	0.10
PSG	0.24	0.19
Reims	-	0.12
Rennes	0.11	0.18
SC Bastia	-	0.13
SM Caen	0.19	0.18
St Etienne	0.21	0.09
Stade Brestois	0.11	0.30
Toulouse	0.14	0.15
Troyes	0.20	0.44
Valenciennes	0.12	0.24

Source: Authors' calculations.

Figure 4: Inefficiency in True Random Effects Model (Selected Teams)



Source: Author's Calculations.

4 Diminishing Returns to Expenditure

The previous section showed that, in spite of initial appearances, PSG may actually have improved its operating efficiency since 2011. Or at least there was no statistically significant deterioration in efficiency after the takeover. Nevertheless, its still displays a significant level of inefficiency of around 20%. Furthermore, even if we were to stretch the point and suggest that PSG has moved closer to the production frontier, this does not imply that it is operating at the optimal point on that frontier. Another way to think of this, is that the even if PSG has become more efficient at turning cash into points, it has obtained many more points than was necessary to win the league. Espitia-Escuer and GarcÍa-CebriÁn (2004) similarly found that highly placed teams in Spain's La Liga could have achieved the same results with fewer resources or could have improved their results with the same resources.

We can see this from the production function implicit in the regressions carried out in the previous sections. The log-log formulation ensures that the marginal effect of (payroll) expenditure on points is diminishing in increased payroll expenditure. Because of diminishing returns in the production function, the "extra" points that PSG scores are very expensive. This observation coincides with Andreff (2018) who argues that Ligue 1 clubs are subject to a soft budget constraint which encourages teams to over-spend on talent, with a comparative lack of performance. He cites PSG as a prime example of this phenomenon.

We can measure this extra expense using the results in Table 2. We simulate the model of equation (1) to calculate how much salary expenditure would be required in order to win the league i.e. to beat the runner up by a certain margin. In effect this analysis is just a different way of presenting the results of figure 4. Figure 4 shows u_{it} which are the (log) points that should have been scored for a given level of salary expenditure, whereas now we calculate excess payroll for a given level of points.

We proceed as follows. Each year we calculate the score of the runner up. We want to calculate how much salary expenditure would be required to score points in excess of this by the desired margin i.e. to reach a target Y in equation (1). As the data reject the restricted model, we simulate the models of columns 5 and 6 of table 2 separately. We need to make an assumption of how inefficient PSG would be in this counter-factual. It seems extreme to assume that PSG could have had zero inefficiency, therefore we allow it to have inefficiency equal to that of the most efficient team in the league that year. We calculate a point estimate for the required salary expenditure given the target points and the assumed level of inefficiency and Montecarlo 95%

