# Credit and Classification:

## Defining Industry Boundaries in 19th Century America *

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**Abstract**

While studies of categorization and its effects have proliferated in recent years, organizational scholars have paid less attention to the problems of meaning that accompany classification systems operating at an early stage of institutionalization. In this paper, we examine how issues of hybridity and ambiguity were handled in one of the first general systems of industrial classification in the United States, the credit rating schema of R.G. Dun and company. Drawing on a repeated cross-sectional study of credit evaluations during the postbellum period, our empirical analyses suggest that organizational membership in multiple categories need not be problematic when classification systems themselves are emergent or in flux, but that these heuristics still lead to sanctions against organizations when they adopt ambiguous identities or challenge externally imposed boundaries. In the 19th century, boundary transgressions were especially serious when they violated the occupational closure of the established professions, mixing sacred with profane trades. As the Dun schema became institutionalized, boundaries between industries were more clearly defined and all boundary transgressions became subject to penalty by credit reporters. Our perspective seeks to highlight the utility of an evolutionary perspective on social classification and the distinctive problems of meaning that may arise over the course of category institutionalization.

"Because men formed groups, they were able to group things; they classified things simply by placing them in the groups they had already formed. And if these various things were not simply juxtaposed to one another but ranked according to a unified plan, that is because the social groups they belong to are themselves interdependent …" Durkheim (1912 [2001: 112])

## Introduction

Classification plays a ubiquitous role in identifying and evaluating organizations in contemporary society. Phone books, newspapers, and the internet offer classified listings of businesses and services, guiding our consumption activities, job searches, and appraisal of local amenities. Trade directories, catalogs, and reviews offer more specialized categorical schema, with functions ranging from the rating of dining establishments (Rao et al. 2005) and enumeration of distinct investment opportunities (Lounsbury and Rao 2004) to the differentiation of artistic genres and producers (DiMaggio 1987; Hsu 2006a). Government agencies and academics rely on standard industrial classification systems, which emerged around the time of World War II in the United States (Kolesnikoff 1940) and abroad (Beale 1949) to assist in the collection of official statistics and the development of industrial policy.

If we turn the clock back to the early or mid 19$^{th}$ century, however, we find little in the way of such systems of organizational classification. In the United States, the first Census of Manufacturers, in 1810, aggregated households and establishments by the kinds of goods they produced (U.S. Census Office 1814), but did not identify individual enterprises or attempt to categorize activities that fell outside of manufacturing. Trade directories at the time were also crude. By the 1840s, large urban centers such as Boston, Charleston, and New York City had directories of businesses and voluntary associations, which enumerated organizations, their locations, and functions (for analyses using these materials, see Pred 1965 and Gamm and Putnam 1999). For the vast majority of individuals populating smaller communities, though, organizational classification remained a matter of personal inspection of the goods or services provided by an enterprise, direct contact with the proprietor, or hearsay about an organization via social ties. Even in cities, the spatial agglomeration of organizations into "retail districts" yielded an important heuristic for identifying their form and function (Domosh 1990).

In this paper, we trace the emergence of one of the first general systems of organizational classification in the United States and analyze its effects on the evaluation of individual enterprises. Considered in the abstract, a number of institutional changes might be tied to the appearance of this classification system during the course of the 19th century, including the transition from generalist to specialist producers (Durkheim 1893 [1984]), the proliferation of formal rationality (Weber 1968), and the increasing importance ascribed to organizational, rather than individual, actors (Coleman 1974). More concretely, systematic classification originated in mercantile agencies that sought to evaluate the credit-worthiness of businesses for purposes of trade finance and investment (see Carruthers and Cohen 2006 for a general discussion). Between the late 1850s and 1900, the most successful of these ventures – R. G. Dun and Company – developed an approach to classification that would remain in widespread use until after World War II. Although narrowly conceived for credit rating, the schema was soon widely adopted by American businesses for purposes of marketing, procurement, site planning, and competitor evaluation (Hayes 1948).

The rise of Dun's system of classification raises a number of provocative theoretical questions for organizational sociology. How do new categorical schemata impose boundaries and create social identities (Lamont and Molnár 2002; Abbott 1995)? What are the consequent effects of relations across boundaries (Zelizer and Tilly 2007)? How do emergent categorical schema compare, in this respect, with schema that are more established and mature? And when, in particular, do violations within new schemata lead to sanctions against the social actors being classified (in terms of unequal access to resources or opportunities)?

To explore these issues, this study draws on an extensive archive of materials from Dun and Co., including the classifications and credit ratings applied to a sample of over 100,000 business enterprises. We begin by reviewing the existing literature on organizational classification, focusing on two theoretical themes that have generally been considered separately – the evolution of classification schema and the treatment of 'hybrid' organizations that do not conform exclusively to a single category. In the next section, we trace the development of credit rating and classification at Dun and Co. from the mid-19th century, suggesting how this case helps shed light on the intersection of these theoretical themes. Our central thesis is that organizational

membership in multiple categories is not problematic when classification systems themselves are emergent or in flux, but that these heuristics still impose sanctions on organizations when they adopt ambiguous identities or violate externally imposed boundaries. The institutionalization of a classification schema over time, however, causes categorical boundaries to gain a normative standing and leads to penalties against organizations that violate them. These arguments are tested in a repeated cross-sectional design, considering the credit ratings of a sample of firms in the Dun Reference Book between 1870 and 1900. In conclusion, we discuss the possibility of extending this analytical approach to other social dimensions, including categories pertaining to class, ethnicity, and occupation.

## Theoretical Background

### *Evolution in Organizational Classification*

The emergence and evolution of systems of organizational classification has been a topic of scholarly inquiry for about a decade now. In early treatments, researchers tended to emphasize how audiences segregate organizations (and products) into hierarchical or mutually-exclusive forms according to a set of underlying criteria and how those criteria change over time (Mohr and Duquenne 1997; Rosa et al. 1999; Ruef 1999). For instance, Mohr and Duquenne (1997) traced taxonomies of social welfare organizations back to the late 19$^{th}$ century, when reformers – such as the minister and sociologist Charles Henderson – sought to map the relationship between classes of the poor and relief practices. Using Galois lattices, Mohr and Duquenne illustrated how the boundaries distinguishing these organizational forms in New York City changed between the period of poverty relief (using data from 1888) and the Progressive era (using data from 1917). Ruef (1999) offered a similar evolutionary analysis of discourse in the American healthcare field, finding that organizational types were only weakly differentiated along a dimension of health services accessibility during the 1960s and 1970s, but became strongly differentiated on this dimension as the field moved toward a market oriented logic.

More recent work on organizational classification has attended to the creation of new categories of industries or products and transformation of existing ones. In their study of the mutual fund industry, Lounsbury and Rao (2004) argue that categories are re-constituted based on internal technical criteria (e.g. number of funds and performance variability within a category) and external pressures from industry media and stakeholders, with particular influence from the interests of dominant incumbents. Ruef's (2000) analysis of the emergence of new industry categories in healthcare likewise finds that regulatory recognition of organizational forms has been driven by both the number of organizations within (or closely related to) a category and media attention surrounding that category in the discourse of physicians, nurses, administrators, and health policy makers.

A shortcoming in this literature on classification has been that it largely ignores the problem of 'hybridity', whereby some organizations can be assigned membership in multiple categories. In one evolutionary study, Ruef (2000: 706) acknowledged this limitation explicitly, noting that "methods for extracting classification hierarchies tend to be committed a priori to treelike structures" even though "many of the most interesting organizational forms are more properly seen as the evolutionary product of two or more parent forms". Thus, the category of 'health maintenance organizations' that emerged in the 1970s could be seen as a hybrid that combined aspects of earlier forms, such as group practices and insurance carriers. As reviewed below, some studies (most notably, Rao et al. 2005) have begun to combine an interest in the evolution of organizational classification with consideration of hybrid identities.

### *Hybrids and Classification*

Largely unconnected to work on evolutionary classification, a growing theoretical and empirical literature has addressed the impact of hybrid identities in mediated markets. In these markets, mass audiences and formal gatekeepers typically devalue organizations or products that cannot be assigned readily in a system of existing classifications (Hannan et al. 2007). Zuckerman (1999, 2004) documented this process in the case of categories employed by securities analysts and, more recently, Hsu (2006a) has identified a similar handicap accruing to

hybrid films that span multiple genres. Several social mechanisms may explain these outcomes. First, audiences come to associate certain features with particular categories and evaluate organizations and their products on that basis. Since organizations that span multiple categories are unlikely to feature the prototypical features of each one, they suffer from illegitimacy when examined on the basis of categorical expectations (Hannan et al. 2007). Second, audience members who are gatekeepers (e.g. critics) develop cognitive schema to help them evaluate organizations and products. When these social objects do not match taken-for-granted categories, gatekeepers devote less attention to covering and analyzing them (Zuckerman 1999; Hsu 2006b). Mass audiences then ignore organizations or products that are bereft of critical coverage.

In contrast to research on the evolutionary dynamics of classification, analyses of hybridity tend to assume that the schema used to evaluate organizations or products are mature and stable. As a result, there is some risk of selection bias, insofar as violations of evaluative schema are found to generate deleterious effects for organizations and / or products, but only when research designs sample industries or audiences that employ stringent and well-developed criteria for classification. A notable exception to this rule is a study of the erosion of categorical boundaries in French gastronomy by Rao and colleagues (2005). Considering the boundary between classical and nouvelle cuisine, they analyze the consequences that accrue to chefs and restaurants that borrow from a rival category (e.g. a classical restaurant that introduces some dishes based on nouvelle cuisine elements). Interestingly, borrowing increases the risk of a downgrade among critics, but this effect is attenuated significantly with increases in the proportion of chefs who borrow elements from a rival category in a given year.

