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A Hedonic Price Analysis of Differentiated Products of Unknown Quality: Freshman Sire Stud Fees in the Thoroughbred Breeding Industry

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Prices transmit information regarding the underlying quality of a product; when quality is unknown to both buyers and sellers, theory predicts that the same price should be charged for all products. However, in the Thoroughbred industry, difference fees are charged to breed to freshman sires, which are stallions of unknown quality standing their first season at stud. We find that stallion owners/ managers differentiate their products according to attributes which may predict offspring quality. A freshman sire's own racetrack performance, standing in the state of Kentucky, and descending from a prominent sire line are found to be statistically and economically significant.

Key Words: differentiated products, freshman sire, hedonic price analysis, Thoroughbred industry, unknown quality

Price is a mechanism used to transmit information regarding the underlying worth or quality of a product. Price and quality are positively correlated, as higher quality products are more expensive to purchase because they often cost more to produce (Bagwell and Riordian, 1991). Yet, sometimes buyers do not know the quality of the product of interest, such as in the case of a new product. The seller may have information regarding the quality but may have incentives to not disclose this information (Grossman, 1981). In other situations, even the seller may not know the quality of the product of interest. If quality is not known by the seller, theory predicts that the same price will be charged for all products. However, in some cases, it may be possible to differentiate products according to attributes which may be related to expected quality. The two-fold objectives of this paper are to estimate the determinants of prices for differentiated products of unknown quality using data from the Thoroughbred breeding industry, and then to estimate the marginal values of identified attributes.

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Every year, approximately 100 Thoroughbred stallions retire from racing and begin their careers in the breeding shed.[1] These stallions are called "freshman sires." Freshman sires represent an interesting class of products to analyze. The relevant price of interest, called a "stud fee," is the price charged for the right to one breeding season to the sire. Depending on the policies of the farm and the fertility of the sire, a stallion can breed upwards of 200 mares in one breeding season. These breeding seasons are differentiated products because each sire possesses different genetic and physical characteristics and capabilities which are believed to ultimately influence their ability to produce successful racehorses.

Nevertheless, in the case of any new sire, the ability to produce successful progeny is entirely unknown; many industry experts believe it takes five years, or four crops of foals, for the quality of a sire to be determined. A stallion that was successful on the racetrack may not have the same success in the breeding shed, whereas a mediocre racehorse might produce brilliant progeny. Another unique feature related to freshman sires is that breeders (the mare owners) place a premium on breeding their mares to unproven sires; breeders are willing to take the risk of breeding to new stallions for the mere possibility of having identified a future star at the beginning of his career (Hall, 2004).

Data show that stud fees for freshman sires are not identical, violating the prediction of equality since their quality is unknown by both the buyer (mare owner) and the seller (stallion owner/manager). How, then, are stud fees for freshman sires determined? One basis for heterogeneity in prices is the differentiation in genetics, conformation, and performance of each freshman sire, at least to the extent that these attributes may predict the likelihood of a stallion producing successful progeny. For example, some studies have found that racetrack performance (as measured by lifetime earnings) is heritable to some extent (Wilson and Rambaut, 2008).[2] As a result, until the quality of a sire's offspring is known, it is reasonable that the sire's own racetrack performance is utilized as one factor in determining his stud fee. Similarly, information regarding the quality of the freshman sire's own dam (mother) and sire (father) as producers of successful racing and breeding progeny may have value as well. Consequently, stallion owners/managers use prices to signal expected quality based on available attributes.

Hedonic pricing studies in the literature have focused mainly on Thoroughbreds sold at public auction. The largest segment of research focuses on Thoroughbred yearlings. These studies suggest that both individual-specific characteristics, such as pedigree, gender, and date of birth, as well as macroeconomic variables, such as

[1] As a rough and generous estimate, 100 colts from a foal crop of 30,000 (15,000 of which are male) enter the breeding shed. This represents less than 1% of all colts born in a year. An unpublished study estimated that based on four years worth of new stallions in central Kentucky from 1994–1997, 88% of breeding-shed stallions were ultimately failures (Hall, 2004). The chance of having a successful stallion in any given year is minuscule—less than 0.1%!