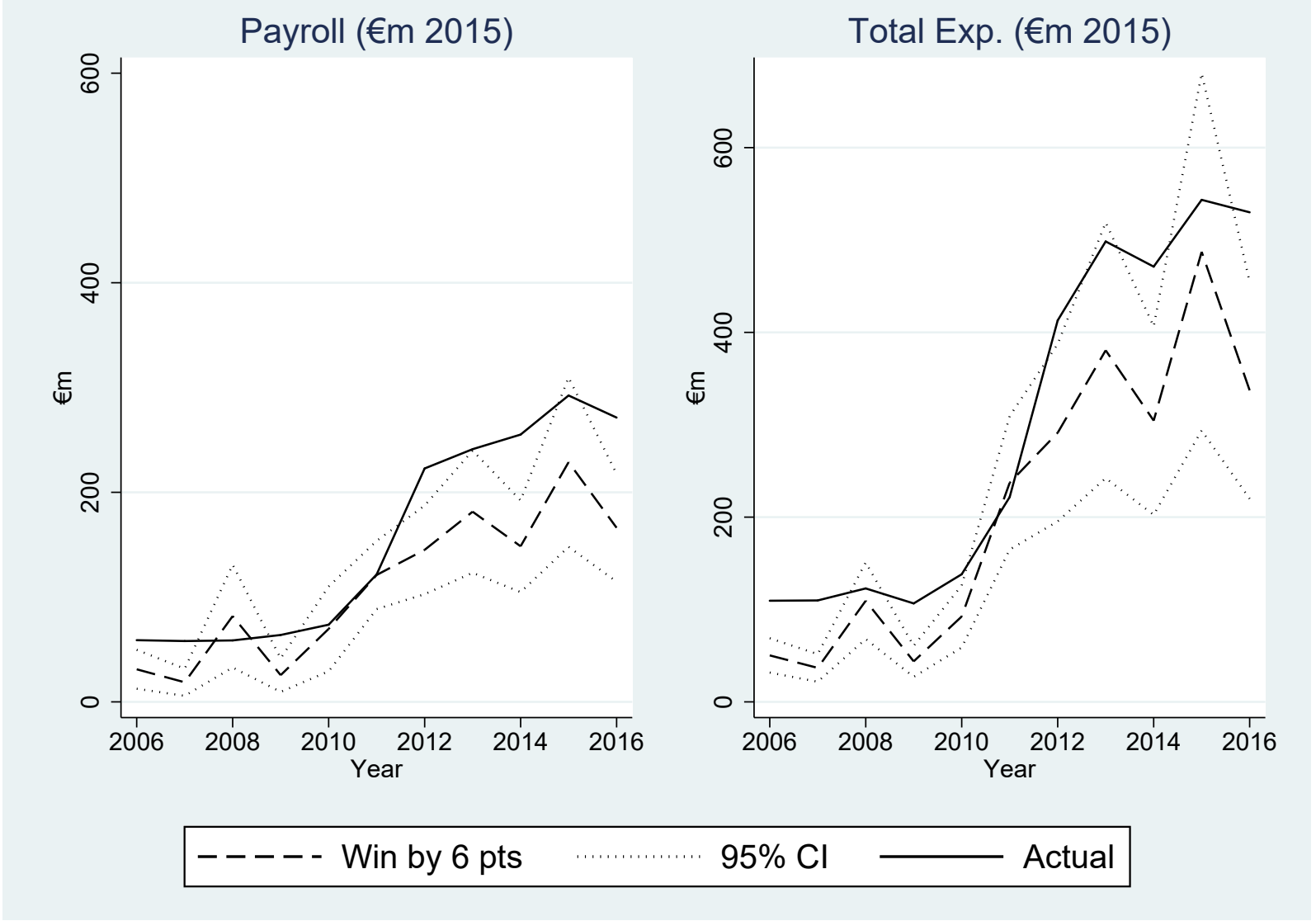
confidence intervals.

The result is shown in left pane of figure 5. The graph shows the salary expenditure necessary to win the league by a margin of 6 points and the 95% confidence interval for this statistic. This allows for a cushion of two wins. As is clear from the figure, the required minimum salary expenditure was substantially below what PSG actually spent in every year since the takeover. In the 2016/7 season the difference was approximately €105m. Furthermore, with the exception of 2015/16, the actual expenditure is above the upper band of the 95% confidence interval. We can calculate the total amount of excess payroll expenditure over the period 2011-17 as the difference actual payroll and the simulated minimum necessary. This total is €413m.

While the choice of a margin of 6 points may be arbitrary, a similar pattern is generated for any margin of victory. If we take the margin to 9 points, which is equivalent to three extra victories, then the cumulative extra salary expenditure falls to €300m. If PSG had operated on the production frontier, i.e. at a zero level of inefficiency, then the accumulated wasted payroll expenditure for a six point margin would have amounted to €530m.

We repeated the exercise, this time based on total expenditure (i.e. the estimates in columns 2 and 3 of table 2). The results are show in the right pane of figure 5. As the two measure of expenditure are highly correlated, the pattern is the same but the scale of the total expenditure graph is roughly twice that of the payroll graph. On this basis, PSG's estimated overspending over the period 2011/12 2016/17 amounted to between €600m and €400m depending on whether we apply a 6 point or 9 point margin with inefficiency equal to that of most efficient team that year.