To extend the evolutionary analysis of hybridization offered by Rao and his colleagues, we should consider contexts where boundaries are being developed, in addition to those were they are being eroded. In the next section, we offer some initial hypotheses concerning the impact of organizational hybridity in emergent systems of classification.

*Emergent Classification and Hybridity*

When systems of classification are not yet institutionalized, they lack the cognitive or normative standing to impose strong sanctions on the social objects they are intended to categorize. Confronted with objects that straddle categorical boundaries in a new system, audience members are more inclined to dismiss this as a shortcoming of the classification heuristic than the object itself. By the same token, formal gatekeepers working with a new heuristic have often not developed coherent schema for evaluating objects and mapping them to categories. Under such circumstances, differential allocation of resources may only be weakly related to categorical conformity.

Research in cognitive psychology suggests that some hard-to-classify objects may suffer devaluation, even when classificatory heuristics themselves are emergent or in flux. To probe these arguments, it is useful to differentiate between two problems of meaning that may confront an audience member who is assigning objects to categories: ambiguity and hybridity. *Ambiguity* is a situation where an object could be mapped to more than one category and the appropriate mapping cannot be determined without additional contextual information (Abbott 1997; Tuggy 2006). For instance, in classifying a 'resort hotel' in a categorical schema, an audience member may have access to categories for 'hotel', 'golf course', 'amusement park', 'spa', and 'miscellaneous', but none for 'resort'. Lacking contextual information, the assignment of a category becomes a matter of guesswork (e.g. 'hotel and amusement park' versus 'hotel and spa'), a failure to resolve ambiguity ('hotel and miscellaneous'), or the elision of categorical information in its entirety (no classification at all).

*Hybridity* is a situation where an object is mapped to one or more categories and the (partial) membership in those categories is clear, even if the degree of membership is not. In positioning a 'hotel and restaurant' in a categorical schema, it is clear that the hybrid has a partial membership in the 'hotel' category and a partial membership in the 'restaurant' category. Vagueness results when an audience member is unclear as to the extent of membership (Rosch and Mervis 1975; Osherson and Smith 1997). At the extremes, is the organization in question primarily a dining establishment with a few rooms-to-rent? Or a motel with a glorified snack

room? Given this uncertainty, the audience member must account for the fact that the hybrid could merely be a borderline exemplar of each constituent organizational category (see Hannan et al. 2007 [Chapter 1]).

The impact of ambiguity and hybridity on classification depends on their capacity to generate 'mistakes' among audience members, where members are unclear either about the classification of a social object or its imagined distance from a categorical prototype. The character of such mistakes will tend to vary with the extent to which a classification system is institutionalized. Addressing experimental evidence on ambiguity, DiMaggio (1997: 270) notes that audiences "interpret ambiguous stimuli more accurately, and retrieve information about a story they have heard more effectively, if it is relevant to preexisting mental structures that render the information interpretable." Evidence from linguistic processing also suggests that naïve subjects experience difficulty in processing ambiguous discourse compared to unambiguous texts. With experience, however, habitual (i.e. automatic) comprehension largely eliminates the lag between ambiguous and unambiguous categorization (Rawson 2004). In other words, as audiences gain experience with a categorization task, they tend to develop schemata that effectively deal with ambiguity, often through the availability of 'default' categories or rapid access to contextual information.

Considering the problem of hybridity, the impact of institutionalization appears to be quite different. Most experimental evidence on hybrids relies on naïve subjects, usually college students who have no prior exposure to the classification task and who lack introspective insight into their own categorization heuristics. As suggested by one important experimental result, these subjects are comfortable rating objects as typical exemplars of a composite category (e.g. 'striped apple'), even when they think the objects are poor exemplars of the constituent categories ('striped' and 'apple') (Osherson and Smith 1982).[1] Applied to an organizational example, a business may closely match an audience's prototype of a 'hotel and restaurant', even when it does not match their expectations for 'restaurant' (perhaps because all patrons must enter through a hotel lobby) or 'hotel' (because many patrons of the business do not reside there). Contrary to

[1] More generally, this psychological bias appears to be a feature of the conjunction fallacy, in which audiences believe that an instance is more likely to be mapped to a conjunction of categories (A & B) than a single category (A), a conclusion that is logically invalid (see readings in Gilovich et al. 2002).

existing sociological theory, this suggests that there is no inherent cognitive bias against hybrids *among a naïve audience*. Penalties for hybridity tend to accrue only when boundaries between social objects become institutionalized in a mature classification system; or, alternatively, when objects violate strong categorical expectations that are imported from existing schemata.

[ Insert Figure 1 About Here ]

In summary, an important insight from cognitive psychology is that the use of categories over time affects the task of classification itself (Ross 1999). If experimental findings can be generalized at a more macro level, the central problems of meaning that arise in social classification will vary with the extent of institutionalization in a classification system (see Figure 1). For classification systems exhibiting a mature level of institutionalization, hybridity is problematic, since audiences have come to expect categorical conformity and the evaluative schema of critics lead them to ignore social objects that transgress conventional boundaries (Zuckerman 1999, 2004; Hsu 2006b). Ambiguity, on the other hand, is dealt with routinely via schemata that offer specific categorical defaults (e.g. 'food products [not elsewhere classified]') and rapid access to contextual information (DiMaggio 1997).

Classification systems operating at an early stage of institutionalization are confronted on a regular basis with problems of ambiguity. Newly developed categories may be ill-equipped to organize social objects, audience members lack schemata to deal with exceptions, and contextual information for resolving ambiguity is absent. At the same time, audiences employing such rudimentary systems of classification tend to be tolerant of boundary transgressions and, thus, hybridity. Based on the evidence of cognitive experiments, audience members may even find that objects which map to multiple categories are simpler to evaluate using prototypical expectations than when they map to individual categories (Osherson and Smith 1982). Deviations from this tolerance for hybridity primarily occur when external schemata provide a strong basis for categorical boundaries that is absent in rudimentary systems of classification.

## Research Setting

To pursue these hypotheses, we consider a setting in which organizational classification was at an early stage of institutionalization, focusing in particular on business enterprise in late-19th century America. We begin by describing some of the problems of meaning confronting audiences who interacted with these organizations and address the efforts on the part of mercantile agencies to categorize and evaluate them. We then discuss the evolution of the classification schema in the credit reports of the Dun Mercantile Agency, which emerged as one of the first – and most influential – comprehensive approaches to categorizing businesses across the United States.

### *Classification in 19th Century America*

Issues of hybridity and ambiguity were widespread in classifying business enterprise in the 19th century. While commercial specialization had become prevalent in some urban centers during the colonial period (see Doerflinger [1983] on the case of Philadelphia), proprietors in more rural areas continued to engage in diversified trade, offering an eclectic variety of product lines and services.[2] Hybrid organizations were commonplace in the United States, ranging from the conventional (e.g. 'hotel and restaurant') to the unusual ('hotel and butcher'). In the postbellum Cotton South, for instance, an estimated 16% of all businesses engaged in multiple trades and 34% operated as 'general stores' (see *Data and Measures* below). On first contact, customers, suppliers, and creditors dealing with these enterprises faced considerable uncertainty as to how much inventory or labor was devoted to a particular line of business and, in some cases, whether such commitments were stable throughout the year or subject to seasonal variation.

Classification in the case of other enterprises was even more difficult, given their adoption of inherently ambiguous identities. The etymology of the term 'sundries' – suggesting miscellaneous products, odds, and ends – dates to the mid-18th century and was soon adopted by

[2] Note that this generalization applies specifically to the case of retailers. As described in Porter and Livesay's (1971) influential account, wholesalers during the same period became increasingly specialized.

business proprietors who had extended their inventory or services in an undefined way (e.g. 'hotel and sundries'). This ambiguity was encouraged by distribution practices at the time, since wholesalers often add miscellaneous free goods to shipments as a competitive strategy. For instance, Clark (1946: n13) describes a characteristic case from the late 1800s, where a merchant transacting with Blackwell's Durham Tobacco Company "was given ten 25-pound boxes of soap with an order for the same amount of tobacco". Lacking detailed contextual knowledge about an enterprise's clientele and suppliers, some observers could only guess as to the lines of business it was engaged in.

Because of the difficulties in classifying 19th century organizations, audiences were forgiving of boundary transgressions. Likely exceptions were organizations that violated the occupational closure of the established professions. Medical doctors, dentists, lawyers, civil engineers, architects, and, by the end of the century, accountants had devoted great effort to differentiating themselves from other trades. To sustain occupational boundaries, they created training schools, founded professional associations, instituted codes of ethics, and lobbied for state licensure (Wilensky 1964). More subtly, their professionalization projects advanced jurisdictional claims that excluded outsiders from their trades, while also limiting their own engagement in non-professional activity (Abbott 1988). While the enactment of these boundaries in everyday work situations has seen limited scholarly attention (Lamont and Molnár 2002), the implications for professional practices and partnerships in the 1800s are clear – the combination of professional offices with some other line of business would attract charges of categorical impurity, even when combinations of profane trades risked little or no sanction. In a landscape of enterprises with ambiguous or hybrid identities, professional organizations were expected to stand out as islands of categorical clarity.