[2] However, environmental effects, such as training methods, jockeys used, and probabilistic injury events, are much more influential.

the exchange rate and the interest rate, are significant predictors of yearling prices (Karungu, Reed, and Tvedt, 1993; Buzby and Jessup, 1994; Chezum and Wimmer, 1997; Neibergs and Thalheimer, 1997; Vickner and Koch, 2001; Robbins and Kennedy, 2001; Parsons and Smith, 2008). Another strand of research analyzes the determinants of broodmare prices. These studies suggest that a broodmare's own racetrack performance and the performance of her progeny matter. More specifically, the attributes of having won a graded stakes races herself and having produced at least one graded stakes winner have the highest marginal values (Neibergs, 2001; Maynard and Stoeppel, 2007).

Few studies related to the Thoroughbred industry and the larger livestock industry in general have focused on prices for sire services. One recent study in the Thoroughbred industry examines the determinants of stud fees for established Thoroughbred sires (Stowe and Brown, 2009). Established sires are those that have been breeding mares for at least five years. The authors conclude that for established sires, their own racing performance is inconsequential; rather, the most valuable attribute is the ability to produce progeny that sell for high prices as yearlings, followed by the ability to produce successful racehorses. In the dairy industry, Schroeder, Espinosa, and Goodwin (1992) analyze the market value of individual heritable traits in dairy bull semen. They find that heritable milk production traits and heritable physical traits explain much of the variation in prices for dairy bull services.

This paper makes several contributions to the literature. First, it is one of only two academic papers identified in our literature search that analyzes the determinants of stud fees; the other paper focuses on Thoroughbred stallions whose breeding quality has already been established. Second, it provides information to stallion owners/managers about which characteristics are most influential and most valuable in determining stud fees; information such as this can influence a horse's training and racing career. Third, this paper contributes to the literature on pricing differentiated products of unknown quality.

The remainder of the paper proceeds as follows. We first discuss the empirical model and estimation procedure. Next, the data set and variables available for analysis are described. The results from the model are then presented, followed by a discussion of the results. The final section is devoted to summary highlights and concluding remarks.

Empirical Model and Estimation Procedure

In a hedonic pricing model, the price of a good is a function of the quantity and quality of its attributes. In the context of this model, however, the quality of the good is not known. More specifically, the quality of a new sire's offspring, as measured by racetrack performance and/or breeding value, will not be known for years. Thus, in place of the actual quality of the sire, breeders use proxies which may help predict which freshman sires will be successful. For example, if a freshman sire himself had a successful racing career, he may be more likely to produce

offspring of high racing quality. In addition, if a freshman sire comes from a family that was successful on the racetrack or that is known to produce successful race horses and/or successful breeding stock, he may be more likely to produce offspring of high racing quality and breeding quality. Consequently, without knowing the sire's actual quality, breeders place value on attributes which may predict future quality.

Equation (1) specifies the model to be estimated:

$$\ln(y_i) = \alpha + \mathbf{x}_i\beta + \varepsilon_i, \tag{1}$$

where y_i is the advertised first-year stud fee (*FYFEE*) for freshman sire i, $\mathbf{x_i}$ is an $n \times k$ matrix of explanatory variables (n is the total number of observations and k is the number of regressors), and ε_i is the error term. The set of explanatory variables includes a stallion's own performance, other individual characteristics, dam quality variables, and sire quality variables. In addition, the year a freshman sire entered the breeding shed is included to account for any trends in stud fees over time.

Data

Data on 653 incoming freshman sires were obtained from the annual *Blood-Horse MarketWatch Stud Fee* issues from 1999–2009. Stallions standing their freshman season outside of the United States were excluded to avoid differences in reported exchange-rate adjusted stud fees. Racing performance statistics were retrieved from the *Blood-Horse Stallion Registry* and the 2009 *American Produce Records*.