Figure 5: Actual and Minimum Winning Expenditure



5 The Champions League

The result of section 4 is inconsistent with Rottenberg's invariance principle. However, as Cairns et al. (1986) point out, the invariance principle is not applicable in the case of European soccer clubs (a) because they may not be profit maximisers and (b) they play in Europe wide competitions in addition to their domestic leagues. Gerrard (2006) finds that allowing for the effects of Champions' League participation provides a more representative estimate of the likely marginal impact of additional wage expenditure on domestic league performance.

As noted earlier, QSi's stated objective is to take PSG "to the summits of the European game". Sloane (2006) claimed that clubs in smaller country leagues may need to be "too strong" for their domestic league in order to compete at a European level. Vrooman (2007) suggested that, even in bigger countries, the largest clubs had outgrown their domestic leagues as a result of their participation in the Champions League, a view echoed by Andreff (2018). Furthermore, this may be particularly the case in Ligue 1 given that it has a large number of small market teams. If PSG's ambition is to compete in the Champions League, then the excess expenditure previously identified may be excessive only in terms of Ligue 1. In fact, it could simply be the price of creditable performance at a European level.

Consequently, our results provide support for the view that the level of spending required to compete at the European level is well in excess of what is required to win Ligue 1. It is worth noting however, that PSG has had limited success in the Champions League since the QSi takeover having only reached the quarter finals on three occasions. This raises an obvious question as to whether PSG's performances in the Champions League represent value for money.

In order to examine this, we compared Champions' League performance to salary expenditure for top European clubs. We obtained data on average player salaries from the Global Sports Salary Survey (GSSS) for 2013/14 to 2016/17.[14] We created a performance variable by awarding teams 1-4 points according to their group stage ranking, with 1 for a bottom team and 4 for the top team. We award an additional two points for each subsequent round won up to, and including, the final. On this basis, the overall winners would score 12 points if they had also topped their group.

Figure 6 shows a plot of teams' Champions League points versus this wage

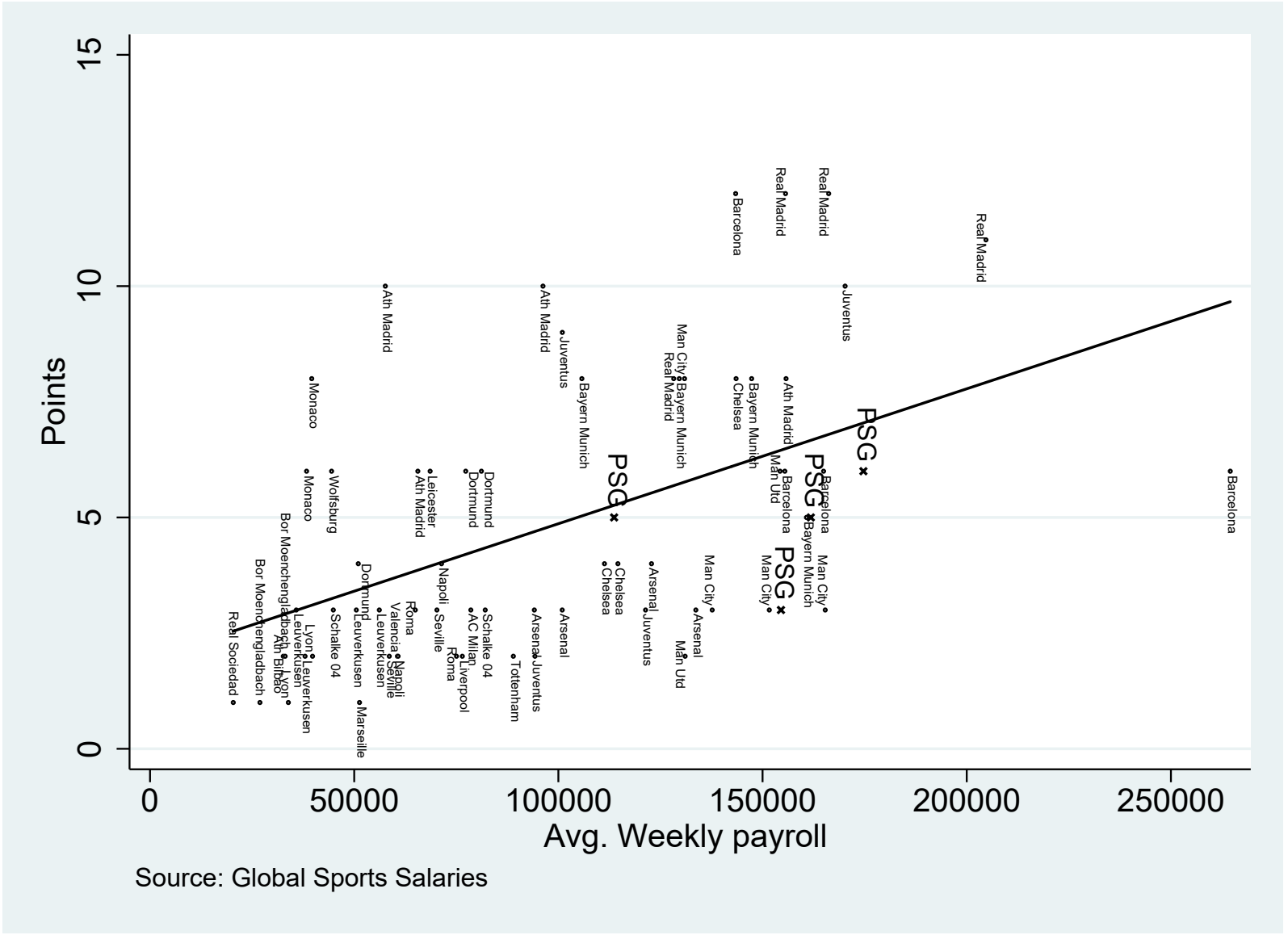
[14]The GSSS data only includes the 5 largest European leagues, i.e. England, Germany Italy, Spain and France although the latter was only included for the first time in 2013/14. The Big 5 leagues accounted for slightly more than half of the teams that participated in the Champions' League over this period and for 30 of the 32 quarter-finalists.