*Credit and Classification*

Antebellum business transactions often suffered from fundamental gaps in information and trust. While local stakeholders could gain knowledge about a business through physical inspection or through their social networks, audiences located at some distance had to rely on less reliable sources, such as letters of reference or reputational hearsay (Madison 1974). The information gap was especially acute for providers of credit, who often offered loans or financed trade without benefit of direct contact (Carruthers and Cohen 2006).[3] With economic expansion in the South and West, financiers and wholesalers in the large Northeastern seaboard ports were especially hard-pressed to obtain informative assessments of merchants and manufacturers in the hinterland.

Rudimentary credit reporting arose in the early 1800s through correspondents, who toured distant districts, collected debts, and made notes on business activities. In 1829, the London firm of Baring Brothers signed a contract with a prominent Boston merchant, Thomas Wren Ward, who was charged with the task of selecting correspondents in North America and organizing their credit reports in a "Private Remarks Book" (Hidy 1939). This book eventually contained information about more than one-thousand businesses, organized into eleven credit categories, but lacked a corresponding schema for industrial classification. Given Ward's extensive reliance on intimate connections, ranging from small merchants to presidents of the United States, critics regarded his approach as "antediluvian" by mid-century (ibid: 87). Around this point, systematic credit reporting depended on local attorneys as correspondents, who offered information on enterprises in their own communities. The new organizational form was pioneered by the New York firm of Griffen, Cleaveland and Campbell in 1835 and the "Mercantile Agency" of Lewis Tappan in 1841, to be refined further under the stewardship of Robert Graham Dun, who replaced Tappan as a partner in the mid-1850s (Foulke 1941; Carruthers and Cohen 2006).

[3] Data for business loans, in the modern sense, only comprised a minor part of this information gap. Given the lack of efficient transportation and communication networks, *any* business transaction involving goods or services delivered at a distance could impose a need for credit assessment. This need was compounded by the scarcity and lack of standardization in 'hard' currency during the colonial period and early Republic (Foulke 1941).

By 1859, the R. G. Dun Mercantile Agency had enjoyed some early successes. It had 1,195 subscribers requesting credit information in New York alone and branch offices in more than a dozen cities in the U.S., Canada, and United Kingdom (Norris 1978). But the business information provided by the Agency suffered from a major weakness. Credit reports could only be obtained by subscribers who called on a "confidential clerk" at the Agency about a particular enterprise (ibid: 51) and there was no comprehensive volume summarizing the activities and credit ratings of a range of businesses. This weakness was being exploited by a Dun competitor, John Bradstreet, who in 1857 had begun issuing a bound volume that offered short-hand credit reports for a variety of enterprises. Although Bradstreet's Commercial Reports had more limited coverage than Dun and focused on urban businesses, its availability had a devastating effect on the profits of the Mercantile Agency.[4] As a competitive response, the Mercantile Agency issued its own "Reference Book" in February of 1859, covering more than 20,000 businesses, listed by name, line of business, and credit rating (Norris 1978).

Given its format, Dun's Reference Book soon became a business standard for linking the evaluation of an enterprise to its industrial classification. As Foulke notes in his retrospective on this history of R.G. Dun, this was a volume "which contains the names of all active commercial and industrial business enterprises in every city, town, village, and hamlet in the United States, together with two symbols, one before, and one after each name. The symbol which appears before each name indicates the line of business activity, and the one which follows indicates the estimated financial investment in the business and its general credit worthiness" (1941: 313). Dun's system of organizational classification did not emerge fully formed in the late 1850s. A detailed examination of the Reference Book over time suggests that its evolution can be periodized into three distinct classification regimes: (a) an antebellum schema, which offered an early, mutually-exclusive classification of trades (1860); (b) a postbellum schema, which recognized the importance of hybrid organizational forms in the Reconstruction era (1864-1885); and (c) a 'modern' schema, which combined features of the antebellum and postbellum approaches, persisting until the adoption of SIC codes in the mid-20$^{th}$ century (1885-1950).

[4] Bradstreet's initial volume contained reports on roughly 17,000 businesses in New York, Philadelphia, Boston, Baltimore, Pittsburgh, Cincinnati, Louisville, St. Louis, and Chicago (Foulke 1941: 298).

*Classification Regimes at R.G. Dun*

Shortly after producing the first volume of the Reference Book, Dun adopted a new approach to the 1860 volume that would divide its contents by industry groups. Six industrial categories were advanced for this purpose, including shipping and commission merchants; silk, cotton, and woolen goods; boots and shoes; hardware, founders, metals, and house furnishings; booksellers, publishers, and stationers; and hats, caps, furs, and straw goods (Dun 1860). The volume also added private bankers, who had not been covered by the inaugural volume. This subdivision was designed primarily to appeal to subscribers who specialized in one of the industrial categories and, thus, only wanted to purchase that part of the Reference Book.

The antebellum schema proved to be abortive. Recognizing "that even under his elaborate classification system many country merchants defied clear classification", Dun excluded small traders and "adapted the present work to that class of merchants who grant credit as bankers, money-lenders and wholesale dealers" (quoted in Norris 1978: 68-69). The number of firms covered in the book declined from over 31,000 to 25,260 in 1861, reflecting a more limited scope for the Mercantile Agency (Vose 1916: 98). With the onset of hostilities in the Civil War, Dun suspended the production of the Reference Book entirely in 1862 and 1863. As the end of the conflict appeared in sight during the following year, the Mercantile Agency prepared to issue a new version of the book, delivering copies to subscribers in September of 1864 and re-issuing the volume with some corrections in January of 1865.

The postbellum schema that emerged revealed a number of fundamental changes. Coverage in the Reference Book had been extended substantially, to 123,000 firms around the end of the war and a staggering half million by 1872 (Vose 1916). Dun also incorporated estimates of capital worth to offer a more substantive financial basis for evaluating businesses. Most notably, the volume was increasingly geared toward large specialized wholesalers ('jobbers'), leading Dun to call for classification "without such rigid discrimination in the markings" (Norris 1878: 83). The correspondents at the Mercantile Agency now referred to some two-hundred categories in classifying business organizations (see Figure 2a for a sample). The

schema explicitly allowed for the identification of hybrids (firms linked to multiple categories) and businesses that evidenced ambiguity in their product or service lines (marked with an '&c.' for etcetera). Some businesses were identified in both multiple explicit categories and with an ambiguous product line (e.g. the store owned by B.H. Bequest in Figure 2a).

[ Insert Figure 2 About Here ]

The postbellum classification schema was well-suited to the hybrid and ambiguous industry boundaries of the Reconstruction era. By the mid-1880s, however, Dun subscribers increasingly wanted categories at a higher level of aggregation, "so they could address circulars and draw off lists of names for the use of traveling salesmen" (quoted in Norris 1978: 112). In March of 1885, the Reference Book added a column for "Trade Classification", which mapped businesses to one of twenty-six categories. The new categories were indicated symbolically (e.g. '*' for general stores, 'ㄱ' for lumber dealers and saw mills) and supplemented the existing detailed classification. While some hybrid forms did not fit comfortably into the higher-order categories and other businesses could not be mapped to them at all (see the turpentine dealers in Figure 2b), this schema became highly institutionalized, persisting until the adoption of SIC codes at Dun and Bradstreet in 1950.[5]

[ Insert Table 1 About Here ]

More generally, the institutionalization of credit evaluation and classification at the Mercantile Agency was evident in several changes between the end of the Civil War and turn of the century (see Table 1). The elaboration of the classification system from a single level of fine-grained industrial categories to a two-tier schema increasingly meant that credit correspondents had to consider the logical coherence of business functions in the enterprises they analyzed. Considering the data we analyze below, around 78% of hybrid organizations straddled the

[5] The number of industrial classifications with symbolic identification grew substantially during the early 20th century. By the 1940s, the Reference Book featured an index of 293 categories (Foulke 1941: 314).

symbolic trade classifications that were adopted in 1885. On Robert Dun's insistence, reporters at the credit agency were also subject to more training in the task of credit and industrial classification. At the end of the Civil War, his correspondents were typically unpaid locals – most often attorneys, bank cashiers, or merchants -- with limited experience in credit reporting. In the succeeding decades, these correspondents were gradually replaced by a cadre of professional reporters, who journeyed over wide-ranging circuits, accumulating experience in credit reporting and exposure to business enterprise in diverse regions. As an infrastructural support to their activities, these reporters could count on an increasing number of branch offices that opened in the United States, Canada, and Europe. In the Cotton South, for instance, these offices numbered only two in total at the end of the Civil War (in New Orleans and Charleston), but by 1890 their numbers had swelled to ten, with new locations in Atlanta, Birmingham, Columbus, Macon, Mobile, Montgomery, Savannah, and Shreveport.

A more subtle facet of institutionalization involved public acceptance of business classification into nominal (industry) and ordinal (credit) categories. Between the 1840s and the 1880s, the morality behind Dun's schema was subject to regular attack, as the press and courts debated the "inquisitorial" (and, potentially, libelous) nature of credit rating agencies (Madison 1974). Opposition to credit rating reached its height in 1876, with the publication of *The Commercial Agency 'System' of the United States and Canada Exposed* by Thomas Meagher, a disgruntled former employee of Robert Dun. Partially in response to such confrontation, the Mercantile Agency's approach to classification and credit rating evolved considerably until the 1880s. These changes seemed to bear fruit with a marked decline in journalistic and legal challenges during the closing decades of the 19$^{th}$ century. In 1882, Federal courts established that credit reports were privileged communications and, in 1896, they were given copyright protection, defined as the intellectual property of the seller, not of the subject or purchaser of those reports (Sandage 2005: 184). At this stage, P. R. Earling, a leading authority on credit agencies, would declare that the Mercantile Agency was "a permanent institution with the American business-public, and has come to stay" (quoted in Madison 1974: 165).