Data available from the annual "Stud Fee" issue of the *Blood-Horse Market Watch* include the name and location of the sire of interest, the sire's introductory advertised stud fee, the sire's own race record and career earnings, and the highest level of race won. Data related to the freshman sire's sire were obtained using the *Blood-Horse Stallion Registry*. Other variables related to the freshman sire's racetrack performance as well as the freshman sire's dam were obtained using the 2009 *American Produce Records*, which contains detailed race records and pedigrees of all Thoroughbred horses from 1960–2008.

Names, definitions, and expected signs of the variables used in the model are presented in table 1. The dependent variable is the natural log of *FYFEE*, the advertised first-year stud fee for the freshman sire. Figure 1 illustrates the average first-year stud fee from 1999–2009.

The variable *FIRSTYEAR* indicates the year in which the freshman sire began his breeding career, and *FIRSTAGE* indicates the freshman sire's age in that year. The categorical variable *KY* denotes whether a freshman sire stands his first season in the state of Kentucky, which is generally thought to be home to the highest quality Thoroughbred stallions and mares in the country.

The first set of variables consists of various metrics relating to the freshman sire's on-track performance. *EARNINGS* indicates the freshman sire's career race-

Table 1. Definitions of Variables and Their Expected Signs

Variable	Definition of Variable	Expected Sign
FYFEE	Advertised price of one breeding season to the freshman sire	N/A
EARNINGS	Freshman sire's total career earnings achieved ($)	+
WINPERC	Freshman sire's career wins divided by career starts × 100	+
AVGWD	Average distance of all races won, in furlongs (one furlong = 1/8 mile)	+
*TWOG*1*SW*	Number of Grade 1 stakes races the freshman sire won as a two-year-old	+
KYDERBY	Indicator variable which takes the value of 1 if the freshman sire won the Kentucky Derby	+
*OTHERG*1*SW*	Number of Grade 1 stakes races won in the freshman sire's racing career, excluding two-year-old Grade 1 stakes wins and Kentucky Derby wins	+
UNRACED	Indicator variable which takes the value of 1 if the freshman sire was unraced (never started a race)	−
KY	Indicator variable which takes the value of 1 if the freshman sire stands in Kentucky for his freshman season	+
FIRSTYEAR	Year in which the freshman sire entered the breeding market	+
FIRSTAGE	Age of the freshman sire in the year he entered the breeding market	−
DAMSW	Indicator variable which takes the value of 1 if the freshman sire's dam won at least one stakes race in her career	+
SWSIBS	Number of stakes-winning siblings of the freshman sire	+
SIRESFEE	Stud fee of the freshman sire's sire	+
*SIREG*1*SW*	Indicator variable which takes the value of 1 if the sire of the freshman sire won at least one Grade 1 stakes race	+
NUMSIRES	Number of stallions with the same sire as the freshman sire standing at stud in *FIRSTYEAR*	+

track earnings before being retired to stud.[3] *WINPERC* specifies the freshman sire's career winning percentage, which is calculated by dividing total races won by total races started, and then multiplying by 100. *AVGWD* is the average distance of races won by the freshman sire; it is measured in furlongs, where a furlong is one-eighth of a mile. Industry experts indicate that horses with the ability to successfully race at distances of at least one mile (8 furlongs) are more valuable. The variable *TWOG*1*SW* represents the number of Grade 1 stakes wins the freshman sire accumulated as a two-year-old.[4] The categorical variable *KYDERBY* indicates whether the freshman sire won the Kentucky Derby as a three-year-old;

[3] It is standard practice for Thoroughbred horses, both male and female, to be retired from racing before they begin their breeding careers.

[4] Stakes races represent the upper echelon of races and generally feature higher quality horses and the largest purses. The most prestigious are the Grade 1 stakes races, followed by Grade 2, Grade 3, and then ungraded stakes races.

