

REF IR/Political Science Prediction Models (version 0.3)

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I conducted a simple Random Forest Regression to examine how IR/Political Science REF 2014 Output GPAs could be predicted using:

- **Mean Journal Impact Factor** for all of the journal article submissions that each university made. Note: if a journal was not assigned an impact factor¹ it is effectively given an impact factor of 0.
- **Percent of journal article** submissions from journals in the **top 20** IR or Political Science categories assembled by Google Scholar.
- **Percent of non-edited books** submitted that were published by a **top university press** (see table in the Appendix for the complete list).

All of these metrics are highly correlated with REF Output GPAs. Mean impact factor has a correlation coefficient of 0.68 with REF Output GPAs. The REF GPA correlation with the Google Scholar metric is 0.76 and 0.7 with the percentage of books submitted that were published by a top university press. The following figure further illustrates these close relationships and City University's placement within them.

It is important to note that neither of these metrics contain information on other materials including edited volumes which are also submitted to the REF.

More Complex Model: Google Scholar + Impact Factor + Books

To examine how well these metrics predict REF Output GPAs I first ran the random forest regression model on a random sample of 70% of the 56 universities (i.e. 38) that made REF submissions for IR/Political Science. I then used the estimates from the model to predict the REF Output scores of the remaining 30% (i.e. 17 universities). The following figure compares the actual REF GPA scores to the predictions. Note: if the model perfectly predicted the GPA score then each dot would lie on the 45 degree line. The mean absolute prediction error when using the two journal metrics was 0.1. In other words, on average the model incorrectly predicted the REF GPA score by 0.1 GPA points or 2.5% of the GPA scale.

Simpler model: Google Scholar Only

The percentage of journal submissions in the top Google Scholar lists is more strongly correlated with REF GPA scores than impact factors. Would a simpler model using just the Google Scholar metric perform just as well as the more complex two metric model? The following figure shows actual vs. predicted GPA scores for this model. The mean absolute prediction error when using only the Google Scholar metric was 0.2. In other words, on average the model incorrectly predicted the REF GPA score by 0.2 GPA points or 5% of the GPA scale. The Google Scholar Only model slightly outperforms the more complex model that also included information on impact factors.

¹E.g. new journals and journals not included in the impact factor list used. Note that we attempted to match all of the submitted articles' journal names with those on the impact factor list. However, due to spelling variations in the two sets of journal names, some matches may not have been made.

