On the causality and cause of returns to organizational status: Evidence from the *grands crus classés* of the Médoc

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On the causality and cause of returns to organizational status: evidence from the grands crus classés of the Médoc

This paper addresses the recent debate about the causality of status effects and identifies the symbolic effect of status on the prices organizations charge for their products. I exploit the grand cru classification of the chateaux of the Médoc, created in 1855, as a fixed hierarchical symbol of class status. The classification cannot be reversely affected by the quality chateaux produce or the prices they charge, which greatly facilitates the estimation of the causal effect. To discern whether status serves as a signal of quality under uncertainty or satisfies the motive of conspicuous consumption, I study a period of time during which the uncertainty about quality has arguably declined. An instrumental variable and a matching estimator identify a symbolic effect of status on prices. The effect increases in a time of decreasing uncertainty, which supports the motive of conspicuous consumption as a driver of the effect. However, the results caution that we might commonly overestimate the symbolic value of status if we underestimate the disproportional value markets place on the pinnacle of quality, the enduring nature of reputation, and the effect of endogenous quality choices on status effect estimates.
Stressing a causal theoretical link, the extant status literature has extensively documented associations between organizational status and desirable organizational outcomes (e.g., Podolny, 1993; Benjamin and Podolny, 1999; Bothner et al., 2011). Recent empirical work on the individual level, however, calls into question that the observed associations between status and outcomes reflect a causal effect of status on outcomes. Matching articles written by scientists appointed as Howard Hughes Medical Investigators to articles of equally likely candidates that were not appointed, Azoulay, Stuart, and Wang (2013) show that the symbolic effect of the appointment on citations to these articles is much smaller and more short-lived than commonly used estimators suggest. Their findings question the causality claims in the organizational status literature, which has yet to establish causality with the same rigor, and whether cumulative advantage can accrue to organizations purely based on the symbolic value of status (Merton, 1968). A failure to establish causality, however, would not only imply that the observed effects of status may be little more than reflections of superior quality. It would also imply that the assertions about what drives status effects would be dubious if the effects were not causal to begin with.

Responding to these challenges, I seek to identify the symbolic value of status for organizations. Aligned with recent discussions in the literature (Azoulay et al., 2013; Simcoe and Waguespack, 2011), I highlight two problem areas that impede the identification of causal effects. First, it is possible to estimate positive, albeit spurious, status effects even in the presence of a perfect correlation between status and quality or reputation. Second, if status is embedded in a web of reversely causal relationships with quality and organizational outcomes, then the standard estimators relied upon in the extant organizational literature will generally not produce consistent estimates of the causal effects. The discussion will suggest that we are prone to overestimate status effects and that markets in which status is commonly believed to matter the most appear particularly susceptible to this bias. Finally, I juxtapose the prevalent view of organizational status as a signal of quality under uncertainty (Podolny, 2005) and the
motive of conspicuous consumption (Veblen, 1899) to assess their theoretical consistency with returns to status that are independent of quality.

To identify the causal effect of status on the prices organizations charge for their products, I analyze whether the grand cru classification of chateaux of the Médoc (cf. Markham, 1998), which sorted 61 producers into five grands crus classés in 1855, exerts an influence on wine prices today. Created by powerful actors, this hierarchical symbol of class status has defied attempts at revision for more than 150 years. The classification cannot be reversely affected by the quality that the chateaux produce or the prices they charge. This eliminates two typical sources of endogeneity, which simplifies the task to estimate the causal effect of status. Wine ratings from blind tastings allow controlling for quality on the product level, constructing a measure of reputation from past demonstrations of quality, and varying the assumption about the market’s memory for quality. An exploratory analysis allows making appropriate assumptions about the functional form of the effects of quality and reputation on prices. Causality is established with an instrumental variable and a matching estimator. To investigate whether the uncertainty about quality or the motive of conspicuous consumption drives the status returns in this market, I study a time period during which the uncertainty about quality has arguably declined due to the proliferation of the Internet.

**The Causality of Status Effects**

The central concern of status scholars is that status orders create a reward structure that prefers those who already occupy high-status positions (e.g., Merton, 1968). The phenomenon, also known as the Matthew effect, comprises a purely symbolic effect of status independent of quality as well as a substantive effect of status on subsequent quality and an effect of that quality on status acquisition even further down the road. Recent theoretical arguments criticize the organizational status literature’s narrow view of status as a signal of quality under
uncertainty (Podolny, 1993), because it neglects the symbolic effect of status and risks confounding status with reputation for quality (Jensen et al., 2011; Washington and Zajac, 2005). Moreover, empirical evidence is accruing that the standard estimators used in the status literature do not produce consistent estimates of status effects (cf. Azoulay et al., 2013; Simcoe and Waguespack, 2011). Understanding the difficulties associated with isolating causal status effects requires definitions of the competing constructs of quality and reputation as well as models for the mechanism by which status is acquired and the mechanisms by which status effectuates advantages. I will define these constructs and outline these processes along the way.

**Mistaking quality and reputation effects for status**

The process of status acquisition is viewed as one in which producers first choose a level of *quality*, where quality is defined as the attributes that determine the performance of a product or service. Through the production of a certain level of quality over time a producer acquires a *reputation* for quality. This reputation may serve prospective buyers to form an expectation about the current level of quality of the firm’s products or services (Shapiro, 1983; Rao, 1994). Reputations should thus be relevant if prospective buyers believe it to predict current quality in markets in which current quality is imperfectly observable (Shapiro, 1982).

As a byproduct of their past or present demonstrations of quality, organizations may obtain tokens of *status* such as awards or prizes, formal recognition or ranks, and connections or network positions. A wine, for example, may win gold medals in tasting competitions (Markham, 1998), be served at dinners of kings or presidents (Cocks and Feret, 1883), or become central and prestigious among peer wineries of its provenance (Benjamin and Podolny, 1999). This view of the process of status acquisition implies that status will generally be correlated with quality or reputation at some point in a producer’s history (cf. Azoulay et al., 2013; Ertug and Castellucci, 2013; Lynn et al., 2009). Separating the symbolic value of status from quality and the signaling value of reputation thus requires comprehensive controls
that render status the symbolic residual once quality and reputation are accounted for.

Controlling comprehensively for quality and reputation is challenging, however, because the available controls are often less than perfect. The more complex products, services, or organizations are, and the more difficult it is to measure their characteristics, the more challenging it becomes to control for quality and reputation. Because of that, status studies in settings like investment banks, universities, or professional service firms likely face an elevated risk of ascribing effects to status that are attributable to quality or reputation.

Specifically, if status is acquired as a byproduct of quality or reputation, it remains indistinguishable from them as long as the status order simply reproduces the order that exists in quality or reputation (cf. Podolny, 1993). This is true even if the status order represents differences in quality or reputation in an amplified way. The reason is that amplification without distortion preserves a rank correlation of one between status and quality or reputation. For status effects to be discernible from quality or reputation effects then, a status order must be a distorted representation of the quality and reputation orders.¹

Nonetheless, it is possible to estimate significant, albeit spurious, status effects even if status is only an amplified representation of quality or reputation. Tokens of status frequently accrue cumulatively or disproportionally. Analogously speaking, the best athlete wins the most gold medals and becomes the star even if the performance difference to the second-best athlete is consistently small. Status may thus frequently be a nonlinear function of quality or reputation. The risk associated with this nonlinear relationship is that, instead of having an effect of its own, status might pick up a nonlinear appreciation for quality or reputation. This could happen if an empirical strategy constrains quality and reputation effects to be linear—an assumption that is common to virtually all organizational status literature.

The risk to mistake nonlinear quality or reputation effects for status effects would seem to be

¹Lynn et al. (2009) study the micro-processes that govern amplification and distortion in social settings. They term status hierarchies that reflect quality differences in an amplified versus distorted way “weakly” and “strongly socially constructed,” respectively.
the greatest in markets in which status is commonly believed to matter the most: superstar markets in which disproportional value is placed on the pinnacle of quality. We are very well familiar with such highly asymmetric reward distributions among wines, movies, professional services, and universities, for example (e.g., Frank and Cook, 1995). But in such markets differences in outcomes might better be explained by the Ricardian rents to differences in underlying qualities that are not fully substitutable and in limited supply than by status. This suggests that we need to allow for increasing marginal effects of quality and reputation in order to be able to attribute returns to status.

Furthermore, if quality varies heterogeneously across producers over time, we may perceive a status hierarchy to be a distorted representation of the reputation hierarchy even when it is not. The *grands crus classés* of the Médoc, for example, underwent periods of weakness in their history, at which point the quality of their products neither matched their historic reputation for quality nor their supposed status. The consequence of such quality fluctuations, however, is that status may capture a producer’s quality in the distant past or his long-term average quality better than his quality in the recent past does. If the market has reason to value quality demonstrations in the distant past or a producer’s long-term average quality, then we might erroneously attribute effects to status if reputation is defined on an inappropriately short lag.

The three- to five-year lag on which extant studies have commonly defined controls for past performance might thus be insufficient to capture producers’ reputations for quality. Schmalbeck (1998), for example, provides evidence that the reputations of law schools are virtually stable over at least 25 years. We should generally expect reputations for quality to be durable when quality perceptions update slowly. This includes markets in which i.) the signal-to-noise ratio in quality signals is naturally high (e.g., law firms, movie production, baseball franchises), ii.) product generations revolve slowly or used products are traded in large volumes (e.g., cars), iii.) products are durable, or they mature or improve with age (e.g.,

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2 A superstar or winner-take-all market is a special form of a market with increasing marginal returns to quality, in which the superstar can serve large portions of the market due to low marginal costs (Rosen, 1981).
wine), or iv.) the consequences of consuming a product or service materialize slowly (e.g., university education). This suggests that we are at risk of mistaking markets in which reputations for quality are enduring for markets in which status matters; and some of the markets in which we believe status to matter the most again seem particularly susceptible to this bias.