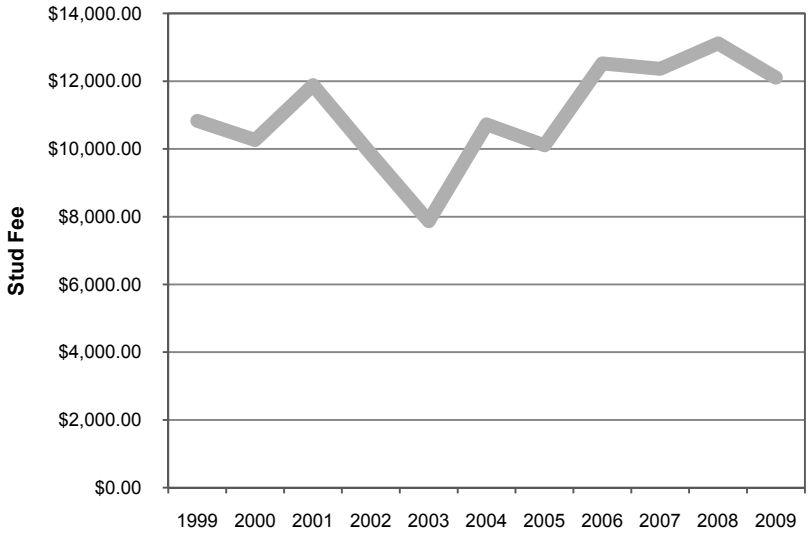

Figure 1. Average freshman sire stud fees, 1999–2009

winning the Kentucky Derby is generally viewed as reaching the pinnacle in the sport. We also include *OTHERG*1*SW*, which specifies the total number of Grade 1 stakes races won by the freshman sire, excluding two-year-old Grade 1 races and the Kentucky Derby. The indicator variable *UNRACED* takes the value of 1 if the freshman sire never started a race.

The next set of variables relates to the quality of the freshman sire's dam and sire. Since racing quality and breeding quality are thought to be heritable to some extent, the success of the freshman sire's parents may also influence his initial value as a sire, and hence the price charged for a breeding season. *DAMSW* is a categorical variable which takes the value of 1 if the freshman sire's dam won a stakes race during her racing career. *SWSIBS* indicates the number of progeny produced by the dam that won at least one stakes race before the freshman sire entered stud.[5]

Variables related to the freshman sire's sire are both performance- and breeding-based. *SIREG*1*SW* is an indicator variable which takes the value of 1 if the freshman sire's sire won at least one Grade 1 stakes race during his racing career. *SIRESFEE* is the advertised stud fee of the freshman sire's sire in *FIRSTYEAR*.[6]

[5] In the Thoroughbred industry, horses are siblings if they share the same dam (but not necessarily the same sire). Horses that share the same sire are not considered siblings because many stallions produce upwards of 100 foals each year.

[6] In the event the fee is not available in this year, perhaps because the freshman sire's sire had since died or moved overseas, we use the most recently available published stud fee. We lost 53 observations because this stud fee was not available for some sires.

Table 2. Summary Statistics of Included Variables

Variable	No. of Observs.	Mean	Std. Dev.	Minimum	Maximum
FYFEE	663	$11,132.73	$16,803.95	$2,000	$200,000
EARNINGS	663	$818,137.10	$1,132,713	0	$10,501,800
WINPERC	663	0.347	0.20	0	1
AVGWD	662	7.21	2.00	0	12.46
TWOG1SW	663	0.08	0.34	0	3
KYDERBY	663	0.01	0.09	0	1
G1SW	663	0.57	1.15	0	9
UNRACED	663	0.03	0.17	0	1
KY	663	0.49	0.50	0	1
FIRSTYEAR	663	—	—	1999	2009
FIRSTAGE	663	5.68	1.32	3	12
DAMSW	661	0.40	0.49	0	1
SWSIBS	663	0.74	1.04	0	9
SIRESFEE	602	$123,971.30	$136,585.50	$2,000	$500,000
SIREG1SW	663	0.58	0.49	0	1
NUMSIRES	652	24.42	32.21	0	128

A higher *SIRESFEE* may suggest proven performance both on the racetrack and in the breeding shed, and possessing these bloodlines may be valuable. Finally, *NUMSIRES* counts the number of stallions standing at stud by the freshman sire's sire in *FIRSTYEAR*. The more prolific the freshman sire's sire has been in producing male breeding stock (being a "sire of sires"), the potentially more likely the freshman sire is to produce quality breeding stock himself.