In order to shed light on the effects of institutionalization, we focus our research design on the schema employed by Dun during the thirty-five years following the Civil War. The

abandoned 1860 schema was only in use for a single year and may be regarded as historically idiosyncratic. By 1900, the year of Robert G. Dun's death, the mercantile system was an integral feature of American business life. Data from the intervening years, as described in the following section, thus provide the most appropriate window on the evolving relationship between classification and organizational evaluation at Dun and Company.

## Data, Measures, and Method

### *Data*

The study employs data from the R. G. Dun *Reference Book*, the most extensive listing of business classifications and credit ratings in the 19th century (Norris 1978). To focus attention on the period of institutionalization in the Dun classification scheme, we sampled firm data from four decennial cross-sections in the Reference Book, including 1870, 1880, 1889, and 1900.[6] In 1870, Dun listed credit information for 430,573 proprietary enterprises; ten years later, the total was roughly 764,000; and, by 1900, the number had expanded to over 1.2 million enterprises (Vose 1916). The sampling frame was then narrowed to address two empirical concerns: (a) all sampled businesses should be located in a region that is subject to relatively homogeneous institutional and economic conditions; and (b) correspondents in that region should be unencumbered by previous classification schema, particularly the 1860 template for categorizing trades. Both design considerations point to the Cotton South (including the states of Alabama, Georgia, Louisiana, Mississippi, and South Carolina) as a particularly useful case for empirical analysis. The welfare of businesses in the region was strongly tied to the success of a single commodity crop, even when those enterprises did not directly engage in the production or distribution of cotton. Moreover, Lewis Tappan's abolitionist sensibilities had constrained the

[6] The timing of these panels offers the advantage of comparison with Census coverage of a subset of enterprises (particularly, those in the manufacturing sector). Exploratory analyses suggest that Dun's coverage is more complete than that achieved by the Census and, moreover, includes a large number of sectors (retail, wholesale, hospitality, service, professional, etc.) that are not covered by the Census at all. For 1889, coincidence with Census data was not a consideration (owing to the destruction of the 1890 Census) and sampling was timed for the sake of completeness of the archives in the Library of Congress.

Mercantile Agency's penetration in the South before the Civil War (Wyatt-Brown 1966). While the South was not entirely virgin territory for R. G. Dun, the two decades after the war witnessed substantial expansion of its credit rating efforts in that region, including the founding of eighteen branch offices in former Confederate states (Norris 1978: 108, 157).

The July 1870 edition of the Reference Book identified 19,929 businesses in the Cotton South; the July 1880 edition contained 31,673 organizations in the region (approximately 4% of all firms enumerated by Dun); 48,053 and 54,983 entries appeared in the 1889 and 1900 editions, respectively. For each case, information was coded on the business location, name(s) of proprietor(s), proprietor demographics, legal form of the business, capital assets, industrial classification, and credit rating. Listwise deletion removed cases that were either cross-listed duplicates or had missing information on capital assets, leaving 119,518 cases for purposes of multivariate analysis. Table 2 summarizes the descriptive statistics and bivariate correlations for all measures.

[ Insert Table 2 About Here ]

Using proprietor names, we linked businesses that had a common owner, both within each cross-section and between cross-sections. About a third of all observations (N=40,258) could be organized into panels using this procedure. In order to parse out the potential impact of unobserved proprietor characteristics, these panel data were analyzed separately, as noted below, as well as part of the repeated cross-sectional data.

### *Measures*

*Credit Ratings*. Credit evaluations serve as the dependent variable in the analysis. In summarizing the credit-worthiness of an enterprise, correspondents were instructed to consider factors such as capital assets, the "nature, extent and hazard of business", qualifications of proprietors, and firm strengths and weaknesses (Norris 1978: 55). During the postbellum period, firms were ranked into seven credit categories, ranging from 'A1', for a respected firm with

unlimited credit, and '1' or '1.5', for firms with strong credit ratings, down to '2' or 2.5', indicating good credit, '3', indicating fair credit, and '3.5', indicating an undesirable credit report (see examples in Figure 2).[7] The distribution of ratings was highly skewed, with many businesses receiving undesirable ratings (roughly 55% in the Cotton South) and few receiving strong or unlimited credit endorsements (less than 2% at a rating of 1.5 or higher). For purposes of analysis, ratings were reverse-coded into an ordinal scale ranging from '1' (undesirable report) to '7' (unlimited credit).

Previous research on the effects of classification has considered the extent of coverage by critics, as well as the ordinal ranking of businesses and goods (e.g. Hsu 2006b). In 20% of the cases in the Reference Book, no credit rating was indicated by a correspondent for an enterprise and Dun subscribers were instructed to view the credit-worthiness of such enterprises with suspicion. Consequently, the analyses below consider credit *coverage*, as well as credit *rating*, addressing both outcomes within the framework of a selection model.

*Capital Assets*. Credit reporters at Dun assigned firms to ten categories of 'pecuniary strength', ranging from a class of small enterprises (referenced by the code 'K'), with less than $2,000 in working capital, to the largest firms (referenced by 'A+'), which possessed more than one million dollars in capital assets.[8] Although a firm's assets were logically independent from its credit rating, R.G. Dun emphasized that assessments of capital worth should be an important criteria for the evaluations offered by his correspondents, leading to a high correlation between these measures (Table 2). For purposes of analysis, we converted capital assets into a continuous measure using mid-point estimation and logged the measure to reduce skewness. The small number of top-coded firms (N=206) were assigned assets of one-and-a-half million dollars prior to log transformation.

[7] During the 1880s, an eighth credit category was added ('4') to denote financially unstable firms. For the sake of comparability with previous years, this category is subsumed under undesirable credit reports.
[8] In 1875, a new category of pecuniary strength ('L') was added to identify enterprises with less than $1,000 in working capital and another category ('M') appeared in the 1880s to identify firms with less than $500. For the sake of historical consistency, both categories were subsumed within asset class 'K'.

*Industrial Classification*. Using Dun's detailed industry descriptors (see Figure 2), each firm was assigned to one or more of 219 categories identified in the *Reference Book* during the postbellum period. Approximately 83% of the firms in the 1870-1900 period were listed with only one explicit category, slightly over 15% were listed with two, 1% with three, and only 0.05% were associated with four explicit categories. Less than 1% of firms were not assigned a classification at all, indicating ambiguity in industrial category. In addition, the classification of 9% of all firms was marked with an etcetera ('&c.'), denoting an ambiguous product line or service for a multi-product enterprise. *Hybrid* organizations were defined as firms that combined more than one explicit category (16% of the sample). *Ambiguous* organizations were defined as uncategorized firms or firms that had (at least) one ambiguous product line or service. Note that hybridity and ambiguity are not mutually-exclusive in this operationalization; empirically, however, these dimensions are effectively uncorrelated in the data (r = -0.003).

Assessment of the effects of hybridity may be sensitive to the general frequency with which a particular hybrid occurs. Some hybrids are so common that they take on an idiomatic status (e.g. 'restaurant and bar') and are widely viewed as cognitively congruent; others entail infrequent combinations ('restaurant and barber shop') that may challenge taxonomic schema among consumers and evaluators. To separate the impact of hybridity *per se* from the degree of taken-for-grantedness associated with common hybrids, our analyses include a control for the frequency of a categorical combination.[9]

The models reported below also consider the possibility that categorical content may affect credit scores. Since Dun correspondents judged the moral character of trades, in addition to their financial prospects, the effect of industry categories will capture some combination of pragmatic and normative considerations. To address variation in the legitimacy ascribed to different industries, all models include dummy variables for the most common organizational forms. Using a frequency of 1,500 firms as a criterion for inclusion, this leads to the addition of controls for general stores (N=40,905), grocers (18,727), dry good stores (5,948), drug stores

[9] When highly-diversified organizations become common, a new category (e.g. 'general store') may emerge in lieu of constant invocation of categorical combinations. While such categories could be treated as hybrids – and display some similarity to hybrids in their evaluative consequences -- we restrict the term exclusively to those organizations that straddle the categories employed by an audience.

(5,252), saloons (4,739), farms (4,586), professional's offices (2,714), and eight other common industry categories (blacksmiths, cobblers, commission merchants, confectionaries, grist mills, jewelers, millineries, and saw mills).[10] Given their frequency and familiarity, grocery stores are used as the reference category. Following Wilensky (1964), the category of professional's offices subsumes all organizations whose proprietors belonged to the established mid-19th century professions, including physicians, dentists, lawyers, civil engineers, and architects.[11]

*Local Market Conditions.* Considering recent ecological treatments of classification (Hannan et al. 2007), we controlled for the impact of other firms in a region on the coverage and evaluation of each focal enterprise. If the local prevalence of businesses matching a particular form serves to enhance cognitive legitimacy (Hannan and Freeman 1989), then firms should benefit in coverage and ratings when numerous firms in a county receive the same industrial classification from credit reporters. Local correspondents will feel a strong sense of familiarity with these enterprises and favor them with attention and approbation. Conversely, one may argue, local firms will also compete with one another for credit coverage and ratings, given a finite amount of bank capital, mercantile credit, and correspondent time. Since such competition extends across industrial boundaries, we include another variable for *all* firms in a locale. Previous research in organizational ecology has suggested that the effects of such competitive interaction may be more geographically localized than the benefits of legitimation (Carroll and Hannan 2000: Chapter 11). Consequently, we operationalize the number of all firms at the level of settlements – i.e. identifiable post office locations, villages, towns, and cities in the Dun Reference Book – rather than counties as a whole. As a general proxy for consumer demand, all models also control for the population residing in a given county. Given the high pairwise correlation of this variable with the count of all firms (see Table 2), the latter measure is subject to a log transformation to avoid multicollinearity in the analyses.