Cumulative advantage and reverse causality

Empirically, the issues identified in the previous section all constitute cases of omitted variable bias. However, the identification of causal status effects is not only at risk because of missing variable bias, but also because of reverse causality in the relationships between status, quality, and organizational outcomes. As Benjamin and Podolny (1999: p. 585) noted in their analysis of the Californian wine industry: “There is undoubtedly a reciprocal relationship between the level of quality that a firm achieves and the structural position that a firm obtains.” Yet, the standard estimators that have commonly been employed in the literature generally do not produce consistent estimates of the causal effects in the presence of such reversely causal relationships.

Some of the complexities arise from the two mechanisms that are suspected to effectuate cumulative advantage (Merton, 1968). First, status may affect the quality level at which producers operate. On the one hand, status may enable producers to produce at a higher level of quality (Merton, 1968). Firms may be so enabled because status attracts greater funding or more capable or hardworking partners (Castellucci and Ertug, 2010; Stuart et al., 1999), for example. On the other hand, status might also constrain a producer to maintain a high level of quality lest he risk losing status (cf. Podolny, 2005: p. 12–14). A producer’s audiences might penalize a low-quality product not only for being inconsistent with the firm’s reputation but also its status claim. A self-reinforcing cycle of status and quality that escalates the quality differences among producers could result (Benjamin and Podolny, 1999). But if status affects
the level or the trajectory of quality that producers pursue, then a producer’s reputation for quality in the past will be a biased predictor of the producer’s quality in the present. Controls for producers’ reputations may thus be insufficient to account for systematic differences in producers’ current quality levels that are driven by status (Podolny, 2005: p. 18), which would result in an overestimation of the symbolic effect of status (Azoulay et al., 2013).³

Second, the causal effect of status on organizational performance that we hope to identify may commonly be confounded with the reversely causal effect of organizational performance on status. Certain organizational outcomes such as price or survival seem particularly apt to drive status. That higher prices imply status is the precise idea of the Veblen good (Veblen, 1899; Leibenstein, 1950). But here the price defines the status of the good rather than that status affects the price. And while status might affect organizational survival (Bothner et al., 2011), survivor organizations with a long history or heritage also had more time and, thus, better chances to accumulate tokens of class status. Rather than status driving organizational outcomes, outcomes drive organizational status in a dynamic feedback loop that can render status an artifactual correlate of performance (cf. Azoulay et al., 2013).

Finally, a producer will only choose the level of quality for which he expects to be able to recoup his investments or be rewarded by the market otherwise, implying an effect of (expected) performance on quality (cf. Benjamin and Podolny, 1999). This means, however, that a producer’s reputation—defined as his demonstrations of quality in the past—is composed of a series of choices in the past that are endogenous to current performance. This endogeneity problem should be more pronounced in markets with greater uncertainty, because it is precisely in these markets that producers make investments into quality today to be rewarded for their reputations tomorrow. Neither current nor past quality choices can thus be treated as exogenous.⁴ While the endogenous relationships between quality or reputation and

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³This problem will likely be more pronounced if a status shock happened recently, if status is itself time-variant, or if quality differences have no natural limit. In these cases, the effect of status on quality is not sufficiently incorporated in a producer’s reputation yet, has not fully unfolded yet, or might never cease to unfold.

⁴Econometrically, this means that in the presence of autocorrelation lagged variables cannot be considered
performance do not directly involve status, standard estimators may propagate the bias in their estimates to the estimates of correlated variables such as status in ways that are difficult to anticipate without knowing the correlation structure of the data.

**Causes of status effects**

In the original view of organizational status (Podolny, 1993), a focal actor interprets the status of his exchange partners as a signal of their quality. He infers the quality of an organization or its products and services from the status position the organization occupies. As status only unfolds its effect on returns indirectly through its effect on perceived quality, audiences would not (have to) rely on status to infer quality if quality were perfectly observable. Hence, for status to be valuable, this view has to assume that there is residual uncertainty about quality or show empirically that status returns increase in uncertainty. There is, in fact, strong empirical evidence for this view. Status generates greater returns when the uncertainty about producer or product quality is high (Azoulay, Stuart, and Wang, 2013; Simcoe and Waguespack, 2011; Stuart, Hoang, and Hybels, 1999; Stuart, 2000).

In the alternative view, status is a positional good (Hirsch, 1977). Because high status is scarce by definition—there can only be few at the top of any given status hierarchy (Podolny, 2005)—status can serve as a differentiator. The “pure social scarcity” (Hirsch, 1977: p. 21) of the status symbol itself, independent of its substance, enables social actors to assert their social precedence over their peers through the conspicuous “consumption” of high-status goods or affiliations (Bourdieu, 1984; Rae, 1834; Veblen, 1899).

The conspicuous consumption perspective differs from the signaling perspective in two ways. First, conspicuous consumption requires an audience in front of which the focal actor consumes. The reason for consuming high-status goods shifts from what the focal actor believes about the quality of the products or affiliations he “consumes” to what the focal actor exogenous (Fair, 1970).
believes about the attributions his audience(s) will make upon observing his consumption of the good (Correll et al., 2012). A focal actor’s uncertainty about the quality of a producer or product, which is central to the signaling perspective, is thus not a necessary condition for returns to status under the conspicuous consumption perspective. Instead, a social actor’s belief that his audience(s) will reward him for the conspicuous display of goods or affiliations is sufficient to generate returns to status even if he knows that substantively they are no better than their lower-status alternatives.

Second, the two views also differ in their implications for the relationship between status and quality and the persistence of status returns over time. When status is defined as perceived quality under uncertainty (Podolny, 1993), status effects can only persist if a high level of uncertainty about quality is sustained. This is likely only if uncertainty is fundamentally irresolvable (as in the case of credence goods) or if a high level of uncertainty is sustained against quality’s general tendency to reveal itself in consumption (goods) or interaction (affiliations). In addition, the flow of information among the audience would probably have to be inhibited across space and time, as otherwise uncertainty would likely be reduced through word of mouth or triangulation. The persistence of the level of uncertainty about quality that is needed to maintain status effects under the signaling perspective thus appears questionable for a fairly wide variety of contexts.

If quality reveals itself through consumption or interaction, uncertainty will decline over time. This would reveal whether status is a biased signal of quality. If status were a biased signal of quality, we would have to anticipate that the quality expectations associated with status adjust to the point where they are unbiased again. This would have two broad implications for status returns under the signaling perspective. First, if status and quality were uncorrelated over extended periods of time, status could have no value in the long run. The lack of correlation would be revealed as such and if a realignment of quality with status were not to occur, status returns should be short-lived. Consistent with this argument, Azoulay et al. (2013) show that
the effect of a status shock on academic citations is short-lived if the shock is uninformative about the underlying quality of the academics and their work. Second, because status would generally (have to) be an unbiased predictor of quality, status could not have an independent effect if quality is observable. Consistent with this argument, Benjamin and Podolny (1999) find that the effect of status depends on the level of quality among Californian wines, with inconsistent findings for the direct effect across two status measures.

Symbolic returns to status, by contrast, are theoretically independent of quality and should be able to self-perpetuate indefinitely. However, status returns that at face value satisfy the motive of conspicuous consumption could still be consistent with the intrinsic gratification derived from possessing a rare status good or affiliation. It would not necessarily satisfy the motive of conspicuous consumption as the “demonstration of wealth through the throwing away of money on more expensive goods that provide no greater utility but cost significantly more,” (Benjamin and Podolny, 1999: p. 587, emphasis added). While recent evidence in the economics and marketing literatures supports that displaying status is a motive of consumption (Berger and Ward, 2010; Han et al., 2010; Heffetz, 2011), we lack convincing causal evidence that consumers are willing to pay a premium for high-status products that perform no better or even worse than their lower-status competitors. Even though Benjamin and Podolny’s (1999) study is frequently cited for the effect of status on prices, they noted: “while we do not deny that conspicuous consumption may be an important motive underlying the purchase of wine, such a view alone does not lend itself to the hypotheses we tested in this paper.” “We simply assert that the existence of the status ordering constrains how firms can develop reputations for quality,” [p. 587 and 585].

Whether status effects, if they exist, are driven by the signaling or the symbolic value of status is ultimately an empirical question, the answer to which will be context-dependent. However,

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5Similarly, while Roberts et al. (2011) estimated symbolic effects of employee mobility on wine prices, their modeling does not focus on the status of the firm itself, and in light of the previous discussion contains weak controls for quality and reputation.
the signaling perspective offers clear advice how to discern these perspectives. If status serves as a signal of quality under uncertainty, returns to status should decline as the uncertainty about producer and product quality declines. Increasing status returns in the presence of decreasing uncertainty are inconsistent with the signaling perspective and would point toward symbolic status returns from conspicuous consumption. I proceed to testing these questions about the causality and cause of status returns among the grand cru classified chateaux of the Médoc.

**The classification of the châteaux of the Médoc of 1855**

The grand cru classification of 1855 was commissioned by the Chamber of Commerce of Bordeaux and created by the Union of Brokers in order to be temporally displayed on a map at the Imperial Universal Exposition in Paris. The classification sorted the presumably 61 greatest producers of Bordeaux wine at the time into five grands crus classés. The Union of Brokers furnished the classification of the chateaux of the Médoc based on historic prices. Value-based classifications had long been a tradition in the trade of Bordeaux wine and were preferred over classifications based on quality judgments because the latter were seen to be subject to error in judgment. Importantly, the classification conferred grand cru status directly upon the producer, and not upon the terroir, thereby creating a persistent link between a chateau’s identity and its class status. Because the fascinating history of the classification is less important for the purposes of this paper than the mere fact of its existence, I refer the interested reader to Markham’s (1998) excellent history of the classification as well as to Cocks’s (1846) and Cocks and Feret’s (1883) pre- and post-classification standard works *Bordeaux: Its Wines, and the Claret Country* and *Bordeaux and Its Wines*.

