Home Bias and Prediction Markets: Evidence from the Racetrack

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TEP Working Paper No. 2211

December 2011

Trinity Economics Papers

Department of Economics

Trinity College Dublin

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Abstract

Significant horse races taking place in Britain and France frequently involve participants from both countries. The existence of distinct and segmented wagering markets in each country facilitates the study of potentially different market behaviors. Using over eight hundred observations from these markets, I show the existence of a pronounced home bias, with participants in domestic markets favoring horses trained domestically. The bias is large, statistically significant, and becomes more pronounced as betting odds rise. Restricting the analysis to foreign trained horses that have already performed well in domestic races, I find the bias virtually disappears—suggesting a role for learning and informational asymmetries.

*I thank members of the Trinity brown bag series for helpful comments. Email: scanlop@tcd.ie

Introduction

This goal of this paper is to address the issue of home bias in a prediction market. Prediction markets are simple, and represent textbook markets in a complete set of Arrow-Debreu securities. To analyze the issue of home bias, they are especially useful: the hedging against aggregate risk is not a motivation, while the purchase of a foreign originated security entails no transaction costs or foreign exchange rate risk. For these reasons, one can examine peoples' relative demands for local and foreign assets, while controlling for many candidate explanations for home bias.

To address this issue, this paper determines whether home bias exists in betting markets for thoroughbred horse races. Over the past decade thoroughbred horse racing has increasingly become an international affair, with many races attracting participants from foreign countries. Yet largely because of regulatory barriers and historical precedent, different wagering markets exist within each country, where people can wager on the outcome of the same race. Because of transactions costs, legal barriers, and uncertainty about final prices, arbitrage across these markets is difficult.

Such market segmentation provides a way to examine the demands of market participants for "assets" originating from different countries. For instance, how much do French market participants wager on British horses running in France, and vice versa? Because any variations in demand show up in price differentials across markets, price comparisons provide a straightforward way to answer such questions.

Selecting a particular horse in these markets entails a similar analysis to choosing amongst different equities; central to both choices, for example, is an examination of past performance and potential. Information about prospective runners is widely available. Professional services, together with specially designated TV channels and newspapers all provide relevant and timely information. Although the markets concerned are not as liquid as equity and bond markets, the sums involved are significant and exceed those in standard experimental studies. Moreover, in contrast to, say, international football matches, national sentiment and patriotism are less likely to affect prices.

In this paper, I compare market prices from wagering markets in Britain and France. These

countries have the largest racing industries and the most liquid and developed wagering markets. To ensure markets are sufficiently liquid, I focus on relatively significant races, where there is more prize money and attract better class horses. Despite this, the vast majority of races I examine are not well-known to the general public and therefore less likely to attract interest from casual, once-off participants. Using data from 2004-2011 and focusing primarily on French horses running in Britain and British horses running in France, I examine the extent of home bias in both markets. Despite presenting a natural forum to examine home bias, to my knowledge this is the first paper to analyze home bias in the context of horse racing.

In Section 1, I present necessary background information on the relevant markets. Section 2 presents the two main empirical findings of the paper. First, there is a pronounced home bias within local betting markets. Second, the bias attenuates as foreign-based horses run well in domestic races and subsequently return to run again. Section 3 presents more informal evidence on the existence of a home bias in other international markets. After briefly discussing particularly strong cases of the bias, I discuss implications of the analysis in Section 4. Finally, Section 5 concludes.

1 Background

In France, most market participants wager through the state-run pari-mutuel (henceforth *PMU*) market. This company has 6.5 million customers and annual turnover of approximately 10 billion euros. The average weekend race in France attracts a total wagering pool of between 200-320 thousand euros. In this system of parimutuel betting, all wagers enter a pool and, after commission, the pool is divided amongst the winners. Within this system, people remain unaware of the ultimate odds or payoff until the end of wagering. Although updates on odds are available throughout the wagering, in practice most significant wagering takes place in the minutes preceding each race. Together with commission, this inherent uncertainty makes risk-free arbitrage impossible. Moreover, a large wager could depress the price so much as to render the arbitrage operation self-defeating.[1]

Because of recent deregulation, a number of new online parimutuel markets have entered the

[1]This is especially the case for overlooked horses in the market.