[10] These industry categories cover 75% of all businesses in the Cotton South. Analyses suggest that results are not sensitive to the inclusion of dummy variables for less frequent organizational forms (e.g. those added via a frequency cut-off of 1000 or more organizations).

[11] Bookkeepers / accountants are excluded from consideration, since a number of important professionalization events – such as the formation of a university-based training program, local professional associations, and a national association – did not occur until the 1880s (Wilensky 1964: 143).

*Branch Offices*. A firm's proximity to a Dun branch office could affect its credit rating and coverage, though the direction of these associations is not clear from the outset. On the one hand, proximity to a branch office may have increased coverage and ratings, given the greater monitoring capacity of the Mercantile Agency in that area and possibility of favoritism toward local enterprise. Coverage in distant locales was especially likely to be affected once Dun relied on traveling correspondents, who were charged with the responsibility of returning to branch offices on a regular basis. On the other hand, credit ratings could also suffer near branch offices, given the more stringent credit assessments conducted by branch staff. To examine these effects, we include a proximity variable in all models, indicating the straight-line distance (in miles) separating the county center where a firm was located from the nearest Dun branch office.

*Control Variables*. The legal form of each enterprise was coded from the proprietor listing in Dun's *Reference Book*, distinguishing among sole proprietorships (which serve as the reference category), partnerships (involving more than one proprietor), and corporations (designating incorporated entities). In addition, listed firms could involve agency relationships, in which one or more proprietors served as agents of an individual or firm. Another characteristic of interest from the Dun files concerns the demography of the owners. The analyses below distinguish firms that have at least one female owner, as well as those that are co-owned by family members as opposed to involving non-kin partnerships. Other characteristics of proprietors (e.g. ethnicity, religious background, etc.) are unavailable in the Reference Book, but are controlled for indirectly using a panel modeling approach (featuring repeated observations on a proprietor). The panel models control for proprietor credit history, while an indicator for the length of credit history (based on previous appearances in the Reference Book) is included in all models.

## *Statistical Methodology*

An ordered logit specification was employed to predict the ranking of each firm in the Dun credit rating system. Given potential changes in model parameters over the 1870-1900

period, the data were organized in a repeated cross-sectional design (Firebaugh 1997). Successive model specifications considered: (1) whether firm attributes and industrial classification were correlated with credit evaluation; (2) whether the effect of hybrid identities, in particular, differed for professional and non-professional enterprises; and (3) whether the effect of parameters of theoretical interest differed between the period of early institutionalization (through 1885) and mature institutionalization (after 1885) of the Dun schema. A parallel set of models were then deployed to predict credit coverage of firms, using a basic logit specification. Since the error terms in credit evaluations are likely to be correlated from one business to another (perhaps as a function of unmeasured environmental conditions, such as crop viability or local political stability), we applied Huber-White estimators to obtain robust standard errors in all models.

Similarities between the predictors for credit rating and credit coverage raise concerns about incidental sample selection bias (Winship and Mare 1992) – i.e. the possibility that the business organizations which are most likely to get low credit ratings are also those that are most likely to be ignored by credit reporters. To evaluate the potential impact of sample selection, we obtained maximum likelihood estimates of Heckman's (1979) model for both equations, with $Y_1$ denoting the observed credit ratings and $Y_2$ denoting whether a firm was covered or not:

$$Y_1 = x\beta + u_1 \qquad \text{if } Y_2 > 0 \tag{1}$$

$$Y_2 = z\gamma + u_2 \tag{2}$$

Where the vector **x** contains the independent variables predicting credit rating and the vector **z** contains the variables predicting credit coverage. Application of the model typically requires that at least one variable in **z** not appear in **x**; to this end, we include female ownership as a hypothesized predictor of credit coverage, but not of credit rating.[12] The Heckman model conceptualizes $Y_1$ as a continuous outcome, leading to some differences from the ordered logit specification that are noted below.

[12] The use of this instrumental variable is justified on the basis that female business owners were significantly less likely to receive credit coverage during this period and that there is no association between female ownership and credit rating in the multivariate models.

## Results

### *Credit Rating*

Table 3 reports the effect of organizational attributes and classification on business credit ratings for all cross-sections. A baseline model (1) suggests that business attributes aside from classification affect credit ratings in a predictable pattern. Enterprises that boast more extensive capital assets and a longer credit history have better credit ratings. While a sole proprietorship that only had $1,000 in assets in 1870 could expect an undesirable credit report ('3.5' rating, net of other factors), a proprietorship that had $100,000 in assets could expect a strong credit report ('1.5' rating). Agency relationships were penalized by Dun credit reporters, perhaps reflecting the perception that agents were not as invested (either financially or reputationally) in their enterprises as independent proprietors. There is also some evidence that credit reporters became increasingly stingy over time in allocating high ratings (see trend estimate for year), a development that was encouraged by the gradual replacement of local correspondents – who sometimes inflated the ratings of businesses in their communities – with traveling credit reporters (Norris 1978: 128-130). The geographic distance of firms from Dun branch offices led to more generous credit scores. Reporters were also influenced by local market conditions, increasing their ratings for each focal enterprise as a function of county population and decreasing ratings as a function of competition with other local businesses (of all types).

[ Insert Table 3 and Figure 3 About Here ]

In the pooled sample, the estimates for classification suggest that both ambiguity and hybridity generally posed problems for firms being evaluated by credit reporters. Ambiguity in the categorization of a business had a negative and highly significant correlation with its credit rating ($p < .001$), suggesting that reporters who encountered organizations engaged in unspecified lines of business were inclined to lower their evaluations. For instance, the probability of a fair (or higher) credit rating for a sole male proprietor running a grocery store with an ambiguous

classification was 0.23, compared to 0.27 for a proprietor running a comparable store with an unambiguous classification (Figure 3a). Similar devaluation is evident for hybrid classification, though at a slightly smaller magnitude. Using the same grocery store example, we estimate the probability of a fair credit rating at 0.24 for this business when it is also placed into another industrial category by credit reporters. This effect holds even when controlling for the frequency of form hybridization.[13]

The estimates for many common organizational forms (drug stores, dry good stores, farms, etc.) suggest that their credit ratings are only weakly differentiated from grocery stores in this specification. One notable exception involves the offices of professionals. The established professions possess human capital and a social status that is not shared by their counterparts in less sacred trades and this translates into a significant boost in the credit rating of professional firms (see Figure 3a).

Our second model investigates whether the effect of hybrid form is different for professional enterprises and other types of organizations. The estimate for the interaction effect suggests that boundary transgression is far riskier for professional organizations ($p < .001$), with the cost of hybridity in credit evaluation largely counteracting the benefits that accrue to the established professions. For instance, a physician in a solo practice who otherwise matched the grocery store mentioned previously had an estimated 0.40 probability of a fair (or higher) credit rating. If that physician's business also involved another trade, however, the probability of a fair credit score dropped to 0.27, no different than the predicted rating of an equivalent enterprise devoted only to the merchandising of groceries.

The last two specifications address the possibility of change over time in the key parameters of empirical interest. The estimates for the measure of hybridity are different between the 1870-1880 and 1889-1900 periods, with no penalty accruing to hybrids during the former era and a significant negative effect appearing during the latter (Wald test $\chi^2$ for difference = 3.85, $p < .05$). This is consistent with the intuition that the institutionalization of the classification schema at Dun served to construct industry boundaries that had a normative, as well as cognitive,

[13] Interestingly, organizational forms and hybrids that were more common in the Cotton South tended to have lower credit ratings. Credit reporters may have developed more critical templates for evaluating such businesses, as opposed to businesses that were relatively novel.

standing. Contrary to the predictions in Figure 1, however, there is no significant change in the effect of ambiguity, which has a consistent negative correlation with credit ratings.

Other changes offer hints about the institutionalization of credit rating at Dun. Correspondents seemed to be placing an increasing amount of importance on firms' capital assets in judging credit worthiness. The economic rationalization of credit reporting over time is understandable, given Robert Dun's own exhortation that "there should be a constant effort to keep the credit marking [of firms] in close relation to [their] capital marking" (quoted in Norris 1978: 93). Evidence of the evolution of credit reporting also appears in the impact of local market conditions on credit rating. Until 1880, local correspondents reacted strongly to the competition for credit that might be generated by other enterprises in a settlement, as well as the legitimacy that could accrue to a firm when others in the region adopted the same organizational form (Model 3). But after Dun switched to traveling correspondents, the local demography of organizations had less bearing on credit rating processes (Model 4).

*Credit Coverage*

Pooled results for credit coverage are similar to credit rating for several variables of substantive interest (see Table 4, Model 1). Net of other factors, firms that exhibited an ambiguous classification were 9% less likely to be covered by reporters, perhaps owing to the greater effort and time involved in evaluating these enterprises. By contrast, firms with a hybrid classification were 21% *more* likely to be covered than those categorized within a single industry. Following Osherson and Smith (1982), this may reflect the greater ease with which hybrid exemplars are evaluated by a naïve audience; or it may reflect the greater interest displayed by observers in exemplars that combine diverse features. The estimates for organizational forms also suggest that professional firms were 34% more likely to receive coverage than grocery stores. However, this effect is no different for other frequently-observed forms, such as general stores (+63%), dry goods stores (+47%), and the like, suggesting that the likelihood of credit coverage may be tied to the cognitive legitimacy of a line of business (Aldrich and Fiol 1994) rather than the professional status of its proprietor.