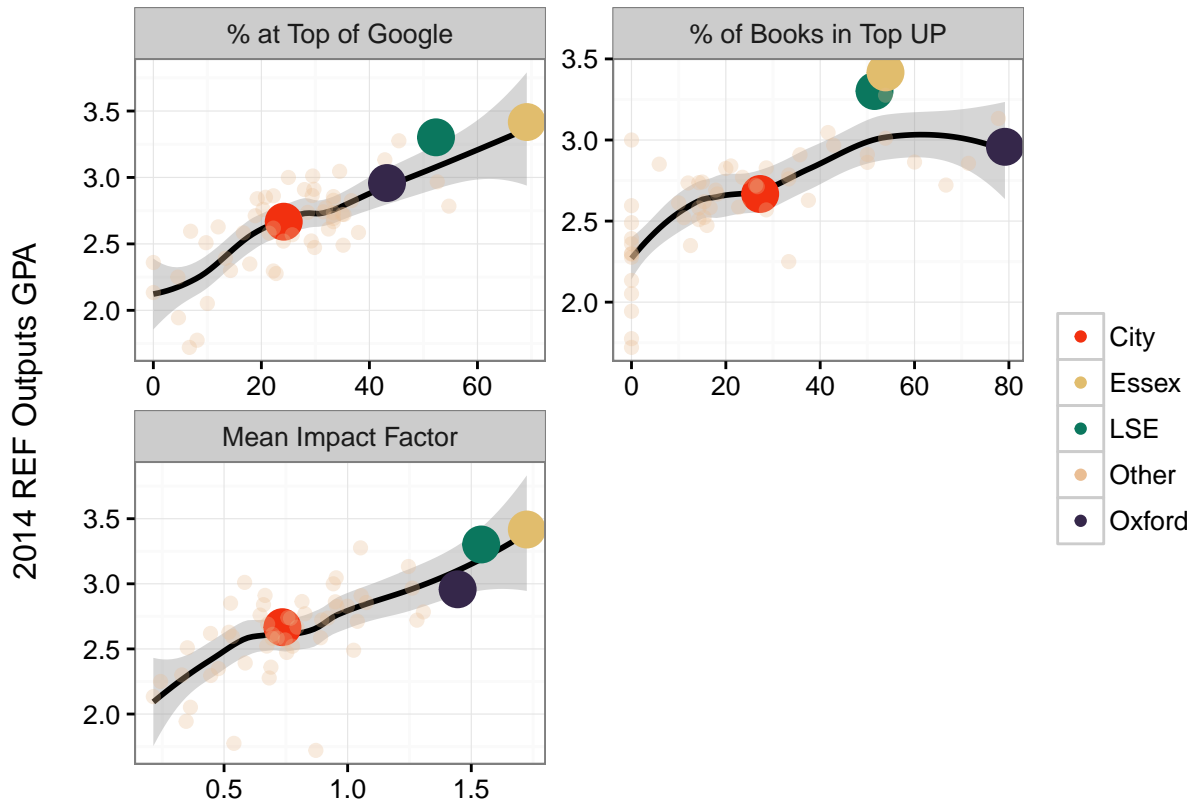


Figure 1: Comparing Universities' REF 2014 Output GPA to Journal Research Output Metrics

Simple, But a Little More Complex: Google Plus

The Google Top 20 IR and Political Science lists are notably lacking important political economy journals, including *Review of International Political Economy* and *New Political Economy*. Does adding these journals to a “Google Scholar Plus” variable improve prediction performance? The following figure shows the predicted vs. actual REF GPAs for our test sample using the Google Scholar Plus variable. The mean absolute prediction error when using only the Google Scholar Plus metric was 0.174. In other words, on average the model incorrectly predicted the REF GPA score by 0.174 GPA points or 4.4% of the GPA scale. The Google Scholar Plus model slightly outperforms both the Two Metric model and the Google Scholar Only model.

Conclusion

For the International Relations/Political Science 2014 REF we can create highly accurate predictions of Output GPA using only universities' percentage of journal submissions that were from the Google Scholar IR and Political Science top 20 lists. Using subject specific knowledge to select two additional journals that are prominent in international political economy allows us to make even better predictions. It may be possible to make even better predictions by including information on high impact book publishers.