French market. One prominent example is *Zeturf*, which commits to lower commission than the PMU. Yet because of historical precedent and the ubiquity of locations where one can wager with them, the PMU remains the largest market in France.

In Britain, a similar state run parimutuel market exists, but in contrast to France, relatively few use this market. In the historically more liberalized British market, most people wager through high street bookmarkers and a large online betting exchange, *Betfair*. Bookmakers individually create markets and adjust prices themselves in the face of fluctuations in demand. By contrast, in a betting exchange, participants offer and take bets from each other. In practice, this market is highly liquid and attracts more sophisticated participants. Yet Betfair failed to acquire a license to operate in France. For our purposes, an important issue is the commingling of pools: for races in Britain, the pooling of French and British parimutuel markets is common for significant races.

In all of the aforementioned markets, most significant wagering is conducted close to the start of the race. Ultimately, market efficiency dictates that the final odds in all wagering systems relate directly to the probability of success for each horse. Most studies of racetrack betting confirm this to be the case.

2 Data

To compare market behaviors across countries, I seek markets where the majority of participants reside in a specific country. For French races, I compare final prices from Betfair and prices from both the PMU. Yet because of the pooling of the British and French parimutuel markets, for British based races, I compare prices from Betfair and Zeturf. Data on all markets is available from 2004-2011 and comes from Group 1 and Group 2 flat races. While Group 1 races are the most prestigious races, both categories of race are highly competitive and attract better class horses.

Because of superior prize money, more British horses travel to France, than French horses to Britain. As a result, there is more date relating to British horses running in France, and analysis of this data comprises the bulk of the study. After removing prospective outliers—horses whose odds exceed 40 to one on any market—I have 677 observations on this margin. Of

these, 235 observations represent horses who have already run in France. From these, I isolate observations who have previously performed well in France: they have come in the first three in similar class races over the past year, or have already won a French Group 1 race at any stage. Regarding French horses running in British races, there are 141 observations over this period with few repeat observations. For the empirical work, I analyze odds in decimal form. This incorporates the return of a unit stake; for example, odds of 3 represent more contentional odds of two to one.

Tables 1–4 illustrate the analysis of the larger sample of British trained horses running in France. Table 1 presents a simple regression of PMU odds on Betfair odds using all observations. Because both markets are pricing the same outcome, market efficiency dictates and intercept of zero and a coefficient of one. Yet the coefficient of 1.27 is significant at 1%, as is the positive intercept. As a result, the PMU odds exceed the Betfair ones. For example, a horse with odds of five to one on Betfair will be approximately eight to one in France.

Examining the prices of repeat observations is one way of determining whether French market participants take account of previous form. In particular, how do French market participants react to a British horse what has already run well in France? To address this, Table 2 presents a similar regression to Table 1, but now includes dummy variable representing good performance in a previous French race. The dummy is negative and highly significant, showing the incorporation of information into prices. By comparison with the previous example, a horse *who has already run well in France* with odds of five to one on Betfair will now have odds of approximately five to one on the PMU. Indeed for odds below five to one, the horse will go off at a lower price on the PMU. By contrast, a horse who has previously performed poorly—and presumably gone unnoticed—or who has never run in France will have odds of almost nine to one on the PMU. Table 3 restricts the same regression to those horses who have already run in France: a similar situation applies.

Table 4 performs the regression for horses whose odds are less than five to one on Betfair—all horses with reasonably good chances of success. In this case, the dummy variable is still highly significant. The French market remains wary of reasonably good horses who still haven't performed on French soil.

The second part of the analysis compares prices of French horses running in Britain. Table 5

shows the result of a regression of Betfair odds on Zeturf odds. Continuing previous examples, a horse that is five to one in France will go off at around six to one in Britain. Table 6 restricts the above regression to horses where Betfair odds exceed five to one; that is, these horses have relatively low chances of winning. According to this regression, a horse of five to one in France will have odds of approximately nine to one in Britain. Comparing this with Table 5, we see the home bias is larger and becomes more pronounced when a horse is relatively unfancied. Finally, to formally test equality of prices, I perform a signed Wilcoxon rank test for both parts of the analysis. Although not shown, the test rejects equality of odds in both cases.