[ Insert Table 4 About Here ]

The penalties accruing to hybrid professional firms in credit coverage parallel those identified for credit rating (see Model 2). Professionals who engaged in other lines of business were significantly less likely to receive coverage than those who devoted themselves exclusively to professional practice. To return to our previous example, a male physician's solo practice only had a 4% chance of not receiving credit coverage, holding all other variables at their means (see Figure 3b). If that physician also ran a grocery store, the chance of non-coverage increased to 5%, roughly equivalent to a merchant active in the grocery business and another (non-professional) trade.

Estimating the model by separate time periods (Models 3 and 4) suggests that coverage of hybrid professional firms may be sensitive to the institutionalization of the Dun classification schema. While the main effect of hybridity did not change over the thirty year period, coverage of professional firms that were also placed in other categories declined markedly (Wald test $\chi^2 = 10.94$, $p < .001$). Rather than discount the ratings of these practices to a greater extent (cf. Table 3), credit reporters appeared inclined to ignore them as boundaries around professional practices became more clearly delineated.[14] By contrast, ambiguity had a larger negative correlation with coverage *before* Dun had a widely institutionalized system of credit evaluation (Wald test $\chi^2 = 6.42$, $p \approx .01$). As suggested by Figure 1, the accumulation of context specific information through branch offices and professional training may have encouraged credit reporters to cover hard-to-classify enterprises, which had previously been ignored in the absence of this knowledge base.

[14] In no small part, this particular instance of boundary definition was probably encouraged by a symbolic classification for "drugs, physicians, and patent medicines" that appeared in 1885.

*Selection Model*

The next set of models address the possibility of sample selection bias on the credit rating variable (see Table 5). Since the selection model is identical to that employed in Table 4 (albeit using a probit function), we restrict attention to the substantive model of credit ratings. A comparison of the ordered logit estimates for credit rating (without modeling selection) and estimates presented here (based on a Heckman selection model) suggest broad similarities. In both cases, ambiguity and hybridity prove detrimental to credit ratings in the pooled sample of businesses (Model 1). We also find that, on the whole, credit ratings associated with professional firms remain higher than those for other common organizational forms. Finally, adjusting for sample selection, the period-specific models continue to highlight the increasing (negative) impact of hybrid classification on ratings with the institutionalization of the classification system at Dun.[15]

[ Insert Table 5 About Here ]

*Is the Relationship between Classification and Credit Spurious?*

A relevant concern in judging the relationship between classification and credit is that there may be unmeasured proprietor characteristics that affect both the classification of a business and its credit rating. In particular, proprietors who suffer from low status or discrimination in a community (based on ethnicity, religious background, and the like) may also tend to employ a strategy of product diversification that allows them to hedge their bets against the vagaries of any specific market niche. In turn, this would lead to an increased probability that their businesses

[15] There are also some notable differences from the ordered logit specification. The estimate for the nonselection hazard is significant ($p < .001$), suggesting that models of credit coverage and credit rating cannot be considered to be independent. In addition, the interaction term for the hybrid classification of professional firms is not statistically significant when ratings are modeled as a continuous, rather than ordinal, outcome. Because this result obtains under OLS estimation as well (i.e. it is a function of how the outcome variable is modeled, not selection effects), we do not report it in Table 5.

would be classified as ambiguous or hybrid by outside evaluators *and* an increased probability of receiving a poor rating from those evaluators. To help address this concern, we reorganized our data into groups of observations sharing a common proprietor and re-estimated the model of credit ratings using a panel model. This model recognizes the Mercantile Agency's own assessment of the continuity of proprietor 'character' in affecting credit scores, suggesting that the Agency "has made men take their real character along with them, the character they bear at home [or] wherever they go to do business" (quoted in Sandage 2005: 115).

Compared to models for repeated cross-sections, the use of panel data on credit evaluations has its own shortcomings, which are worth emphasizing. Relatively few firms in the postbellum South survived long enough to appear in multiple panels. Those that did clearly exhibit an upward 'survival' bias in their credit ratings, as intimated by the effect of credit history duration in Table 3. In addition, the great majority of panels entail two observations per firm, with only 30% including three or more observations. This limits the usefulness of the panel data in tracing the evolutionary impact of classification on credit evaluation.

[ Insert Table 6 About Here ]

Table 6 summarizes the estimates of credit rating from a random effects model, when we limit consideration to firms with multiple observations.[16] The two parameters of fundamental interest – hybrid and ambiguous classification – continue to exhibit a strong negative correlation with credit rating. Consequently, it does not appear that these estimates are unduly affected by unmeasured proprietor characteristics. By contrast, the dummy variable for professional firms is statistically insignificant in this specification. Once we implicitly control for the human capital and reputation of proprietors, their classification *qua* professionals no longer increases credit ratings substantially. In the panel data analysis, it is also worth noting that a firm's credit history has a considerable bearing on its present rating, with substantial benefits accruing to businesses with good or excellent histories.

[16] A Hausman test comparing the random effects specification to a fixed effects model was inconclusive, owing due to the numerical sensitivity of the test to the inclusion of credit history. Consequently, we present estimates from the more parsimonious random effects model here.

*Is the Relationship between Classification and Credit Causal?*

The preceding analyses offer evidence of a fairly robust correlation between classification and credit rating, but are unclear as to the causal nature of this relationship. Did credit reporters react to difficulties in classifying these businesses by lowering their credit ratings and adjusting their coverage of firms? Or did reporters first decide how to rate these firms and only then arrive at their industrial classification? In the absence of fine-grained data on the credit evaluation process or an experimental design, it is impossible to establish causal direction with full certainty. However, unpacking the mechanisms in the credit rating process offers additional support for the intuition that classification causally impacts credit ratings.

[ Insert Table 7 About Here ]

The explicit instructions given to credit reporters emphasized that they should first evaluate the "nature" of the business and then assign credit ratings (see discussion of credit rating measure, above). Classification was thus proffered as a *logical precedent* to credit evaluation at the Mercantile Agency. Moreover, the handwritten credit ledgers maintained by Dun reporters required that proprietor name(s), location, and industrial classification be entered first, followed by entries on assets, credit evaluation, and activities, often over a period of successive months (see example in Table 7). For the majority of entries, classification thus appeared as a *temporal precedent* to credit evaluation. Entries and updates for credit standing were common, while those for industrial classification were relatively rare. As a practical consequence, a given entry in the typewritten Reference Book (e.g. July of 1874) would typically pick up a relatively recent assessment of credit and assets (June of 1874, in the case of Farr and Wages) and a less proximate judgment of industrial classification (September of 1873). Despite the cross-sectional nature of the Reference Book data, then, the mechanics of credit evaluation often ensured that classification occurred prior to credit scoring.

## Discussion

In the period surrounding the Civil War, Robert Dun's Mercantile Agency created one of the first general schema for classifying and evaluating business enterprise in the United States. At an early stage, Dun's system evidenced limited institutionalization along a number of dimensions, including the complexity of his industrial taxonomy, the training of his correspondents, the organizational infrastructure available to support their activities, and the acceptance of his classifications and evaluations on the part of the general public. Within the span of a mere thirty years, the Mercantile Agency and its Reference Books became a "permanent institution" in American business. Professional correspondents replaced amateurs, branch offices proliferated, and legal assaults on the credit rating system ebbed. By the end of the century, the industry boundaries constructed by Dun and his agents enjoyed a normative standing, affecting the fate of firms that violated them.

The implementation of the Dun schema during the postbellum period offers a unique historical window onto a system of social classification in the process of emergence. Since most recent organizational studies have been concerned with the effects exercised by mature systems of classification, this case proves to be both theoretically and empirically informative. While mature classification systems lead audiences to ignore or sanction objects that straddle social boundaries (Zuckerman 1999; Hsu 2006a), Dun's correspondents were *more* likely to cover hybrid organizations and imposed no significant penalties when rating these enterprises *during the period of early institutionalization*. The one exception in this regard involved organizations run by professionals (physicians, lawyers, civil engineers, and architects). By the mid-19$^{th}$ century, universities, associations, and credentialing programs had established boundaries surrounding these trades in an effort to secure exclusive jurisdictions (Wilensky 1964; Abbott 1988). Violation of those boundaries could lower the evaluation of professional firms in the eyes of credit reporters.

Some boundary transgressions are tolerated in primitive systems of classification because the boundaries themselves are in flux or have not yet achieved social legitimacy. But ambiguity presents more fundamental problems to a naïve audience. When Dun's correspondents

encountered firms with lines of business that did not fit into any of the industrial categories within their schema, they lacked well-developed routines for handling these exceptions. As an empirical consequence, credit reporters may have simply noted the 'miscellaneous' activities of these organizations, reduced their probability of credit coverage, and increased the likelihood of bad credit ratings for such firms. By contrast, sophisticated audiences can deal with ambiguity routinely through categorical defaults or rapid access to contextual information. With the evolution of the Mercantile Agency's system, ambiguity no longer posed problems for coverage, though it continued to have an adverse impact on ratings.

