Analyzing 2013-14 San Antonio Spurs in terms of players' impact on wins and revenue

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For this assignment, I will be analyzing the San Antonio Spurs during the 2013-2014 season. I will evaluate the on-court value of players who spent the entire season with the team. Using the Player Impact Plus-Minus (PIPM) method, as outlined in the tutorial slides, I will calculate each player's contribution to the team's performance. Following this, I will employ the Marginal Revenue Product (MRP) method, based on the Scully approach, to assess the players' market values. These calculated values will also be compared with the players' salary rankings to identify who is relatively overpaid or underpaid.

The 2013-2014 NBA season was a defining moment in the history of the San Antonio Spurs, culminating in a remarkable championship run that showcased the true essence of "Spurs basketball." Finishing the regular season with a league-best 62-20 record, the Spurs secured the top seed in the Western Conference, thanks to their unselfish ball movement and a deep, well-coached roster. Their playoff journey was equally impressive, highlighted by a hard-fought seven-game series win over the Dallas Mavericks, followed by convincing victories against the Portland Trail Blazers and the Oklahoma City Thunder. The season reached its pinnacle in the NBA Finals, where the Spurs avenged their previous year's loss to the Miami Heat by dominating the series 4-1, including a historic offensive display in Game 3. Kawhi Leonard, just 22 years old, was named Finals MVP for his outstanding two-way performance, while Tim Duncan secured his fifth and final NBA title, further solidifying his legacy. Under the strategic brilliance of Gregg Popovich, the Spurs not only claimed the championship but also played one of their best-ever seasons, making an unforgettable impact on the league.

The Player Impact Plus-Minus (PIPM) metric estimates each player's impact on the court for every 100 possessions relative to the league average. It comprises both offensive and defensive components, making it a valuable indicator of a player's overall influence on the game.

However, it is important to note that extrinsic factors such as luck are not accounted for in the PIPM calculations for the Spurs players, even though luck can sometimes affect game outcomes.

Examining the PIPM values for the Spurs during the 2013-2014 season, Marco Belinelli, the Italian small forward, had the highest rating at 6.45. This suggests that replacing Belinelli with a league-average player at his position would result in the Spurs scoring approximately 6.45 fewer points per 100 possessions during his minutes on the court. Tim Duncan, one of the team's most renowned players, recorded a PIPM of 4.56, which was higher than most of his teammates. Kawhi Leonard, the Finals MVP, had a PIPM of 3.6, which was roughly average for the team during the regular season. It is worth considering that Leonard's MVP award was based on his exceptional performance in the Finals, indicating that his impact likely increased during those critical games.

When analyzing Belinelli's PIPM further, it becomes evident that his value was heavily skewed toward offense. His offensive PIPM of 5.7 implies that the team's scoring increased by 5.7 points per 100 possessions when he was on the court, compared to having a league-average player. However, his defensive PIPM was only 0.76, indicating a minimal improvement in the Spurs' defensive performance with Belinelli on the floor. Therefore, having a balance between offensive and defensive abilities may contribute to a player's overall value, as they are more well-rounded. For instance, Kawhi Leonard had less than a 1-point difference between his defensive and offensive PIPMs.

The next question to be asked is: “How does this PIPM measure contribute or convert to wins?” This formula takes PIPM values and converts them to a win percentage for each player:

Win% = (Points For)^E / (Points For^E + Points Against^E)

This win value indicates the percentage of possession sets an average team would theoretically win when the player of interest is added to the team. For instance, the average NBA team would, in theory, win 64.6% of their possession sets when Tim Duncan is added to the team, up from the average of 50%.

Using these win percentage values, I was able to calculate the Wins Above Replacement value for each player, which helped in assessing the marginal revenue product of each player. The end goal was to determine if players were worth the salaries they were being paid. After calculating these values, we find that, for instance, Kawhi Leonard had a Wins Above Replacement rate of 8, meaning that he would contribute 8 more wins for his team over the course of a season than if the team had an average player instead of him. According to this metric, Marco Belinelli was again the highest-rated, generating an extra 11 wins more than an average replacement player for a team over the course of a 48-game season.

Using the Wins Above Replacement values for each player, the NBA minimum salary for 2014 ($507,336), a 5% discount rate, and the regression of win percentage on revenue from the tutorial, I was able to calculate the marginal revenue product for the players on the Spurs roster during the 2013-2014 season. Here is an example of the equation I used on Tim Duncan to calculate his MRP:

$507,336 + 9.9 \times (486,524 + (1/1+0.05) \times 358,24)$.

Interpreting some of these values, we see that, for instance, Marco Belinelli generated $10.3 million extra for the Spurs based on his output for the team, while Kawhi Leonard generated $7.41 million extra in revenue for the team, and Tim Duncan $9.04 million extra in revenue.

After calculating these MRP values, I found the salaries for each player on the Spurs that season. These salaries had to be adjusted to 2011 dollars using an inflation calculator, as the values from the win-on-revenue regression provided during the tutorial and used in my calculations were from that year. It would only make sense to compare the revenues a player generates to their salary if the two values were being measured equally, accounting for inflation.

When comparing these MRP values to player salaries, we see that Marco Belinelli, Tony Parker, and Kawhi Leonard were all severely underpaid by $6-8 million. In the case of Kawhi, this made sense because he had just been drafted into the league two seasons prior and was still practically a rookie. The 2013-2014 season was his breakout season as a star, and so he would have been underpaid as his salary for the season reflected his status as a young rookie who had not yet proven himself. In the case of Belinelli, one reason for his underpayment, despite his standout impact on the team, would have been the Spurs' salary cap. To maintain a competitive roster, the team would often sign players to team-friendly contracts. So, Belinelli was part of a Spurs team that was trying to balance paying their star players, like Tim Duncan and Manu Ginóbili, while also building a deep roster. In both cases of Kawhi and Belinelli, their underpayment represents a failure of the market, whether due to salary caps (market limitations) or a market lag in responding to player improvement.

On the other hand, it is surprising to find that Tim Duncan, despite having a strong PIPM, Wins Above Replacement, and MRP rating, is considered overpaid. It is also unexpected since he was the star of that Spurs team. Here, there is likely a flaw in the calculation method when assessing Duncan's MRP. This is because the shared revenue agreement in the NBA makes it so that the extra revenue generated by a team player is often reflected more in the collective betterment of NBA revenues rather than the individual teams. That is to say, Tim Duncan

contributes a lot to overall league revenues as well but the metric we use to measure his impact does not account for this. So in actuality, Tim Duncan is probably generating more MRP which the measurement used ignores.

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Calculating PIPM: the box component

- An explainer for PIPM is here

	OPI Box	DPI Box
GS%^2	0.632	1.924
PTS/36	1.144	0.049
TRB/36	0.143	0.259
AST/36	0.705	0.192
STL/36	0.597	1.694
BLK/36	-0.013	1.393
TOV/36	-1.695	-0.874
PF/36	-0.059	0.251
FTA/36	-0.308	0.055
2PA/36	-0.910	-0.191
3PA/36	-0.612	-0.138
Intercept	-5.621	-3.521

Calculating Barnes' total PIPM

- The formula(s) for PIPM, combining the Box, On/Off, and +/- components is:

	D-PIPM		O-PIPM
D-On/Off	0.42754	**O-On/Off**	0.24714
DPI Box	0.50307	**OPI Box**	0.47893
D-AVG	0.29603	**O-AVG**	0.20545
Intercept	0.00504	**Intercept**	-0.29177