Summary statistics of the dependent and independent variables are presented in table 2. The average published first-year stud fee (*FYFEE*) for freshman sires in the sample is $11,132.73, with a minimum of $2,000 and a maximum of $200,000 per breeding. Most freshman sires in the data set had successful racing careers, with average earnings per horse (*EARNINGS*) of over $800,000. Since 3% of the stallions in the sample were unraced, they earned nothing; however, maximum earnings top $10,000,000. Very few stallions in the data set won a Grade 1 stakes race as a two-year-old; on average, a freshman sire won only 0.08 stakes races as a two-year-old (*TWOG1SW*).[7] One percent of the sample consists of Kentucky Derby winners (*KYDERBY*), and stallions in the data set won an average of 0.57 Grade 1 stakes races during their entire racing career (*G1SW*). Of the freshman sires in our sample, 49% stood their first season in Kentucky (*KY*). The average age at which a stallion enters the breeding shed (*FIRSTAGE*) is 5.7 years, the minimum is 3 years, and the maximum is 12 years.

[7] One stallion in the data set won three of the possible seven Grade 1 stakes races as a two-year-old.

Forty percent of the freshman sire's dams won a stakes race (*DAMSW*), and each freshman sire had, on average, less than one stakes-winning sibling (*SWSIB*). Sires of freshman sires had, on average, 24 stallions at stud (*NUMSIRES*) in the freshman sire's first year at stud; however, at least one sire had no other stallions at stud, while one especially prolific "sire of sires" had 128 stallions standing at stud in one year.

Given these variables, the model being estimated is written as:

$$\begin{aligned}(2)\qquad \ln(FYFEE_i) = {} & \beta_0 + \beta_1 EARNINGS_i + \beta_2 EARNINGS2_i + \beta_3 WINPERC_i \\ & + \beta_4 AVGWD_i + \beta_5 AVGWD2_i + \beta_6 TWOG1SW_i \\ & + \beta_7 KYDERBY_i + \beta_8 G1SW_i + \beta_9 UNRACED_i + \beta_{10} KY_i \\ & + \beta_{11} FIRSTYEAR_i + \beta_{12} FIRSTAGE_i + \beta_{13} DAMSW_i \\ & + \beta_{14} SWSIBS_i + \beta_{15} SIREG1SW_i + \beta_{16} \ln(SIRESFEE_i) \\ & + \beta_{17} NUMSIRES_i + \varepsilon_i .\end{aligned}$$

In equation (2), the natural log of *FYFEE* is regressed on the set of own-performance variables, individual characteristics, dam quality variables, and sire quality variables. S*IRESFEE* is transformed using the natural log function, and variable names followed by a "2" indicate squared terms. The results from this model are presented in the next section.

Results

When the quality of offspring that will be produced is unknown, the results from the regression model in equation (2) indicate that nearly all attributes with the potential for possessing information regarding expected quality are valued by the market. The regressors explain over 76% of the variation in ln(*FYFEE*). Remaining variation can be attributed to characteristics not observable to the econometrician, such as the freshman sire's physical conformation, as well as how the freshman sire's pedigree complements a mare's pedigree (called "nicking"). Results from the model are presented in table 3.

First, consider the influence of the freshman sire's career racetrack performance on the first-year stud fee. While own performance is insignificant for established sires, it is highly significant for freshman sires.[8] More specifically, career earnings appear to have a quadratic relationship with first-year stud fee; both *EARNINGS* and *EARNINGS*2 are significant at the 1% level. Our model predicts stud fee is maximized when earnings equal $5,168,603. This result may occur for two reasons.

[8] While contradicting the results from Stowe and Brown (2009), this outcome is reasonable. Stud fees for established sires are based only on the quality of progeny they produce, because once a sire is established, his own racing record is inconsequential. What matters is the quality of horses he produces. However, progeny quality for freshman sires is unknown, and hence stud fees cannot be based on those attributes. Instead, stud fees depend in part on the quality of freshman sires as racehorses in their own right, since racing performance is at least partially heritable.