What implications do these results have for the sociology of organizations? Scholars in the field have long recognized that meaningful classification is essential to analyzing differences in products, routines, authority structures, and goals among organizational actors (DiMaggio 1987; Hannan and Freeman 1989). While early work considered 'objective' features that could be identified by analysts in efforts to develop organizational taxonomies, the more recent literature has taken a decidedly constructivist turn, emphasizing the subjective perspective of organizational stakeholders and audiences (Aldrich and Ruef 2006: Chapter 6; Hannan et al., 2007). An examination of the evolution of classification systems continues this constructivist trend, intimating how different problems of meaning impact organizations over time. In lieu of ahistorical accounts, our understanding of how society evaluates different forms of organizations becomes enriched by attention to cultural change in the evaluative schema themselves.

Naturally, the evolutionary study of classifications systems need not be limited to formal organizations. The social construction of racial, class, and occupational categories has varied substantially throughout history and across societies (Snipp 2003; Lamont 2000). While the present study suggests that the strength and clarity of categorical boundaries may influence the evaluation of social actors along a number of dimensions, social scientists have only begun to probe the ramifications of this process. For example, in an examination of the legal treatment of bisexual, multiracial, and other hybrid identities, Colker (1996) notes the tendency of binary distinctions in contemporary U.S. legal doctrine to ignore or devalue these 'mixed' categories. Other historical and cultural contexts give rise to different categorical systems and different evaluative consequences (e.g., see Telles [2004] on the case of multiracial identities in Brazil).

Because formal organizations are potent sites for the construction and reinforcement of such categories, organizational scholarship may hold valuable lessons for our understanding of the link between classification and social evaluation more generally.

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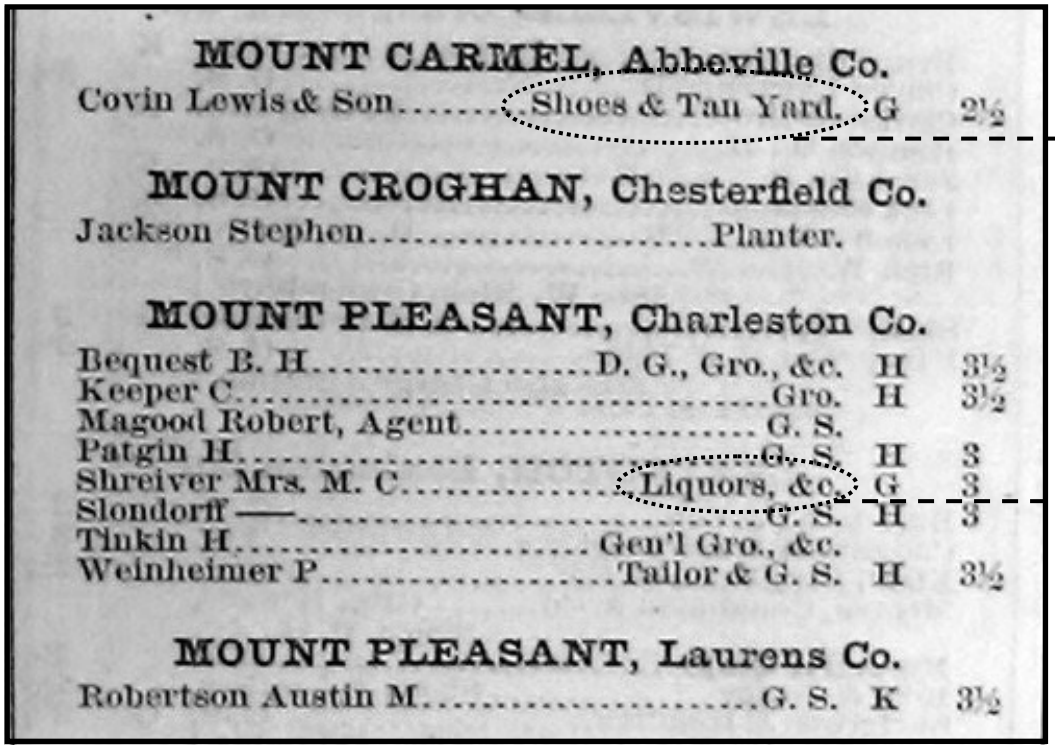
Figure 1. Consequences of Problems of Meaning in Social Classification

| Problem of Meaning | | Institutionalization of Classification System: **Early** | Institutionalization of Classification System: **Mature** |
|---|---|---|---|
| | **Ambiguity** (classification depends on context). | *High impact* … audiences have difficulty resolving ambiguity and interpreting contextual cues. | *Low impact* … audiences deal with ambiguity routinely through default assumptions and rapid access to contextual information. |
| | **Hybridity** (classification reflects partial category membership) | *Low impact* … audiences forgive boundary transgressions and have less difficulty judging composite versus simple categories. | *High impact* … audiences sanction violations of normative boundaries and ignore objects that straddle categories. |

Figure 2. Samples from R.G. Dun's Reference Book



**MOUNT CARMEL, Abbeville Co.**

Covin Lewis & Son.....Shoes & Tan Yard. G 2½

**MOUNT CROGHAN, Chesterfield Co.**

Jackson Stephen.....Planter.

**MOUNT PLEASANT, Charleston Co.**

Bequest B. H.....D. G., Gro., &c. H 3½
Keeper C.....Gro. H 3½
Magood Robert, Agent..... G. S.
Patgin H.....G. S. H 3
Shreiver Mrs. M. C.....Liquors, &c. G 3
Slondorff ——.....G. S. H 3
Tinkin H.....Gen'l Gro., &c.
Weinheimer P.....Tailor & G. S. H 3½

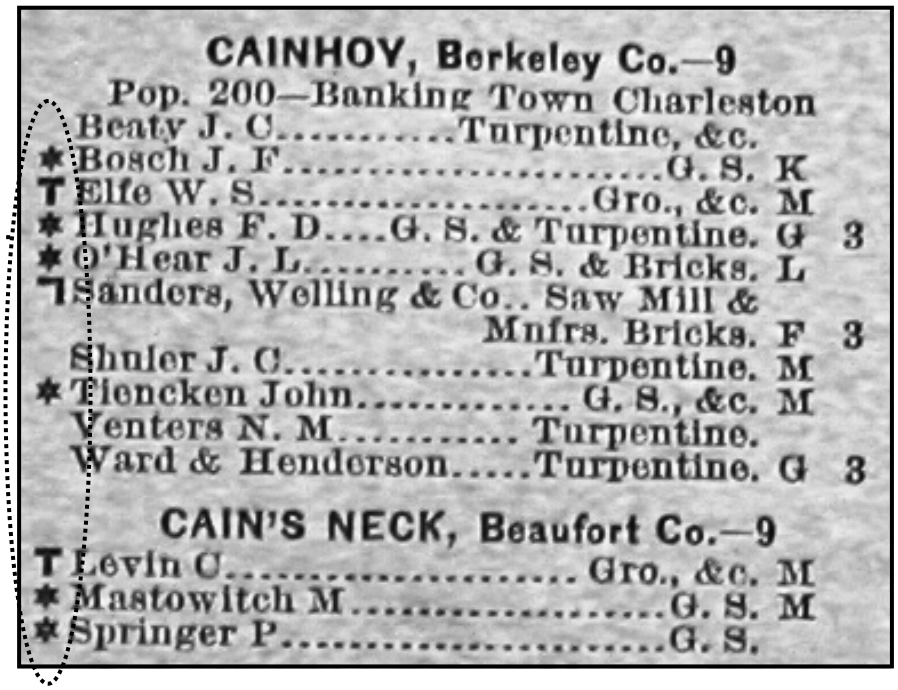
**MOUNT PLEASANT, Laurens Co.**

Robertson Austin M.....G. S. K 3½

Hybrid Form

Ambiguous Form

a. Entries for South Carolina, 1870



**CAINHOY, Berkeley Co.—9**

Pop. 200—Banking Town Charleston
Beaty J. C.....Turpentine, &c.
* Bosch J. F.....G. S. K
T Elfe W. S.....Gro., &c. M
* Hughes F. D....G. S. & Turpentine. G 3
* O'Hear J. L.....G. S. & Bricks. L
Sanders, Welling & Co.. Saw Mill & Mnfrs. Bricks. F 3
Shuler J. C.....Turpentine. M
* Tiencken John..... G. S., &c. M
Venters N. M..... Turpentine.
Ward & Henderson.....Turpentine. G 3

**CAIN'S NECK, Beaufort Co.—9**

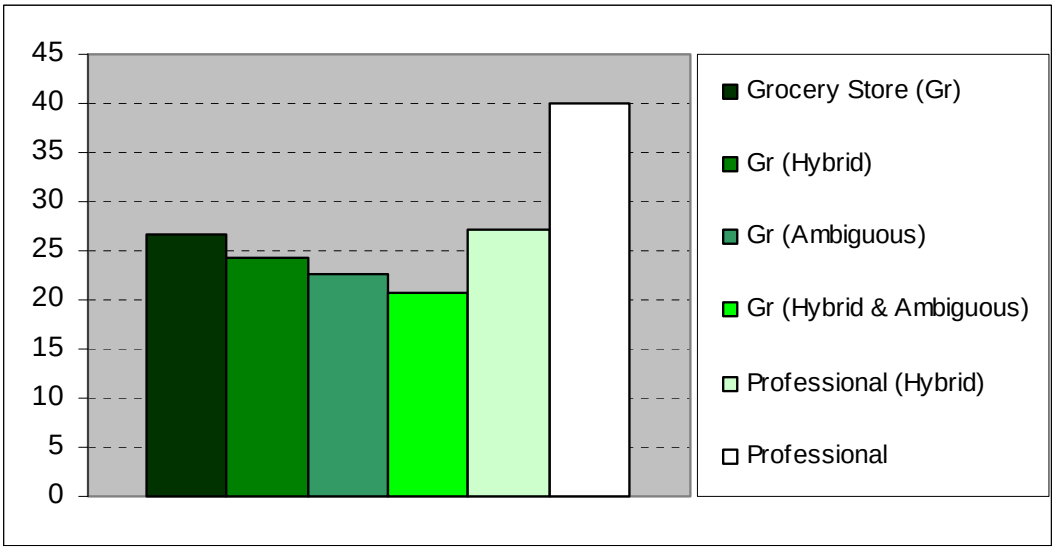
T Levin C..... Gro., &c. M
* Mastowitch M.....G. S. M
* Springer P.....G. S.