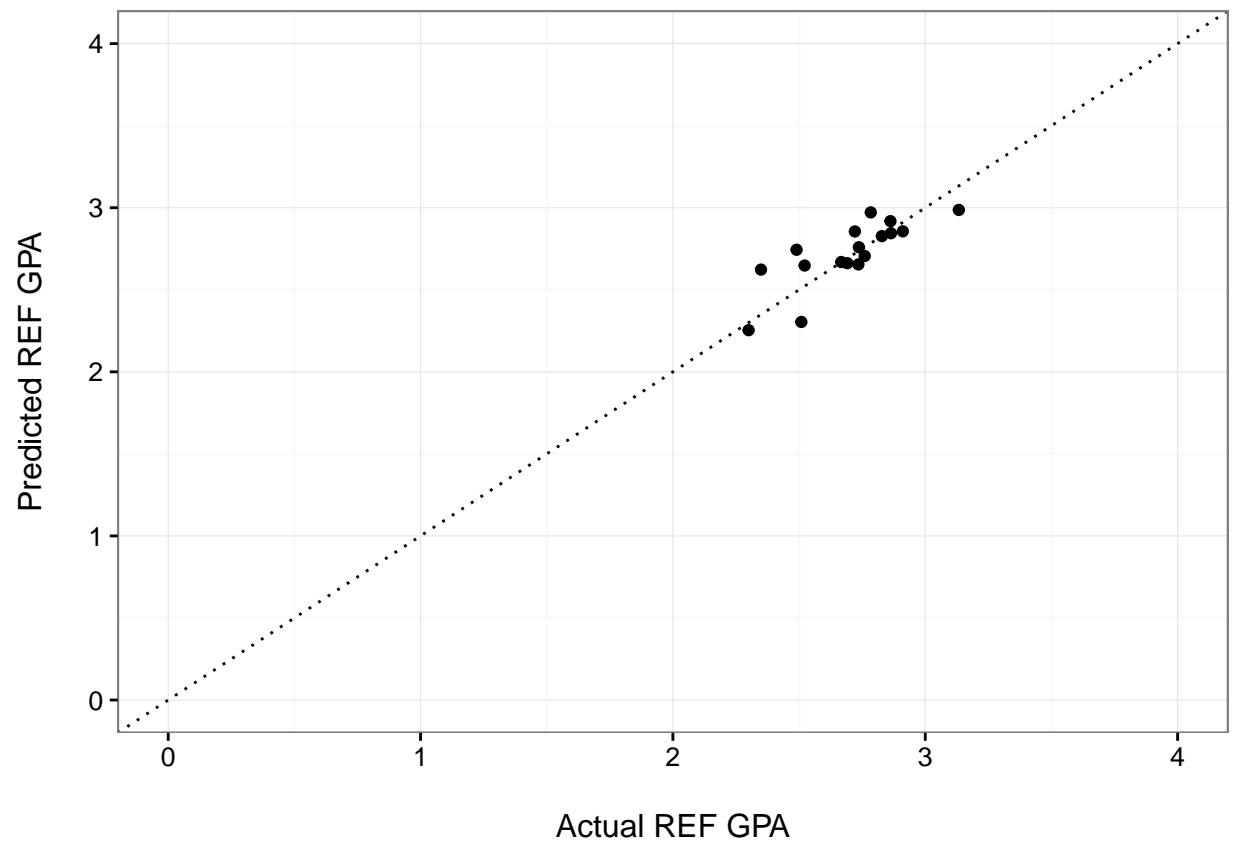


Figure 2: Actual vs. Predicted 2014 REF Output GPAs Using All Output Metrics for a Test Set of 17 Randomly Selected Universities

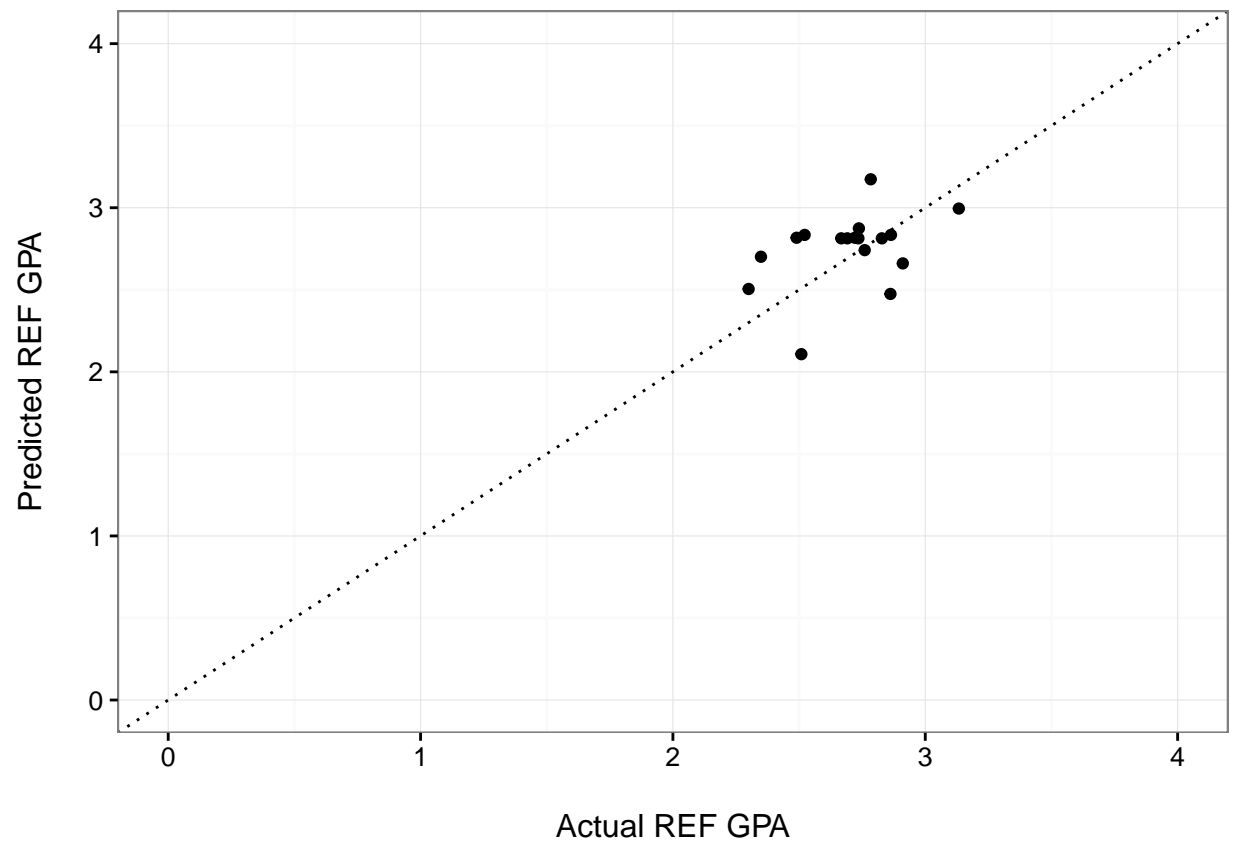


Figure 3: Actual vs. Predicted 2014 REF Output GPAs Using Google Scholar Metric for a Test Set of 17 Randomly Selected Universities