Table 3. Regression Model Results [dependent variable = ln(*FYFEE*)]

Independent Variable	Coefficient Estimate	Standard Error	Marginal Value ($)
Intercept	−24.4819	11.4714	
EARNINGS[a]	0.0523***	0.0046	487.50
EARNINGS2[a]	−0.0005***	0.0001	
WINPERC	0.0060***	0.0012	66.89
AVGWD	0.0424	0.0381	−431.11
AVGWD2	−0.0053*	0.0032	
TWOG1SW	0.3490***	0.0557	3,890.48
KYDERBY	0.7933***	0.1883	8,843.31
OTHERG1SW	0.2036***	0.0265	2,269.63
UNRACED	−0.1884	0.1614	−2,100.19
KY	0.5455***	0.0416	6,080.96
FIRSTAGE	−0.0804***	0.0163	−896.26
FIRSTYEAR	0.0157***	0.0057	175.02
DAMSW	0.0687*	0.0387	765.80
SWSIBS	0.0270	0.0178	300.98
ln(*SIRESFEE*)	0.1281***	0.0189	14.28
SIREG1SW	−0.0095	0.0393	−105.90
NUMSIRES	0.0004	0.0008	4.46

No. of Observations (N) = 600
R^2 = 0.7714
Adjusted R^2 = 0.7647
$F(19, 580) = 115.53$ ($p < 0.000$)

Note: Single, double, and triple asterisks (*,**,***) denote statistical significance at the 10%, 5%, and 1% levels, respectively.

[a] Parameter estimates and marginal values reflect rescaling of total earnings by 10^{-5}.

First, some of the most valuable stallion prospects are those that have extremely successful three-year-old racing performances, such as winning the Kentucky Derby. At this point, breeding value outweighs their potential earnings on the racetrack, so they are retired to the breeding shed before career earnings have an opportunity to reach their maximum. Second, career earnings may be high because stallions whose breeding value is lower than potential track earnings continue to run. Hence, they have higher career earnings but lower first-year stud fees when they do retire to the breeding shed. Based on the coefficient estimates, the marginal value of each additional dollar of career earnings on stud fee is roughly one cent; interpreted differently, each additional $100,000 in career earnings has a marginal value of $487.50 on first-year stud fee.

Other racetrack performance variables are highly significant as well. The marginal value of *WINPERC* is $66.89. For example, if a stallion's winning percentage

goes from 20% to 21%, the incremental increase in average first-year stud fee is almost $67. More meaningfully, suppose a horse runs 10 races in its lifetime. Winning one additional race will increase his winning percentage by 10 percentage points (say, from 10% to 20%), and it would be worth an additional $668.90 on the first-year stud fee. Given the value of winning more races, trainers choose carefully where their horses run. The marginal value of winning a two-year-old Grade 1 stakes race is $3,890.48.[9] Winning the Kentucky Derby is valuable; the marginal value of a Kentucky Derby win on a freshman sire's stud fee is $8,843.31. The marginal value of any other Grade 1 stakes race win is $2,269.63. *AVGWD* is not significant anywhere near conventional levels, and interestingly, being unraced is not significant either.[10]

Next, consider a freshman sire's individual characteristics. Standing a freshman season in Kentucky is quite valuable; the marginal value is $6,080.96. As expected, the longer a stallion waits to enter the breeding shed, the less value the market places on him; each additional year results in a marginal value on first-year stud fee of −$896.26. However, this trend may not continue in the near future as declining yearling sales prices and lower stud fees may tip the scales in favor of racing a year or two longer.