3 Other Evidence

Although this study has focussed on British and French races, an interesting question is whether the bias exists in other international wagering markets. To address this informally, I examine data from the last three most internationally contested races in Britain: the Golden Jubilee race run at Royal Ascot in 2010, the July Cup in 2010, and the Kings Stand Stakes at Royal Ascot in 2011. The virtue of this exercise is the wide international participation from across the world, and the existence of four local separate markets for each race. Tables 6—8 present odds from these races from markets in Australia, Britain, France, and Hong Kong. Consistent with the regression results, a significant home bias is evident—in most cases, the odds for domestically trained horses are shortest in the domestic market.

Perhaps the most striking example of home bias in racing is the 2006 *Prix de l'Arc De Triomphe*—the most famous European horse race. Here a Japanese horse, Deep Impact, who had won all of his previous races, was widely supported in the betting by a large contingent of Japanese traveling to France. The weight of Japanese support—who could not wager on this race in Japan—attracted total wagers of 1.6 million euros (out of a pool of 2.9 million), causing the horse to go off at odds of 1 to 2. Such odds were widely regarded to overestimate the success of Deep Impact, who went off at approximately 2 to 1 on Betfair—four times higher than the PMU. In the most recent running of the race in 2011, a German horse, Danedream, won and again attracted little attention in British or French markets.[2] This is despite the

[2]A daily British racing newspaper, the Racing Post, quoted a representative from a large bookmer, William Hill: "This is the greatest Arc result for bookies in modern memory. Our guys were keen to keep Danedream

fact Danedream previously won two Group 1 races in German in 2011. In Britain, France, and German, the starting odds of 38, 28, and 18 respectively. Another recent example is the success of a French horse Makfi, in the British 2000 Guineas in 2010. Despite easily winning its previous race in France, Makfi went off at odds of 64 on Betfair and 12 on the PMU.[3] Overall, this evidence suggests that home bias can manifest itself in large liquid markets that attract considerable attention. The final point refers to learning. In subsequent races, British bookmakers made Makfi and Danedream favorites for their next races.

4 Discussion

The existence of different prices for the same asset indicates a market inefficiency in the sense that both prices cannot be reflecting the same information. Because of the nature of parimutuel markets and the relatively large commission, however, whether one can profit from such price discrepancies is unclear.

What is driving the bias? Two possible explanations are plausible: informational frictions or a behavioral explanation such as overoptimism or familiarity bias.

In contrast to equity markets, the termination and repetition of wagering markets—where horses run in subsequent races—provides one way to disentangle both theories. The fact that that the bias diminishes for horses who have previously run well suggests markets incorporate salient information. By contrast, if locals were inherently patriotic or over confident about domestically trained horses, the bias would show little tendency to diminish. Yet it does. The fact the bias is largest for horses with lower chances of success suggests that locals are especially wary of purchasing a foreign originated asset that presumably receives little publicity or attention. This again points to an informational friction. Furthermore, the empirical analysis shows that a home bias remains for poorly performing horses who run repeatedly. As a result, familiarity fails to reduce the bias.

The analysis suggests a role for informational frictions. On the face of it, this is unsurprising.

onside and punters just weren't interested, with only one per cent of the money fielded for the German filly.

[3]In this case, the PMU was pooled with the British parimutuel market. Because the British pool is not widely used in Britain, French participants have a disproportionate effect on it. Discussing a similar happening, a 2010 report in the *Belfast Telegraph* notes "the 1,000 Guineas win pool had a total of 151,000 pounds, 37,000 of which was on the 9-2 favorite made up of 28,000 from the French system (PMU). She paid only 3.50 on the tote—equivalent to a final price of 5-2 for the win."

As in equity markets, agents face a large number of options in a typical horse race. Careful analysis of each option is costly in terms of time and money. Faced with this prospect and only a marginally higher chance of success, the rational choice might be simply to incorporate the most salient information. In the context of markets in this study, that is simply information about domestic horses and foreign horses of proven ability. In a paper addressing interstate arbitrage across betting markets in U.S. states, Hausch and Zimba (1990) note regional biases.[4] Although that paper is not concerned with home bias *per se*, this evidence suggests a role for informational issues and undermines the role of patriotism in driving home bias. This finding is similar in spirit to that of Coval and Moskowitz (1999), who show the existence of a home bias at a local level: local investors invest disproportionately in local firms.