Multiple features make the grand cru classification of Bordeaux an unusually favorable setting to study status effects. First, the classification is a hierarchical signal of class status, reflecting

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6This feature distinguishes the classification(s) of Bordeaux from the classification(s) of Burgundy, where class is based upon terroir, i.e., location.
not only quality and price, but also the endorsement by elite actors: “the wines of the Médoc are placed on the tables of Kings and Great of the earth to receive the honour due to their varied merits,” (Cocks and Feret, 1883: 96–97). Second, the classification stands as one of the few examples of a normative and impenetrable status hierarchy. It was factually inscribed in law in 1949, when the conditions for the use of the term cru classé were set in stone (Markham, 1998: 177). Chateaux cannot be added to or drop out of the classification (see exceptions below), nor can the quality a chateau produces or the price it charges affect its rank in the classification. Third, sixty of the sixty-one chateaux of the original classification are still in operation. The fact that there is so little attrition implies that there is effectively no selection effect that could affect the analyses. Fourth, sixty of the sixty-one classified chateaux are located in the AOC Haut-Médoc or one of its sub-appellations. The AOC Haut-Médoc is a fairly small area on the left bank of the Gironde estuary. It contains approximately 392 producers on 18 square miles (the area of the AVA Napa Valley is about four times larger).

Fifth, even though the wines can be a blend of up to six grape varietals that are permissible by law, Cabernet Sauvignon generally dominates the wines. Sixth, the chateaux generally sell the wines as futures (also known as en primeur) in the year after the harvest and 12 to 18 months before the wine is bottled. The wines are sold to brokers, who then further distribute the wines, largely implying channel and sales cost homogeneity across chateaux. Seventh, without having tasted newly released wines, buyers have to rely on expert evaluations of the wines when making their purchase decisions. Rating agencies like Robert Parker’s Wine Advocate and the Wine Spectator provide such ratings from blind tastings. Hence, they are presumably unbiased. This implies that with respect to composition, terroir, climatic

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7 An appellation guarantees the origin of the grapes and the grape varietals in the wine. The sub-appellations of the Haut-Médoc are Margaux, St.-Julien, Pauillac, and St.-Estephe.

8 The only other grape varietal that is used in a proportion that rivals or exceeds Cabernet Sauvignon for rare vintages and few chateaux is Merlot.

9 Robert Parker’s Wine Advocate and the Wine Spectator are the most influential publications of the trade. Both use a 100-point scale for their ratings with virtually identical categorical cutoffs. The overwhelming majority of the wines in this study, is rated between 80 and 100 points, which puts them in the Wine Spectators’ good (80-84), very good (85-89), excellent (90-94), and classic (95-100) categories. Parker’s cutoff for the highest category is 96 points.
conditions, market mechanism, and institutional environment, the *grand cru* classified chateaux of the Médoc constitute a coherent set of producers with a fixed status hierarchy for which alternative explanations are unlikely to drive the effects shown hereafter.

Since 1855 there have only been three cases of mobility—one into the classification, one out of the classification, and one within the classification—that are worth noting. Chateau Cantemerle was added to the classification in late 1855 or early 1856, but is regarded an original member of the classification today. Its owner, the widow Villeneuve-Durfort, appealed directly to the Union of Brokers, not the Chamber of Commerce, and was able to prove that her chateau had been unjustly omitted from the list (Markham, 1998: p. 158–161). The Chamber of Commerce or the Union of Brokers declined all other appeals at the time. Chateau Dubignon, a third growth, ceased to exist. Its vineyards had first been absorbed into another classified growth, then spun out again (causing declassification), and later re-absorbed into multiple classified growths (Coates, 1995: p. 36). Finally, after decades of first-class quality and price, and lobbying by its owner, Baron Phillipe de Rothschild, Chateau Mouton-Rothschild was elevated to first-growth status under opaque circumstances by then Secretary of Agriculture, the later President of France, Jacques Chirac, in 1973 (Lewin, 2009: 236–241). While the need to update the classification was pointed out soon after it was created (e.g., Cocks and Feret, 1883: p. 95), all such attempts were actively or passively barred by powerful actors, in particular the Chamber of Commerce of Bordeaux (Lewin, 2009: 235–236, Markham, 1998: 170–181).

There is a theoretical mechanism in place by which a revision of the classification could be undertaken today. However, it is unlikely that this will ever occur. An official revision would require the approval of all producers within a class (Markham, 1998: 204). Thus, producers at risk of losing their current *grand cru classé* status would have no incentive to vote in favor of a revision if class status indeed conferred benefits or were anticipated to do so in the future. As a proprietor of a classified chateau confirmed in personal conversation, a change in the classification can be deemed an impossible event today: “It is what it is; it is not going to
change.” Given the impermeability of the classification, it is implausible to assume that producers choose their level of quality or set their price hoping that this would elevate their status in the classification.

Data

The data source is the Wine Spectator’s online database. I initially downloaded the ratings and tasting notes for all red Bordeaux wines of the vintages 1980 through 2010. I then restricted the data to the wines of the 61 classified chateaux for the vintages 1991 to 2008. This is the period for which the Wine Spectator records hold fairly complete data for both the ratings and the release prices of these wines, and for which data from the 1980s allows constructing the chateaux’ reputations for quality. I use Wine Spectator data over data from www.erobertparker.com because the data from the Wine Spectator are more comprehensive.10 Of the 61 classified growths, I exclude Chateau Haut-Brion from the analyses. Haut-Brion is a special case, because it is the only chateau in the classification of 1855 located in Graves (specifically, Pessac-Leognan), an area outside of and not contiguous with the Médoc that created its own classification in 1959. Haut-Brion was included in the classification because of the exceptional reputation and price that it had had for more than 200 years at the time the classification was created in 1855.11 However, the records suggest that Haut-Brion’s inclusion was selective because at least one other chateau in the same area would have warranted to be classified by the standards of the classification.12 Haut-Brion thus stands as an exception in the classification of the great Médoc wines. Its inclusion does not substantially affect the results.

10 Analyses using data from www.erobertparker.com produce very similar results.
11 Haut-Brion may well have been the first cult wine. The English philosopher John Locke, who visited Haut-Brion (Pontac), remarked in 1677 that prices had dramatically increased “thanks to the rich English who sent orders that it was to be got for them at any price,” (as quoted in Lichine, 1967: 288–289).
12 In 1745, Chateau La Mission Haut-Brion (the neighbor across the street of Chateau Haut-Brion) fetched a price that would have warranted a classification as a second grand cru classé (Markham, 1998: p. 215), and Cocks (1846: p. 167) and Cocks and Feret (1883: p. 240) document that La Mission was held in high regard before and after the classification was created.
The remaining 60 chateaux produced 1080 vintage wines over the 18 years of study. I observe ratings and tasting notes for 955 of these 1080 wines. For 858 of them the records contain information about the release prices of the wines. Thus, complete information is observed for about 80 percent of the wines. The comparative completeness of the sample alleviates concerns about selection effects. Using only the observations for which instruments are feasible based on lagged variables reduces the sample to 836 observations. From this sample I derive the variables for my analyses.

The dependent variable is the \textit{GDP-deflated, logged per-bottle price} of a wine at the time the wine was released. \textit{Quality} is measured by a wine’s rating as published in the \textit{Wine Spectator}. \textit{Reputation} is measured as the mean of the quality ratings over the years $t - 1$ to $t - 5$ or otherwise specified lags. I subtract from both variables the observed minimum of 70 points, which renders the intercept informative. \textit{Status} is measured by a chateau’s \textit{grand cru classé}, operationalized by a set of dummy variables (baseline: first \textit{grand cru classé}).

There had been many classifications before 1855 (Markham, 1998: p. 211–305), showing that a producer’s class was tied into a feedback loop with quality and price up until 1855. In essence then, the classification of 1855 is the 135+ year lag of an endogenous variable. Lagged endogenous variables can be treated as exogenous only if there is no autocorrelation of the error terms, as endogeneity between contemporaneous variables gets carried over to endogeneity between lagged and current variables otherwise (Fair, 1970). For the feedback loop between status, quality, and price (cf. Merton, 1968; Benjamin and Podolny, 1999), the absence of autocorrelation may generally be an unrealistic assumption. However, the fixed nature and old age of the classification remedy this issue. Even if the error terms were correlated at $\rho = 0.97$, the risk of carrying forward endogeneity from 1855 to the period of study would be negligible, as the residual autocorrelation would be 0.0164 at the beginning of the period of study. Hence, the classification created in 1855 stands as an unambiguous symbol of class status that can be treated as exogenous today due to the passage of time.
Results

The association of status and quality

Before proceeding to the main part of the analyses, I briefly provide descriptives for the association between status and quality. To the extent that high-status chateaux own superior land, operate with superior technology, or are otherwise enabled or constrained in the level of quality they produce, chateaux in higher *grands crus classés* should produce at higher levels of quality, on average. Table 1 provides comparisons for the estimated differences in average quality between pairs of *grands crus classés*.