data for the available years (2013-16). The solid line indicates the OLS line.[15] It is obvious that PSG is below the line in all years for which we have data. So while its payroll was above most other teams', its performance was below what would be expected. A number of teams outperformed PSG despite having lower average players' salaries. Interestingly, in some years, another French Team, Monaco, has performed better than PSG with substantially less resources.

This analysis is obviously informal. A more formal analysis, on the lines of section 3, would require a model to take account of the knock-out nature of the competition as well as the fact that the teams entering the league vary every year due to their performance in the domestic league. This would be a interesting topic for further research.

[15]We also conducted a similar analysis using estimated squad value obtained for www.transfermarket.com. This analysis leads to similar results insofar as it suggests that PSG's performance has been less than the open market value of the squad would imply. This supplementary analysis is available upon request.

Figure 6: Payroll vs. Champions League Points (2013-16)



6 Conclusions

This paper set out to test whether PSG recent domination of French soccer represents value for money for its owners. On the face of it, the efficiency of the team seemed doubtful as its dominance had been purchased at an extraordinary financial cost. Nevertheless, more careful analysis using a Stochastic Production Function models does not suggest any significant deterioration in PSG's efficiency, indicating that its domestic success is largely a result of spending more. Nevertheless, PSG scores way more points than is necessary to win the league. Because of diminishing returns, the extra points are extremely expensive. When we simulate the model to see what would have been required to win the league, we find that PSG may have spent up to €600m more, with salaries accounting for approximately half of this, than was necessary to win Ligue 1 over the period 2011/12 to 2016/17.

One could just view this as evidence that level of spending required to compete at European level may be way in excess of what is necessary to win the French league. Initial indications suggest that PSG has underperformed in the Champions' League, although further work is required to establish this conclusively. In any case, this assumes that success at the European level is the owner's actual objective, as QSi have stated, rather than the more amorphous objective of building soft political power as Montague (2018) claims. As the then Arsenal manager, Arsene Wenger, remarked following PSG's signing of Neymar:

> "Once a country controls a club, everything is possible."(Austin, 2017)

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