5 Conclusion

This paper highlights the existence of a home bias in a simple market for contingent claims. It shows a home bias exists in the absence of issues particular to the international economy. That is, it exists in an environment with no aggregate or exchange rate risk and no additional transactions costs to purchasing foreign assets. The fact that i) the bias diminishes after the revelation of information and ii) the bias is most pronounced for horses who presumably receive less media attention suggests information issues play a role in explaining the results. Overall, therefore, the study provides suggestive evidence that informational frictions play a potentially important role in explaining home bias in financial markets.

[4]For example, they note that in the 1986 Kentucky Derby, the winner Ferdinand paid 16.8 for 2 dollars at Hollywood Park in California, where he was a regular race participant. Meanwhile, he paid 37.4 at Aqueduct Part in New York, 79.6 at Woodbine in Toronto, and 90 at Evangeline in Louisiana.

Table 1: Dependent = PMU Odds

Variable	**Coefficient** (Std. Err.)
Betfair Odds	1.27** (0.05)
Intercept	1.61** (.56)
N	677
R^2	0.54
$F_{(1,675)}$	795.22

Table 2: Dependent = PMU Odds

Variable	**Coefficient** (Std. Err.)
Betfair Odds	1.24** (0.05)
Dummy	-3.72** (1.08)
Intercept	2.30** (.59)
N	677
R^2	0.55
$F_{(2,674)}$	404.93

Table 3: Dependent = PMU Odds

Variable	**Coefficient** (Std. Err.)
Betfair Odds	1.16** (0.08)
Dummy	-4.69** (1.27)
Intercept	3.82** (1.10)
N	235
R^2	0.54
$F_{(2,232)}$	139.32

Table 4: Betfair odds < 6. Dep. = PMU Odds.

Variable	**Coefficient** (Std. Err.)
Betfair Odds	1.49** (0.09)
Dummy	-.80** (.30)
Intercept	-.37 (.33)
N	261
R^2	0.53
$F_{(2,258)}$	145.91

Table 5: Dependent = Betfair Odds

Variable	**Coefficient** (Std. Err.)
Zeturf Odds	1.12** (0.07)
Intercept	1.60** (.59)
N	141
R^2	0.67
$F_{(1,139)}$	286.62

Table 6: Betfair Odds > 6. Dep = Betfair Odds.

Variable	**Coefficient** (Std. Err.)
Zeturf Odds	.88** (0.10)
Intercept	5.3** (1.15)
N	82
R^2	0.48
$F_{(1,80)}$	8.43

	UK	FR	Aus	HK
UK	**7**	13	7.7	10
UK	**27**	40	36	54
FR	12.7	**7.7**	18.2	27
FR	13.7	**16**	25	26
FR	35.7	**23**	58	67
FR	119	**14.1**	115	68
AUS	6.8	7.3	**4.7**	8.2
AUS	59.5	30	**32**	18
AUS	75.6	119	**16**	86
HK	10.2	14.1	6.6	**2.4**
USA	8.5	10	11.3	13

Table 7: Odds from the Golden Jubilee at Royal Ascot, June 2010. The top column indicates the respective betting market, while the left hand column shows representatives from each country.

Horse	UK	FR	Aus	HK
UK	**3.8**	7.2	5.7	3.5
UK	**17**	20	20	21
FR	19.6	**16**	23	23
FR	16.2	**15**	19	25
AUS	3.2	2.3	**2.9**	3.3
AUS	9	16	**5.4**	12
AUS	111	95	**29**	80

Table 8: Odds from the Darley Cup, July 2010

Horse	UK	FR	Aus	HK
UK	**6.2**	16.3	14.1	19
UK	**5.6**	8.1	7.2	8.7
FR	15.0	**16.8**	13.8	19
FR	43.0	**34.7**	72.1	59.0
AUS	6.8	4.4	**3.7**	3.7
HK	24.1	26.5	12.1	**7.7**

Table 9: Odds from the King's Stand Stakes, Royal Ascot, June 2011

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