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Insert table 1 here
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Table 1 confirms that chateaux in higher *grands crus classés* produce higher quality, on average. For example, chateaux in the first class produce wines that are rated 3.35 points higher than wines from the second class and 5.90 points higher than wines from the fifth class, on average. These differences are highly statistically significant. By contrast, the fourth class produces wines that are rated only 0.31 points higher than wines from the fifth class. This is the only statistically insignificant difference. Generally, the quality differences are large at the top and become smaller toward the bottom of the classification, implying nonlinearity. The fact that quality differences to the lower classes increase nonlinearly in status amplifies the concern that nonlinear marginal returns to quality (or reputation) could be attributed to status if unjustified linearity assumptions are forced upon the returns to quality or reputation. The differences in reputation (not shown) closely mimic the quality differences among classes. They must do so by definition, because reputation is measured as an average over past quality.
This does not mean that quality and reputation are indistinguishable. The correlation between quality and reputation is only 0.48, attesting to the significant vintage-to-vintage variation in quality. There is also sufficient quality overlap between pairs of classes to warrant a comparison. In every class there is at least one producer (often more) that produces at a comparable level of quality as producers from one or more other classes. To provide graphic evidence for this overlap, figure 1 shows the mean estimates and confidence intervals for each chateau’s average quality over the years 1991 to 2008. While the figure attests to the overlap of quality among producers from different classes, it also highlights that the first-class producers may not be comparable to the producers in some other classes.

Insert figure 1 here

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The causality of status effects

The fixed nature of the classification prevents that status itself is entangled in a feedback loop with quality or organizational performance, thereby eliminating two sources of endogeneity between typically contemporaneous variables. This simplifies the task of estimating the causal effect of status as displayed in figure 2. The third source of endogeneity, the reversely causal effect of performance on quality (which likely implies endogeneity between reputation and performance), will be addressed with an instrumental variable and a matching estimator. I will detail both estimators in the appropriate sections. While the instrumental variable estimator i.) endogenizes a chateau’s choice of its reputation, ii.) allows making appropriate assumptions about the functional form of quality and reputation effects, and iii.) allows varying the assumption about the market’s memory for quality, the matching estimator obviates these issues by comparing wines that look like monozygotic twins in terms of quality and reputation, but that differ in their status class. These identification strategies are displayed in figure 3.
Instrumental variable estimation

To make appropriate functional form assumptions for the effects of quality and reputation, and address that quality is an endogenous choice, the estimation proceeded in multiple steps. I first estimated a non-parametric regression in which I regressed logged prices on smooth functions for quality and reputation that were determined by the data as well as status and vintage fixed effects. This approach revealed two pieces of information. First, it indicated that the effects of both quality and reputation on logged price increase at the margin and suggested that they could be approximated by quadratic functions (see figure 4). This creates the complication that predicting quality or reputation using the instruments and then squaring the prediction is not permissible, as it would result in a “forbidden regression” that generally yields biased and inconsistent estimates (Wooldridge, 2010: p. 267). Instead, one has to instrument for both the linear and squared term, which increases the number of instruments needed.

Second, an inspection of the residuals of this regression indicated autocorrelation at the first, second, and third lag. The autocorrelation implies that reputation, operationalized as a moving average over endogenous quality choices in the past, cannot be treated as exogenous (e.g., Fair, 1970). I was unable to find a set of fully exogenous instruments that affect quality or reputation at the chateau level. Weather conditions would be a suitable exogenous instrument,
for example, but weather data are not available at the chateau level. Lagged endogenous variables were the next best option for instrumentation. When instrumenting with lagged endogenous variables one has to hope to find lags that maintain the strength of the instruments (because weak instruments can lead to more severe bias than fully endogenous independent variables) but minimize the residual endogeneity carried forward through autocorrelation (Arellano and Bond, 1991; Bound, Jaeger, and Baker, 1995). I did not find a sufficient set of lagged endogenous variables that satisfied the criteria of strength and exogeneity.

I eventually instrumented for a wine’s reputation for the vintages \( t - 1 \) to \( t - 5 \) and the squared term of this variable with the interactions of a wine’s reputation for the vintages \( t - 6 \) to \( t - 10 \) and the number of vintages for the period \( t - 6 \) to \( t - 10 \) that were reviewed in the Wine Spectator with the average rainfall in August and September (the months when the grapes ripen) and the average temperature in September over the vintages \( t - 1 \) to \( t - 5 \). The methodological reason for instrumenting in this way is that the lagged endogenous variables introduce variation at the chateau level and retain the strength of the instruments, whereas the weather characteristics introduce exogenous variation and depress the endogeneity problem carried forward through autocorrelation. The substantive reason is the idea that high quality chateaux should be less susceptible to bad weather. Consistent with this conjecture the effect of the rain interactions was negative and the effect of the temperature interactions was positive in the first-stage regressions for the linear and quadratic term (not shown).

Only a model with more instruments than endogenous regressors allows deploying diagnostics to test the validity of the IV approach. Because of the dearth of valid instruments and the need to instrument for both the linear and the squared term(s), I instrumented for reputation, but not for quality. There are two reasons why we may believe \textit{a priori} that it is appropriate to instrument for reputation but not for quality in this context. One reason is that the classification should have fully unfolded its effect on quality differences between classes, because it had at least 135 years time to do so and because the limits of the scale on which wines are rated put a
limit on the maximum quality differences between classes. Hence, past quality differences between classes should be a fairly accurate predictor of current and future quality differences between classes for the period of study. The second reason is that while chateaux may be able to select the average level of quality at which they produce, they may have little control over quality fluctuations from vintage to vintage, which are dominated by the weather. Importantly, the conjecture that quality is exogenous conditional on instrumenting for reputation is testable. The diagnostics maintained the null that quality is exogenous (see appendix). The final estimator is:

\[
\log(price_{i,t}) = \sigma \text{status}_i + \beta_1 \text{quality}_{i,t} + \beta_2 \text{quality}^2_{i,t} + \beta_3 \text{reputation}_{i,t} + \beta_4 \text{reputation}^2_{i,t} + \text{vintage}_t + \alpha + \epsilon_{i,t}
\]

Traditionally, one would start the analysis by showing the more restricted models and progress towards relaxing the restrictions, i.e., the hierarchical inclusion of regressors and the switch from less to more sophisticated estimators. This approach is impracticable here. It would require displaying an inordinate number of models, many of which would not be very informative, because they would relax multiple restrictions non-experimentally at the same time. Instead, I pursue the opposite route and start with the least restrictive model that best estimates the causal status effect. I will then enforce experimentally the assumptions as they are commonly made in the extant literature and that I argued would bias the estimates of status effects. The results are presented in table 2.

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Insert table 2 here

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Model 1 shows the estimates from the IV estimator and supports a causal effect of status on prices. The estimates indicate that controlling for quality and reputation first growths fetch
prices $\frac{1}{\exp(-0.765)}=2.15$ times as high as second growths. Second growths are estimated to be 18 percent more expensive than wines from the third class. Wines from the third, fourth, and fifth class charge prices that are not statistically different from each other. The insignificance of the reputation effects in this model is purely due to multicollinearity. An F-test indicates that the explanatory power of the model increases significantly when the reputation terms are included, and if I include the linear or the quadratic term alone, either term is flagged as a significant positive predictor of prices. The fact that model 1 is overidentified also allows putting an approximate bound on the residual bias contained in the IV estimates. The instrument diagnostics (see appendix) indicate that the relative bias is about five percent. Hence, under the null that all status effects are zero, the residual bias in the IV estimates should be no greater than five percent of the estimated coefficients.

Note that the quadratic form assumption forces a true u-shape into the quality effects within the range of data. It predicts that very low quality wines (below 80 points) would fetch higher prices than wines in the 80 to 90 point range, albeit with very wide standard errors. This is a statistical artifact of the quadratic form assumption and of the fact that the data are sparsely populated below 80 points and very heavily populated above 85 points (which drives the shape of the curve). To assure that this does not affect the results presented hereafter, I conducted two robustness analyses. In one I removed the wines with less than 80 points. In the other I winsorized the data, retaining these outliers but clipping their extreme values to the 95th percentile of the observed range. Both analyses produced the same insights with only slight differences in the coefficients.

Model 2 presents the OLS estimates of an otherwise identically specified model. Throughout, the estimates of the status effects are larger than the estimates of the IV estimator. A Hausman test rejected the null that the IV and the OLS estimates of the status effects are equal. This confirms significant bias of the status effects in the OLS estimates. Neglecting that the choice of quality is endogenous to prices carries over bias to the status coefficients despite the fact
that status is fixed here.

Model 3 omits the product quality controls. It assumes that conditional on reputation and status the quality of the focal wine has no effect on price. An inability to control for quality on the product level is not uncommon in the organizational status literature (for exceptions see Benjamin and Podolny, 1999; Washington and Zajac, 2005). This model overestimates status effects by 15 to 20 percent. A Hausman test rejected the null that the status coefficients are equal to the estimates in model 1. Quality differences correlate with status even for this ancient and fixed status hierarchy and after conditioning on reputation. Reputation controls are thus insufficient to account for contemporary quality differences.

Model 4 is estimated for comparison only. It contrasts model 3 with a model that includes the quality controls but that omits the reputation controls. The model shows that a failure to control for reputation induces bias in the status coefficients of around 45 percent. The Hausman test between the status coefficients of model 1 and model 4 is highly statistically significant. A comparison of the estimates of models 3 and 4 implies that failing to control for reputation induces greater bias in the estimates of status effects in this context than failing to control for quality. This is expected here for two reasons. First, the ancient and fixed status hierarchy had much time to unfold its potential to drive quality differences between status classes. Second, status may correlate more strongly with past or long-term average quality than with current quality if quality undergoes long-term fluctuations. Both facts imply that differences in reputation should be fairly accurate predictors of differences in quality in this compared to other contexts.