The belief that racing quality and breeding quality are heritable and therefore valuable is minimally supported. The number of stakes-winning siblings produced by the freshman sire's dam is not significant, and whether the dam has won a stakes race or not is significant at the 10% level. The marginal value of *DAMSW* is $765.80. The racing performance of the freshman sire's sire, as measured by number of Grade 1 stakes wins, is not significant. However, the stud fee of the freshman sire's sire is significant at the 1% level. The stud fee of the freshman sire's sire is a signal of his ability to produce high quality racehorses and high quality breeding stock, and the higher *SIRESFEE* is, the greater the expected value of the freshman sire in the breeding shed. For every additional $100 in *SIRESFEE*, the marginal value on *FYFEE* is $14.28. It is mildly surprising that the measure of how prolific a freshman sire's sire is in terms of being a "sire of sires" (*NUMSIRES*) is insignificant. It may be the case that this information is already contained in the *SIRESFEE* variable; i.e., a sire that tends to produce more breeding stallions stands for a higher stud fee himself.

The variable *FIRSTYEAR* is significant at the 1% level. While the coefficient estimate suggests an overall upward trend in freshman sire stud fees over time, the marginal value is small ($175.02). This is not surprising given the variations in average first-year stud fees as illustrated in figure 1. In addition, it is expected that this trend will not persist, at least not in the next few years as the Thoroughbred industry recovers from a significant "market correction" exacerbated by the economic recession of 2008 and 2009.

[9] This result provides further evidence that the industry values "precocious," or fast, two-year-olds, regardless of the long-term effects of racing fast at such a young age. Chezum and Wimmer (2009) show that two-year-olds with faster training times sell for significantly higher prices at two-year-old-in-training sales.

[10] This may be due to the fact that some stallions never race because of an unexpected injury.

Summary and Conclusions

When the quality of a product is unknown, the attributes which may help predict quality are valuable in determining prices. More specifically, in the context of first-year Thoroughbred stallions, called freshman sires, racing quality and, to some extent, breeding quality are somewhat heritable, and thus the market places value on the quantity and quality of these attributes.

In this study, we find that measures of a freshman sire's own racing career are significant. This result stands in contrast to Stowe and Brown (2009), who report that own racing performance is insignificant in predicting the stud fees of established sires. In the case of established sires, their ability to produce quality offspring is known, and rationally, stud fees depend on attributes related to progeny quality. Since no such information exists for freshman sires, stud fees are determined by attributes which may predict offspring quality.

In our study, winning the Kentucky Derby is the most valuable attribute for a freshman sire's stud fee, even though Kentucky Derby winners have been failures at stud in recent years. However, since only one horse can win the Kentucky Derby each year, winning other Grade 1 stakes races is valuable as well. In addition, the location of the freshman sire is important; more specifically, a freshman sire that stands in the state of Kentucky on average receives a higher price for a breeding season. Finally, the prominence of the freshman sire's sire, as measured by his stud fee, is influential in determining the freshman sire's initial advertised stud fee.

The marginal values estimated are useful to stallion owners and managers because they prescribe a course of training and racing which can maximize the future expected breeding value of a stallion prospect. For instance, owners/managers with stallion prospects would prefer to prepare the horse to win a Grade 1 stakes races. Moreover, choosing races and to some extent competition can maximize the stallion's winning percentage, and this pays off in the breeding shed as well. The marginal values may also be useful to individuals contemplating the purchase of a young stallion as an investment—i.e., these potential purchasers may be prompted to consider stallions with a greater likelihood of winning the more prestigious stakes races and descending from prominent sire lines.

In addition, the estimated marginal values are economically significant. For example, the marginal value of winning the Kentucky Derby is over $8,800.00. Assuming conservatively that the freshman sire covers 100 mares in his first season, this amounts to an additional $800,000 in revenue for the stallion owner/manager. If the stud fee remains constant over the first five years of his breeding career, this amounts to an additional $4 million in revenue. Consequently, stallion owners (or potential stallion owners) should find this information beneficial.

Historically, the Thoroughbred business has been an industry in which decisions have been made by instinct and experience. Compared to other industries, there is minimal statistical evidence supporting decisions that are made for the substantial amounts of money involved. This hedonic price analysis is conducted with the intent of informing owners and breeders about the decisions that are made on a daily basis and the impact they have.

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