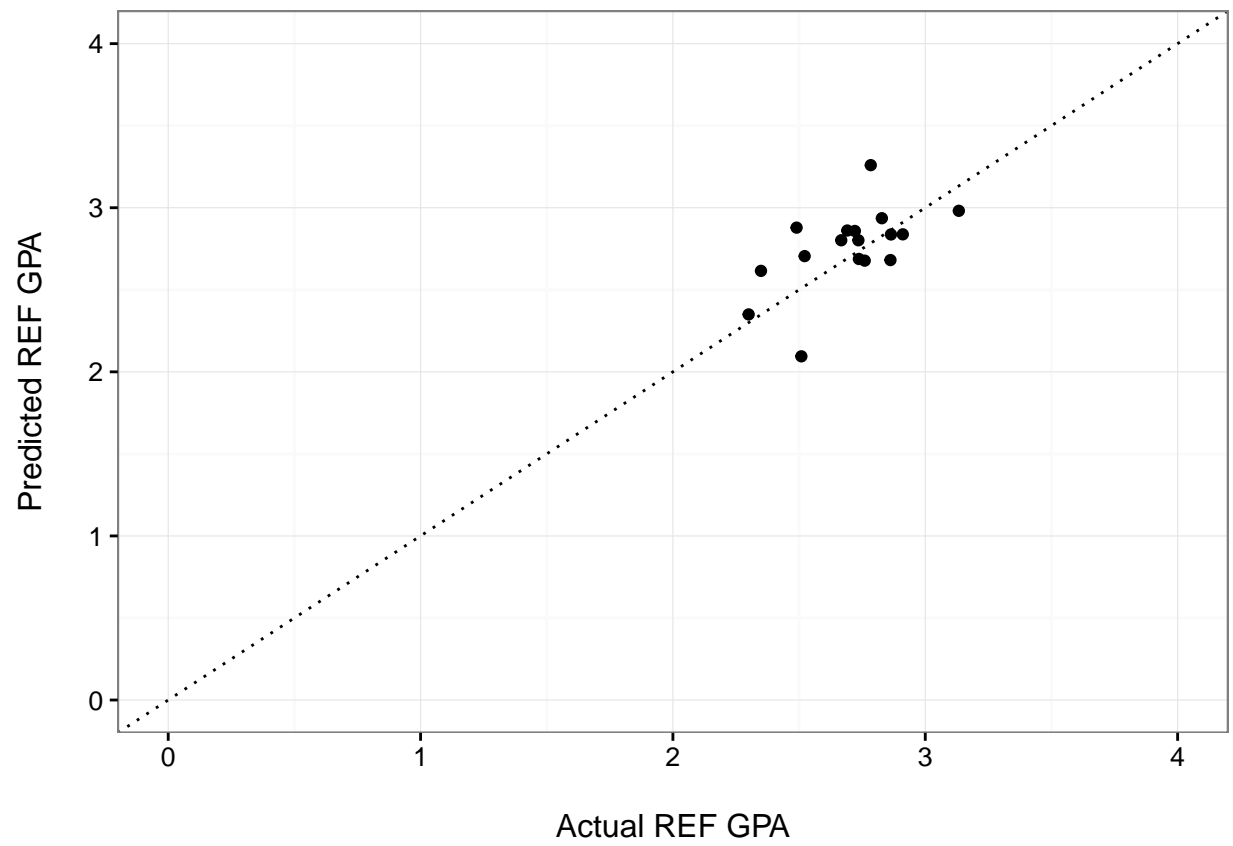


Figure 4: Actual vs. Predicted 2014 REF Output GPAs Using Google Scholar Plus Metric for a Test Set of 17 Randomly Selected Universities

Appendix: Top 20 (IR + PS) Google Scholar Journals (February 2016)

For reference, the following is a list of the top 20 journals in the Google Scholar IR and Political Science categories. We also include the most recent Thomson-Reuters Impact factor to enable comparison between the two metrics. Note that the table does not include 40 journals because some journals (*World Politics* and *Journal of Democracy* show up on both the IR and Political Science lists).

Journal	TR Impact Factor
political analysis	4.655
american political science review	3.688
journal of peace research	3.387
american journal of political science	3.269
annual review of political science	3.140
international organization	3.019
european journal of political research	2.508
world politics	2.450
journal of politics	2.255
governance	2.237
perspectives on politics	2.132
comparative political studies	2.028
foreign affairs	2.009
british journal of political science	1.987
european journal of international relations	1.972
jcms	1.855
party politics	1.830
journal of european public policy	1.817
international studies quarterly	1.705
political behavior	1.691
journal of conflict resolution	1.609
west european politics	1.576
security dialogue	1.356
international affairs	1.246
electoral studies	1.182
journal of democracy	1.180
political research quarterly	1.149
review of international studies	1.087
global governance	1.016
third world quarterly	0.981
political studies	0.939
international studies review	0.878
millennium	0.841
washington quarterly	0.788
journal of european integration	0.656
international studies perspectives	0.652
pacific review	0.527
ethics & international affairs	0.453