Model 5 replaces the nonlinear quality and reputation effects with linearity assumptions. This approach induced a bias in the estimated status effects of 47 to 57 percent. A Hausman test strongly rejects the null that the status coefficients of model 1 and model 5 are equal. The resulting bias is greater than the biases induced by any of the other omissions. Model 6 augments model 5 by omitting the control for current quality. It shows an even greater bias
than model 5, overestimating status effects by 53 to 66 percent. These biases are remarkable because all models are log-linear models, which already embody an assumption of increasing marginal effects of quality and reputation on price. Nonetheless, the log-linear form proves insufficient to capture the extraordinary value this market places on high quality and reputation.

Model 7 defines reputation on a ten-year lag rather than a five-year lag. Otherwise, the model is specified like model 2. The comparison with model 2 shows that status effects are estimated larger when the market’s memory for quality is assumed to be shorter. The upward bias in the coefficients in model 2 over model 7 is approximately 12 percent. This cautions that choosing an arbitrary and inappropriately short lag on which reputation is defined may result in upward biased estimates of status effects. The estimates seem to approach the IV estimates, but a Hausman test still rejected the null, indicating significant bias of the status effects in model 7 over model 1.

To assure that the smaller status effects in model 7 compared to model 2 are not due to choosing a second arbitrary value of $\tau$ for the lag on which the market defines reputation, I systematically varied $\tau$ from 1 to 10 in models that were otherwise specified like models 2 or 7. For brevity, I do not present the regression table. Instead, I graphically present the estimated status coefficients as a function of $\tau$ in figure 5.

Insert figure 5 here

Figure 5 shows that the estimated status effects decline in the market’s assumed memory for quality. Compare, for example, the estimate for the fifth class (solid line) at $\tau = 1$ and $\tau = 10$. When the market is assumed to look back only one year to determine reputation, I estimate that a first-class wine costs 3.9 times the price of a comparable fifth-class wine. However, when the market is allowed to look back ten years to determine reputation, I estimate that a first-class
wine costs only 2.9 times the price of a comparable fifth class wine. It is disconcerting that the trend for status effects to decline does not further attenuate after year three. Without historic data reaching further back or without a consistent estimator as a basis of comparison (model 1), it would remain impossible to determine the appropriate lag even asymptotically.

**Coarsened exact matching estimation**

The regression analysis in table 2 allows to estimate the price differences between all pairs of status classes. It is unclear whether all such comparisons are permissible given the data. For example, model 1 estimated that a first growth costs $1/(\exp(-0.957))=2.6$ times the price of a fourth growth. Yet, figure 1 suggested that producers in the first and fourth class produce at so vastly different levels of quality that they should not be compared. The comparisons between some status classes might thus be an out-of-sample extrapolation of unknown validity.

To overcome this shortcoming, I complement the regression analysis with a coarsened exact matching estimator that only compares wines and, thus, status classes that are in fact comparable. The idea of the coarsened exact matching procedure (Azoulay, Stuart, and Wang, 2013; Iacus, King, and Porro, 2009) is to find two units of observation that appear like monozygotic twins. It holds constant, within narrow limits, all important control variables except the variable of interest. Here the procedure matches two wines that are equal, on average, in quality and reputation but that differ in their status class. The question is whether status has a residual impact on price conditional on that it has not differentially affected selection into quality or reputation. The null hypothesis is that conditional on being of the same quality and reputation two wines should fetch the same price irrespective of class. A rejection of the null would indicate that buyers are willing to pay for status at the margin. I construct the matched sample requiring the following from two matched wines:

1. The producing chateaux are in different *grands crus classés*. 
2. The wines’ ratings are within a one-point difference of each other.

3. The average rating of the two wines in the ten years prior to the focal vintage is within a half-point difference of each other.

4. The number of vintages reviewed by the *Wine Spectator* in the 10 years prior to the focal vintage is within a one-count difference of each other.

5. Both wines are from the same vintage.

The effect of a status difference on price is the treatment effect of interest. Hence, the two wines are required to differ in their status class. The second through the fourth matching criteria aim to hold constant the quality and the reputation for quality of two matched wines. The last matching criterion holds vintage and macroeconomic conditions constant that might otherwise differentially affect the prices of wines from different vintages.

The matching procedure first identifies all possible matches given the matching criteria. If it finds more than one match for a focal wine, the matching wine is selected at random out of the possible matches. If no match is found, the observation is dropped. Double matches resulting in duplicate observations are removed. Because I select the match for each focal wine at random out of all potential matches, every run of the matching procedure yields a somewhat different sample. To increase the accuracy of the estimates, I bootstrap 300 matched samples according to the matching criteria. I provide a comparison of the treatment and control groups in the matched samples in table 3 and a comparison of the matched samples with the data at large in table 4.

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13 For example, 2006 Chateau Lafite-Rothschild may be matched with 2006 Chateau Leoville-Las-Cases in both instances, when Lafite is the focal wine and a match is being sought for Lafite and when Leoville Las Cases is the focal wine and a match is being sought for Leoville Las Cases. Double matches always occur when two wines are the only matches for each other.
Table 3 shows how closely the higher-ranked chateaux resemble the lower-ranked matches. The close correspondence between the higher- and lower-ranked matches is important to the causality claim of this analysis. Suppose the lower-ranked chateaux would only achieve the lower bound of the allowable difference of the matching criteria. Then we would be unable to say that the price difference is truly due to a status difference and not due to the residual difference in quality or reputation. The effective absence of a difference reassures that this estimator estimates a causal effect.

Table 4 shows that the matched sample closely resembles the full data. The close correspondence between the matched sample and the data at large implies that the sample average treatment effect (SATT) identified with this analysis should generalize beyond the matched sample(s) and come reasonably close to the average treatment effect on the treated (ATT). That is, the estimated status effects should be representative of status effects on the population of the 61 grand cru classified wines of the Médoc.

I analyze for each pair of grands crus classés the price ratio of the higher-ranked wines vis-a-vis their lower-ranked matches. This mimics the previous regression analysis. The ratio indicates the price multiple buyers pay for the higher-ranked wine relative to the lower-ranked wine of tightly matched quality and reputation. A ratio significantly greater than one indicates a status premium. The results of the matched-sample analysis are presented in table 5.

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14 The relative prices of two grands crus classés for the earlier regression analyses is obtained by exponentiating the difference between two grands crus classés coefficients (the omitted baseline for the 1st class is zero).
Table 5 shows that wines from the first *grand cru classé* fetch an estimated 3.73 times the price of wines from the second *grand cru classé*, holding quality and reputation constant. Wines from the first class are estimated to cost 2.9 times the price of a matched wine from the third class, but this effect is imprecisely estimated. There are only very sporadic matches of first-class with third-class wines, and they involve only one third-class producer (Chateau Palmer). Wines from the fourth class are never matched with wines from the first class. Finally, the matched samples contain a median number of five matches between wines from the first and wines from the fifth class. First-class wines are estimated to cost 2.98 times the price of a matched fifth-class wine. Overall, this analysis reproduces the finding that the first class enjoys a substantial price premium over the other classes. However, it points out that a comparison of wines from the first class may only be warranted with wines from the second class, as wines from the lower classes match first-class quality and reputation sporadically at best.

Second growths fetch an estimated 29 percent more than third growths, 38 percent more than fourth growths, and 28 percent more than fifth growths of equal quality and reputation. It may come as a surprise that the advantage of the second over the fifth growths is smaller than over the fourth growths. However, note that the confidence intervals of these estimates overlap widely. Moreover, this may be due to the fact that the analysis brushes over some detail. Fourth growths are more likely to be matched with second growths that produce at the bottom of the quality distribution of the second class. By contrast, some high-quality fifth growths like Chateaux Clerc-Milon, Lynch-Bages, or Pontet-Canet are matched with chateaux closer to the top of the quality distribution of the second class (cf. figure 1), suggesting that status might play a more important role as a buffer than as a booster.

Third growths charge an estimated 4 percent more than fourth growths and 9 percent more than fifth growths, but these premiums are statistically insignificant. Fourth growths charge an imprecisely estimated 18 percent more than comparable fifth growths, which is just significant at the five-percent level. Overall, six of the eight comparisons show significant returns to
status. The price premium is huge for the first growths, substantial for the second growths, and may be small or zero among the third, fourth, and fifth growths.

**The cause of status returns**

To assess the underlying cause for the status effects in this market, I study their development over time. This analysis assumes that wine ratings effectively resolve the uncertainty about product quality. Wine ratings have become ubiquitously available with the proliferation of the Internet. This increase in the availability of information about quality should have reduced the buyers’ uncertainty about quality. Therefore, if status returns were driven by uncertainty about quality, they should have decreased over the period of study.

Increasing status returns over time will only be inconsistent with the uncertainty hypothesis and point to the conspicuous consumption hypothesis, however, if three additional conditions hold: first, the classification must not have become a stronger signal of quality over time. Second, buyers must not have become more uncertain about quality over time, which might otherwise cause a greater reliance on the classification as a signal of quality even when its signal strength is constant. Third, competitive pressures on the lower classes must not have increased disproportionately relative to the competitive pressures on the higher classes, which would otherwise depress the prices of the lower-quality and, by correlation, lower-status chateaux more than the prices of the higher-status chateaux. In the first two cases the uncertainty hypothesis would be a plausible alternative explanation to the conspicuous consumption hypothesis for increasing status returns over time. In the latter case, increasing status returns over time could be driven by unaccounted-for changes in the broader competitive environment that the classified chateaux of the Médoc face.

Through methods available from the author, I isolated three distinct time intervals over the period of study. Over the vintages 1991 through 1994 the classification became a stronger
signal of quality due to increasing statistical precision (but not increasing effect size), and the Internet was not yet available. For the vintages 1995 through 2003 none of the three conditions that might compromise the conspicuous consumption hypothesis apply. The classification did not become a stronger signal of quality, demand came from long established markets (CIVB, 2010), and while competitive pressures seem to have increased, they increased proportionally for producers at all levels of quality (and, by correlation, status). For the vintages after 2003 the influx of Chinese money (CIVB, 2010) resulted in a massive increase in prices. The Chinese might be particularly status-conscious, but due to their lack of experience with Bordeaux wines they might also be particularly uncertain about quality, which could result in an increased reliance on the classification as a signal of quality. Under these conditions, increasing status returns over the time period 1995 to 2003 would provide the strongest evidence for the conspicuous consumption hypothesis.

To assess the development of status returns over time, I re-estimate a variant of model 7 in table 2 for each of the three time periods. I include an interaction of a linear time trend with an indicator variable that takes 1 if a wine’s producing chateau is not a member of the first class. Unreported regressions of the time trend interaction with the individual grand cru classé fixed effects indicated that they were jointly statistically significant for each of the three time periods, but that they were not significantly different from each other, implying that they can be collapsed into one. As controls I include linear time trends for the changing effects of quality and reputation on prices over time. More complex models or an IV estimator were not feasible because of multicollinearity and the number of required instruments. However, if we make the assumption that the estimates will be similarly biased as the estimates in model 7 in table 2, we should expect that the following status coefficients might be overestimated between

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15Competitive pressures were assessed by the number of wines reviewed in the Wine Spectator that fall in the categories 85–89, 90–94, and 95-100 points. The number of reviewed wines grew strongly over the period of study, but at an indistinguishable rate across these categories.

16In further robustness analyses I substituted the time trend with world internet prevalence, with the GDP of China, and with media mentions of Robert Parker and the Wine Spectator. All produce consistent results, but all are highly correlated with time such that it is not possible to distinguish between them.
3 and 12 percent. The results of the analysis are presented in table 6.

All models indicate an increase in status returns for the first class within the three time periods and hence over the period of study as a whole. The period between 1995 and 2003 offers the cleanest test of the conspicuous consumption hypothesis. Although smaller than in the other periods, the increasing relative advantage of the first class is statistically significant and economically sizeable. The first growths gained an estimated 5.3 percent (1/exp(-0.052)) per year relative to the other classes over this period. First-growth prices diverge even more strongly from the prices of the other classes for the vintages 1991 through 1994 and 2004 to 2008. The first class gained about 8.4 percent per year for the vintages 1991 through 1994, and a whopping 30.5 percent per year over the vintages 2004 through 2008 relative to all other classes. For reasons discussed above, the signaling value of the classification might explain the trends in these two time periods.

Note, however, that invoking the uncertainty explanation for the period 1991 through 1994 would be paradoxical. While the status hierarchy has become a more precise signal of quality over this period, it is unclear how buyers would be able to realize and incorporate this information into the release prices of wines if they did not pay close attention to the ratings. This undermines the standard uncertainty explanation for increasing status returns during this period. Instead, it seems to be the stronger alignment between quality and status and, hence, the increasing certainty that superior quality can only be had from the highest-class producers that exacerbates the status returns during this period. This suggests that the value of status in this context may not depend as much on the uncertainty about quality as it depends on status class accurately distinguishing producers that produce at different levels of quality.
For the period of exploding demand from China for the vintages 2004 through 2008, both the uncertainty and the conspicuous consumption hypothesis are plausible explanations for the dramatic increase in status returns. Even though the hypotheses cannot be discerned with the data, there are some hints that the effect may be driven by conspicuous consumption more so than by the uncertainty about quality. Press reports indicate that the Chinese consider these wines luxury goods like any other, and that they are not primarily concerned with the quality of the wines. The same report indicates that Chateau Lafite-Rothschild (the first growth heading the list that the Union of Brokers sent to the Chamber of Commerce in 1855) is the beverage of choice to ingratiate with business partners, seal business deals, and entertain government officials.17 Another report indicates that in Chinese restaurants expensive bottles like Lafite are placed on the table with the label facing outwards for everyone to see. Finally, up to 90 percent of all Lafite sold in China is counterfeited. Counterfeit goods are characteristic of demand from a class of consumers that are neither interested in being deeply knowledgeable about that category of goods nor in their quality, but who attempt to elevate their status through the consumption of highly conspicuous goods that even uninformed audiences can identify (Han et al., 2010).18 This at least suggests that much of the first-growth effect for the vintages after 2003 is driven by the status-directed, ostentatious display of wealth among the Chinese buyers rather than their uncertainty about quality.

Discussion

The first goal of this paper was to identify the causal, symbolic effect of organizational status on product prices and to highlight the impediments to identifying causal status effects in the process. I investigated this question in the context of Médoc wines of the vintages 1991 to

17http://www.guardian.co.uk/lifeandstyle/2010/apr/02/bordeaux-wine-china; last accessed 14 December 2012.
2008 whose producing chateaux were grand cru classified in 1855. The fixed nature of the classification resolved most of the endogeneity concerns that typically plague empirical studies of organizational status. Wine ratings from blind tastings enabled implementing tight controls for quality and reputation on the product level. The concern about reverse causality between quality and price was addressed with an instrumental-variable and a matching estimator. As a result, this study provides one of the cleanest tests of organizational status effects yet that differentiates the effects of status, reputation, and quality.

The instrumental variable and matching estimators provided strong evidence for a causal, symbolic effect of status on the prices of the grands crus classés of the Médoc. The greatest returns to status accrue to the highest-status producers. The returns to status decline toward the bottom of the status hierarchy. The differences are indistinguishable from zero for some pairs of status classes in the instrumental variable and matching estimators, respectively. At least in this market, status is thus a phenomenon of categorical rather than continuous hierarchical distinction. However, the descriptives highlighted that the first-class chateaux broadly validate their status position by producing much higher quality, on average, than the producers in the other classes, and the matching estimator showed that this strongly limits their comparability. Whether this is a direct consequence of the incentives flowing from the status hierarchy is beyond the scope of this study and an interesting question for future research. However, it certainly does not explain why Chateau Leoville Las Cases, a second growth that has been producing at first-growth quality for thirty years, cost 60 percent of a first growth in 1991, but costs only about 25 percent of a first growth today.

Beyond the identification of the causal effect, this study highlighted important sources of biases in status effect estimates. Comparatively small effect sizes in the extant literature give reason to suspect that many of the causality claims might not hold if the status effects were properly identified. The failure to control for reputation (demonstrations of quality in the past) induced greater bias in the status effect estimates than the failure to control for quality. We
may expect this finding to generalize to other settings in which the status hierarchy is ancient or fixed and is approaching the limit of its potential to drive quality differences between status classes. If status is expected to (continue to) drive quality differences between producers, by contrast, we should expect that the omission of controls for current quality becomes a more important source of bias (cf. Azoulay et al., 2013). Some studies that cannot directly assess the quality of a firm’s products or services might find a partial remedy for this problem by using forward- in addition to backward-looking versions of the available controls for reputation. This should purge status effect estimates from some of the substantive effects of status and thereby get closer to its symbolic effect.

Status, quality, and reputation are not only correlated, their effects also all increase at the margin in this market. Restrictive assumptions about the functional form of quality and reputation effects were thus the most important source of bias for the status effect estimates. Even a log-linearity assumption (which already allowed for exponential effects of quality and reputation on prices), was too restrictive to account for the increasing marginal willingness to pay for quality and reputation. We should thus be careful to not misattribute returns to status that truly derive from the value markets place on the pinnacle of quality. Future work on status would benefit from testing and reporting the validity of its functional form assumptions.

In addition, the results alert to not underestimate the enduring nature of reputation in markets in which we believe status to matter. Status may capture a producer’s long-term average quality better than his recent demonstrations of quality do. Hence, we may mistake reputation for status effects if an empirical strategy defines reputation on an inappropriately short lag. Consistent with this reasoning, the estimated status effects among the grands crus classés of the Médoc declined as the lag on which reputation was defined was extended. Defining reputation on a longer lag seemed to remedy large parts of the bias in the OLS estimates, but without the reference point of a consistent estimator it would be unknown how much of the bias is remedied and what the appropriate lag is. In studies that cannot track the entire quality
history of a producer, status returns that asymptotically approach a bound as the market’s memory for quality is extended or a plausible theoretical limit for the durability of reputations might provide some, albeit imperfect, relief from this problem.

Finally, I showed that neglecting that quality choices are endogenous can propagate bias to the status effect estimates even if status itself cannot be reversely affected by quality or price. The instrumental variable estimator produced the lowest estimated status effects of all estimators and allowed putting an approximate bound on the residual bias contained in the estimates. Less sophisticated estimators will neglect reverse causality and produce biased estimates not only for the endogenous variables themselves, but also for correlated variables. As status scholars we study a complex social phenomenon for which it is difficult to ascertain causality because of the endogenous feedback loops between status, quality, and organizational outcomes. While our methods need to address this complexity, some of these methods (like the matching estimator) need not be complicated. Relatedly, the choice of the empirical setting can greatly aid in identifying the causal effect of status, as this work and other recent articles have shown (Azoulay et al., 2013; Simcoe and Waguespack, 2011).

By studying a period of time during which the Internet proliferated, I tested inductively two alternative root causes for the returns to organizational status: status as a signal of quality under uncertainty and conspicuous consumption. So far, the evidence that buyers are willing to pay a premium for a good of equal or lesser quality had been weak. Consistent with the conspicuous consumption hypothesis, I found that the symbolic returns to status, i.e., that part of the Matthew effect that is not justified by differences in underlying quality, has strongly increased in a time of decreasing uncertainty and benefited only the highest-status producers. I conclude from this that uncertainty is not a necessary condition and the motive of conspicuous consumption is a sufficient condition to generate returns to status. Considerations of conspicuous consumption might enter many decisions that are not typically considered consumption. For example, this might include the choice among employers or educational
institutions for purely symbolic reasons. Further inquiry into the scope conditions of conspicuous consumption is needed.

The presence of an audience, at least an imagined one, is a defining characteristic of conspicuous consumption as an explanation for status effects. In this view a social actor consumes or displays goods or affiliations to elevate his audience’s perception of him. Without an audience, the motive of conspicuous consumption cannot generate returns to status. Under the perspective that status acts as a signal of quality under uncertainty, by contrast, no audience is required to generate returns to status. At least three features thus suggest themselves to testing the underlying mechanisms that drive or bound status effects: changes or differences in i.) the presence, absence, or composition of audiences ii.) the conspicuousness of goods or consumption, or iii.) uncertainty about quality. Future work should continue to exploit such variation to identify the underlying explanation for status effects, but it would also benefit from more comparative studies of status hierarchies to identify their distinguishing features.

The reader should not interpret the evidence for conspicuous consumption to mean that uncertainty does not generally have a positive effect on the returns to status, which is a cornerstone of the theoretical and empirical organizational status literature. Instead, one should interpret this to mean that the uncertainty about the producers was low even before the advent of the Internet and that, therefore, a different root cause must explain the status returns in this market. After all, each of the chateaux had been in existence for more than 150 years, and the trade was aware of rating agencies such as the Wine Spectator and Robert Parker well before the Internet started to proliferate. The purely symbolic returns to status I have identified here imply that status acquisition becomes an organizational end in itself, beyond the purpose of signaling quality. How organizations can affect audience perceptions of organizational status independent of quality remains an interesting question for future research.
Appendix

The IV estimator with four instruments but only two endogenous variables allows deploying a range of IV diagnostics to assess its validity. A Kleibergen-Paap rk LM test rejects the null that the equation is not identified ($\chi^2 = 48.15, p < .0001$). The Kleibergen-Paap rk $F$-value ($F=17.64$) confirms the strength of the instruments. It suggests that the true size of an $\alpha$-test at the five-percent level is at best 10 percent for the IV estimator and thus only mildly inflated (instrumentation will generally increase the size of the test, but the inflation decreases in the strength of the instruments). The $F$-value further indicates that the bias of the IV estimator relative to the OLS estimator should be smaller than five percent. Even under the starting assumption of the null that status effects are zero, we can expect the IV estimates of the status effects to be within .06 of the true $\beta$.

The Anderson-Rubin Wald ($\chi^2 = 69.69, p < .0001$) and Stock-Wright S statistics ($\chi^2 = 50.56, p < .0001$) reject the joint null that the endogenous regressors are insignificant in the main equation and that the orthogonality conditions are valid. While we would of course want the regressors we instrument for to be significant in the main equation, we would not want the instruments to be correlated with the error term. These tests are unable to distinguish the two. However, Hansen’s J statistic tests the overidentifying restrictions under the null that the instruments are valid, i.e., uncorrelated with the error term. Hansen’s J statistic fails to reject the null at the five-percent level ($Hansen’s J=5.38, p=0.07$). Overall, these diagnostics indicate that the IV approach estimates an identified equation instrumenting for relevant endogenous regressors using strong and sufficiently exogenous instruments. Importantly, the quality variable passed the orthogonality test ($C statistic=0.77, p>.37$), corroborating that while chateaux may have control over their average level of quality (reputation), they have little control over vintage-to-vintage variation.
References


Notes. Mean estimate and confidence intervals of the chateau fixed effects from a regression of wine ratings on chateau and vintage fixed effects. The baseline and the mean of the vintage effects were added back in to show average quality aligned with the Wine Spectator's 100-point scale. Chateaux are sorted by class with the first class on top. Classes are separated by dashed lines (- - -). Within classes, chateaux are sorted by average quality.
Figure 2
ENDOGENEITY BETWEEN STATUS, QUALITY/REPUTATION, AND PRICE

(a) Typical setting
(b) This setting

Figure 3
IDENTIFICATION STRATEGIES

(a) Instrumental variable estimator
(b) Matching estimator
Notes. The figure shows smoothing splines and their confidence bands for the quality and reputation effects from a semi-parametric model. The estimator regressed the logged, GDP-deflated prices on smooth functions of quality and reputation that were determined by the data in a penalized maximum likelihood approach in addition to grand cru classé and vintage fixed effects.
Notes. The figure shows the estimated status effects on logged prices dependent upon varying assumptions about the market’s memory for quality ($\tau$). The x-axis denotes the assumed $\tau$, the y-axis denotes the point estimates. The traces indicate the point estimates for the second class (− · −), third class (· · ·), fourth class (− − −), and fifth class (—). The first class is the omitted baseline (0).
### Table 1
**Estimated Quality Differences Between Grand Cru Classés, 1991–2008**

<table>
<thead>
<tr>
<th></th>
<th>1st GCC</th>
<th>2nd GCC</th>
<th>3rd GCC</th>
<th>4th GCC</th>
<th>5th GCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd GCC</td>
<td>3.36</td>
<td>0</td>
<td>1.41</td>
<td>2.24</td>
<td>2.54</td>
</tr>
<tr>
<td></td>
<td>$p \approx 0$</td>
<td>$p \approx 0$</td>
<td>$p \approx 0$</td>
<td>$p \approx 0$</td>
<td>$p \approx 0$</td>
</tr>
<tr>
<td>3rd GCC</td>
<td>4.77</td>
<td>1.41</td>
<td>0.83</td>
<td>1.13</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>$p \approx 0$</td>
<td>$p \approx 0$</td>
<td>$p&lt;0.01$</td>
<td>$p&lt;0.0001$</td>
<td>$p&lt;0.26$</td>
</tr>
<tr>
<td>4th GCC</td>
<td>5.60</td>
<td>2.24</td>
<td>0.83</td>
<td>1.13</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>$p \approx 0$</td>
<td>$p \approx 0$</td>
<td>$p&lt;0.01$</td>
<td>$p&lt;0.0001$</td>
<td>$p&lt;0.26$</td>
</tr>
</tbody>
</table>

**Notes.** The cells show the estimated quality difference between the column and the row grands crus classés. The estimates are from a regression of wine ratings on grands crus classés and vintage fixed effects. The $p$-values are from a series of $F$-tests against the null hypotheses that the respective column and row class fixed effects are equal. $p \approx 0$ means that the $p$-value of the test is smaller than $10^{-14}$ in a one-sided test.
### Table 2
REGRESSIONS FOR THE EFFECTS OF STATUS, QUALITY, AND REPUTATION ON PRICE

<table>
<thead>
<tr>
<th></th>
<th>(1) IV, $\tau = 5$</th>
<th>(2) OLS, $\tau = 5$</th>
<th>(3) OLS, $\tau = 5$</th>
<th>(4) OLS, $\tau = 5$</th>
<th>(5) OLS, $\tau = 5$</th>
<th>(6) OLS, $\tau = 5$</th>
<th>(7) OLS, $\tau = 10$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd class</td>
<td>-0.765*** (-7.80)</td>
<td>-0.887*** (-9.94)</td>
<td>-0.996*** (-11.19)</td>
<td>-1.085*** (-11.19)</td>
<td>-1.125*** (-10.73)</td>
<td>-1.174*** (-11.51)</td>
<td>-0.792*** (-9.05)</td>
</tr>
<tr>
<td>3rd class</td>
<td>-0.930*** (-7.62)</td>
<td>-1.086*** (-10.53)</td>
<td>-1.239*** (-11.93)</td>
<td>-1.346*** (-12.63)</td>
<td>-1.400*** (-12.13)</td>
<td>-1.476*** (-13.25)</td>
<td>-0.976*** (-9.35)</td>
</tr>
<tr>
<td>4th class</td>
<td>-0.957*** (-7.94)</td>
<td>-1.159*** (-12.03)</td>
<td>-1.322*** (-13.55)</td>
<td>-1.459*** (-14.64)</td>
<td>-1.486*** (-13.26)</td>
<td>-1.574*** (-14.67)</td>
<td>-1.028*** (-10.57)</td>
</tr>
<tr>
<td>5th class</td>
<td>-0.944*** (-7.71)</td>
<td>-1.184*** (-12.13)</td>
<td>-1.349*** (-13.74)</td>
<td>-1.483*** (-14.71)</td>
<td>-1.485*** (-13.22)</td>
<td>-1.573*** (-14.53)</td>
<td>-1.060*** (-10.81)</td>
</tr>
<tr>
<td>Reputation</td>
<td>0.046 (0.50)</td>
<td>-0.104*** (-3.59)</td>
<td>-0.139*** (-4.93)</td>
<td>0.053*** (5.74)</td>
<td>0.076*** (7.83)</td>
<td>-0.161*** (-10.16)</td>
<td></td>
</tr>
<tr>
<td>Reputation$^2$</td>
<td>0.003 (1.03)</td>
<td>0.005*** (5.33)</td>
<td>0.006*** (7.61)</td>
<td></td>
<td>0.007*** (5.63)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td>-0.133*** (-5.33)</td>
<td>-0.096*** (-6.32)</td>
<td>-0.112*** (-6.25)</td>
<td>0.039*** (7.11)</td>
<td></td>
<td>-0.091*** (-6.03)</td>
<td></td>
</tr>
<tr>
<td>Quality$^2$</td>
<td>0.004*** (5.60)</td>
<td>0.004*** (8.34)</td>
<td>0.005*** (9.16)</td>
<td></td>
<td>0.004*** (7.74)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vintage fixed effects included</td>
<td>included</td>
<td>included</td>
<td>included</td>
<td>included</td>
<td>included</td>
<td>included</td>
<td>included</td>
</tr>
<tr>
<td>Constant</td>
<td>3.343*** (4.57)</td>
<td>5.207*** (20.59)</td>
<td>4.820*** (18.15)</td>
<td>5.198*** (31.76)</td>
<td>3.212*** (12.35)</td>
<td>3.311*** (12.94)</td>
<td>5.387*** (19.39)</td>
</tr>
<tr>
<td>Observations</td>
<td>836</td>
<td>836</td>
<td>836</td>
<td>836</td>
<td>836</td>
<td>836</td>
<td>836</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.788</td>
<td>0.838</td>
<td>0.804</td>
<td>0.810</td>
<td>0.794</td>
<td>0.779</td>
<td>0.848</td>
</tr>
</tbody>
</table>

**Notes.** *** p<0.001, ** p<0.01, * p<0.05, † p<0.1. T-statistics for heteroskedasticity and autocorrelation robust standard errors in parentheses.
<table>
<thead>
<tr>
<th>Treatment/control</th>
<th>.05</th>
<th>.25</th>
<th>.5</th>
<th>.75</th>
<th>.95</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality treatment</td>
<td>85</td>
<td>88</td>
<td>90</td>
<td>91</td>
<td>94.2</td>
</tr>
<tr>
<td>Quality control</td>
<td>85</td>
<td>88</td>
<td>90</td>
<td>92</td>
<td>95</td>
</tr>
<tr>
<td>Reputation treatment</td>
<td>85.4</td>
<td>87.1</td>
<td>88.4</td>
<td>89.4</td>
<td>91.8</td>
</tr>
<tr>
<td>Reputation control</td>
<td>85.4</td>
<td>87</td>
<td>88.3</td>
<td>89.4</td>
<td>91.6</td>
</tr>
<tr>
<td>Reviews treatment</td>
<td>6</td>
<td>9</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Reviews control</td>
<td>6</td>
<td>9</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

Notes. The table shows the close correspondence of the treatment and control groups for the 300 matched samples in all quantiles of the coarsened matching characteristics. The treatment group stands for the wines in the higher grand cru classé, and the control group for the wines in the lower grand cru classé that were matched to the treatment group.
Table 4
QUANTILES OF THE MATCHED SAMPLES AND THE DATA AT LARGE

<table>
<thead>
<tr>
<th>Data at large/matched samples</th>
<th>.05</th>
<th>.25</th>
<th>.5</th>
<th>.75</th>
<th>.95</th>
</tr>
</thead>
<tbody>
<tr>
<td>First class data</td>
<td>86.6</td>
<td>91</td>
<td>93</td>
<td>95</td>
<td>100</td>
</tr>
<tr>
<td>First class matched samples</td>
<td>86.4</td>
<td>90</td>
<td>94</td>
<td>95</td>
<td>98.3</td>
</tr>
<tr>
<td>Second class data</td>
<td>83</td>
<td>87</td>
<td>90</td>
<td>92</td>
<td>96</td>
</tr>
<tr>
<td>Second class matched samples</td>
<td>85</td>
<td>88</td>
<td>90</td>
<td>92</td>
<td>95</td>
</tr>
<tr>
<td>Third class data</td>
<td>83</td>
<td>87</td>
<td>89</td>
<td>91</td>
<td>93</td>
</tr>
<tr>
<td>Third class matched samples</td>
<td>85</td>
<td>88</td>
<td>90</td>
<td>91</td>
<td>94</td>
</tr>
<tr>
<td>Fourth class data</td>
<td>80</td>
<td>87</td>
<td>88</td>
<td>90</td>
<td>92</td>
</tr>
<tr>
<td>Fourth class matched samples</td>
<td>85</td>
<td>87</td>
<td>88</td>
<td>90</td>
<td>92</td>
</tr>
<tr>
<td>Fifth class data</td>
<td>80</td>
<td>85</td>
<td>88</td>
<td>90</td>
<td>93</td>
</tr>
<tr>
<td>Fifth class matched samples</td>
<td>84.6</td>
<td>87</td>
<td>89</td>
<td>91</td>
<td>93.6</td>
</tr>
</tbody>
</table>

Notes. The table shows the correspondence in the quantiles of the 300 matched samples and the data at large. Some lack of correspondence is apparent in the lower quantiles for the lower classes, i.e., where wines are of such poor quality that they have no match or few matches within the grand cru classification.
### Table 5

**Matched sample analysis: relative prices**

<table>
<thead>
<tr>
<th></th>
<th>1st GCC</th>
<th>2nd GCC</th>
<th>3rd GCC</th>
<th>4th GCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd GCC</td>
<td>3.73</td>
<td>(3.39–4.07)</td>
<td>[19]</td>
<td></td>
</tr>
<tr>
<td>3rd GCC</td>
<td>2.90</td>
<td>1.29</td>
<td>(0.88–4.92)</td>
<td>(1.13–1.45)</td>
</tr>
<tr>
<td>4th GCC</td>
<td>n/a</td>
<td>1.38</td>
<td>1.04</td>
<td>(1.13–1.62)</td>
</tr>
<tr>
<td>5th GCC</td>
<td>2.98</td>
<td>1.28</td>
<td>1.09</td>
<td>1.18</td>
</tr>
</tbody>
</table>

*Notes.* Mean estimate for the relative price of a wine in the column *grand cru classé* relative to a wine of equal quality and reputation in the row *grand cru classé* from 300 bootstrapped matched samples. Mean of the standard error estimates from the 300 bootstrapped matched samples in parentheses. Median number of matches per bootstrap in brackets. *n/a* designates that there were no matched wines for that pair of status classes in any of the 300 bootstraps.
### Table 6  
**Regressions for the effect of status, reputation, and quality on price over time**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Not first class × time</td>
<td>-0.081**</td>
<td>-0.052**</td>
<td>-0.265***</td>
</tr>
<tr>
<td></td>
<td>(-2.55)</td>
<td>(-2.30)</td>
<td>(-3.98)</td>
</tr>
<tr>
<td>Reputation × time</td>
<td>0.009*</td>
<td>-0.004</td>
<td>-0.000</td>
</tr>
<tr>
<td></td>
<td>(1.78)</td>
<td>(-1.06)</td>
<td>(-0.04)</td>
</tr>
<tr>
<td>Quality × time</td>
<td>-0.005</td>
<td>0.003</td>
<td>0.010</td>
</tr>
<tr>
<td></td>
<td>(-0.98)</td>
<td>(1.58)</td>
<td>(1.21)</td>
</tr>
<tr>
<td>2nd class</td>
<td>-0.571***</td>
<td>-0.436***</td>
<td>-0.485*</td>
</tr>
<tr>
<td></td>
<td>(-8.85)</td>
<td>(-3.35)</td>
<td>(-1.83)</td>
</tr>
<tr>
<td>3rd class</td>
<td>-0.699***</td>
<td>-0.692***</td>
<td>-0.586*</td>
</tr>
<tr>
<td></td>
<td>(-6.55)</td>
<td>(-4.78)</td>
<td>(-1.89)</td>
</tr>
<tr>
<td>4th class</td>
<td>-0.765***</td>
<td>-0.731***</td>
<td>-0.655**</td>
</tr>
<tr>
<td></td>
<td>(-9.15)</td>
<td>(-5.11)</td>
<td>(-2.22)</td>
</tr>
<tr>
<td>5th class</td>
<td>-0.785***</td>
<td>-0.784***</td>
<td>-0.652**</td>
</tr>
<tr>
<td></td>
<td>(-10.05)</td>
<td>(-5.53)</td>
<td>(-2.22)</td>
</tr>
<tr>
<td>Reputation</td>
<td>-0.072**</td>
<td>-0.085*</td>
<td>-0.120</td>
</tr>
<tr>
<td></td>
<td>(-2.15)</td>
<td>(-1.86)</td>
<td>(-0.98)</td>
</tr>
<tr>
<td>Reputation²</td>
<td>0.003***</td>
<td>0.005***</td>
<td>0.006*</td>
</tr>
<tr>
<td></td>
<td>(2.99)</td>
<td>(2.86)</td>
<td>(1.80)</td>
</tr>
<tr>
<td>Quality</td>
<td>-0.010</td>
<td>-0.132***</td>
<td>-0.232***</td>
</tr>
<tr>
<td></td>
<td>(-0.57)</td>
<td>(-4.97)</td>
<td>(-3.96)</td>
</tr>
<tr>
<td>Quality²</td>
<td>0.001</td>
<td>0.004***</td>
<td>0.006***</td>
</tr>
<tr>
<td></td>
<td>(1.37)</td>
<td>(6.62)</td>
<td>(5.48)</td>
</tr>
<tr>
<td>Vintage fixed effects included</td>
<td>included</td>
<td>included</td>
<td>included</td>
</tr>
<tr>
<td>Constant</td>
<td>4.306***</td>
<td>5.112***</td>
<td>6.438***</td>
</tr>
<tr>
<td></td>
<td>(16.65)</td>
<td>(13.60)</td>
<td>(6.20)</td>
</tr>
</tbody>
</table>

**Notes.** ***p<0.001, **p<0.01, *p<0.05, †p<0.1.** T-statistics for heteroskedasticity and autocorrelation robust standard errors in parentheses.