Symbolic Classification of Trades

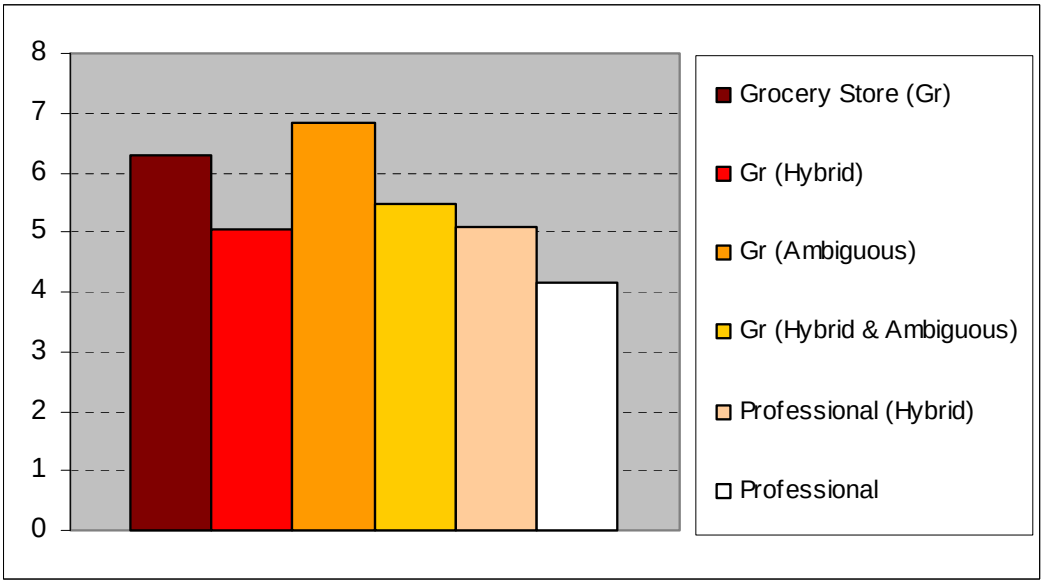
b. Entries for South Carolina, 1885

Figure 3. Estimates of Credit Rating and Coverage by Type of Industrial Classification

a. Probability that a Firm Receives a Fair Rating (Dun Rating 3 or better)




b. Probability that a Firm Receives No Credit Coverage




Note: All estimates based on a male-owned, sole proprietorship with other variables held at their means.

Table 1. The Impact of Institutionalization on Credit Evaluation at R.G. Dun and Company

| | **Early Institutionalization** (1864-1885) | **Mature Institutionalization** (1885-1900) |
|---|---|---|
| **Classification System** | Single Level Taxonomy; Accommodation of Hybrid and Ambiguous Firms | Multi-Level Taxonomy; Accommodation of Hybrid and Ambiguous Firms |
| **Correspondents** | Untrained Local Attorneys, Merchants, and Bank Cashiers | Professional Traveling Credit Reporters |
| **Branch Offices** | Few (two in the Cotton South after the Civil War) | Numerous (ten in Cotton South by 1890) |
| **Legitimacy Challenges** | Numerous (including law suits and exposés by the press and former insiders) | Few (the Mercantile Agency is seen as a "permanent institution") |

Table 2. Descriptive Statistics and Bivariate Correlations for Dun Reference Book Entries in the Cotton South, 1870-1900

| | | | | Pearson Pairwise Correlations | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Independent Variables | | Mean | SD | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (20) |
| (1) | Year (1870=0) | 18.34 | 10.44 | | | | | | | | | | | | | | | | | | | | |
| (2) | Assets ($1000s) | 17.51 | 79.06 | -0.02 | | | | | | | | | | | | | | | | | | | |
| (3) | Branch Distance | 95.26 | 0.86 | -0.41 | -0.08 | | | | | | | | | | | | | | | | | | |
| (4) | Drug Store | 0.04 | 0.20 | 0.01 | -0.02 | 0.02 | | | | | | | | | | | | | | | | | |
| (5) | Dry Goods | 0.05 | 0.22 | -0.16 | 0.01 | 0.12 | -0.04 | | | | | | | | | | | | | | | | |
| (6) | Farm | 0.04 | 0.19 | -0.08 | 0.02 | 0.10 | -0.04 | -0.03 | | | | | | | | | | | | | | | |
| (7) | General Store | 0.34 | 0.47 | 0.14 | -0.07 | 0.09 | -0.14 | -0.16 | 0.04 | | | | | | | | | | | | | | |
| (8) | Professional | 0.02 | 0.15 | -0.07 | -0.02 | 0.10 | 0.18 | -0.03 | 0.04 | -0.10 | | | | | | | | | | | | | |
| (9) | Saloon | 0.04 | 0.20 | -0.00 | -0.03 | -0.03 | -0.04 | -0.04 | -0.04 | -0.13 | -0.03 | | | | | | | | | | | | |
| (10) | Other Form | 0.25 | 0.43 | -0.02 | 0.12 | -0.13 | -0.12 | -0.13 | -0.12 | -0.42 | -0.09 | -0.12 | | | | | | | | | | | |
| (11) | Hybrid | 0.16 | 0.37 | -0.02 | 0.03 | 0.02 | 0.05 | 0.21 | 0.24 | -0.10 | 0.11 | 0.07 | -0.07 | | | | | | | | | | |
| (12) | Ambiguous | 0.09 | 0.28 | 0.05 | -0.01 | -0.05 | -0.02 | 0.09 | -0.04 | -0.16 | -0.04 | -0.04 | 0.14 | -0.00 | | | | | | | | | |
| (13) | Corporation | 0.12 | 0.33 | 0.03 | 0.23 | -0.02 | 0.01 | 0.01 | -0.06 | -0.04 | -0.05 | -0.05 | 0.13 | -0.02 | -0.01 | | | | | | | | |
| (14) | Partnership | 0.17 | 0.37 | -0.03 | 0.03 | 0.06 | 0.00 | 0.04 | -0.04 | 0.07 | -0.04 | -0.04 | -0.02 | 0.00 | 0.00 | -0.17 | | | | | | | |
| (15) | Agency | 0.01 | 0.07 | 0.00 | -0.01 | -0.01 | 0.01 | -0.01 | -0.01 | -0.00 | -0.01 | -0.00 | -0.00 | -0.00 | -0.00 | -0.02 | -0.03 | | | | | | |
| (16) | Family-Owned | 0.06 | 0.24 | 0.04 | 0.03 | -0.01 | -0.01 | 0.02 | -0.02 | 0.07 | -0.03 | -0.03 | -0.02 | 0.01 | 0.01 | -0.07 | 0.54 | -0.01 | | | | | |
| (17) | Female-Owned | 0.05 | 0.23 | 0.04 | -0.04 | -0.04 | -0.04 | 0.02 | -0.03 | -0.07 | -0.04 | -0.01 | -0.04 | -0.03 | 0.01 | -0.08 | -0.10 | -0.01 | -0.05 | | | | |
| (18) | Firms in Settlement (all) | 525.37 | 1201.14 | 0.05 | 0.11 | -0.42 | -0.02 | -0.01 | -0.08 | -0.30 | -0.05 | 0.12 | 0.19 | 0.01 | 0.05 | 0.01 | -0.05 | -0.02 | -0.02 | 0.07 | | | |
| (19) | Firms in County (same type) | 62.09 | 163.28 | 0.13 | -0.01 | -0.24 | -0.06 | -0.05 | -0.04 | -0.03 | -0.05 | 0.12 | -0.18 | -0.02 | -0.02 | -0.05 | -0.04 | -0.01 | -0.02 | 0.07 | 0.56 | | |
| (20) | Population (1000s) | 50.35 | 66.84 | 0.05 | 0.12 | -0.45 | -0.02 | -0.02 | -0.09 | -0.29 | -0.06 | 0.11 | 0.19 | 0.00 | 0.04 | 0.02 | -0.06 | -0.02 | -0.03 | 0.06 | 0.96 | 0.55 | |
| Dependent Variables | | | | | | | | | | | | | | | | | | | | | | | |
| (21) | Credit Rating | 1.84 | 1.22 | -0.21 | 0.59 | 0.01 | -0.04 | 0.08 | 0.07 | -0.13 | -0.03 | -0.07 | 0.16 | 0.06 | -0.00 | 0.29 | 0.10 | -0.02 | 0.06 | -0.09 | 0.13 | -0.04 | 0.14 |
| (22) | Credit Coverage | 0.80 | 0.40 | -0.15 | 0.10 | 0.00 | 0.04 | 0.06 | 0.06 | 0.03 | 0.01 | -0.04 | 0.02 | 0.07 | -0.01 | 0.10 | 0.10 | -0.08 | 0.05 | -0.07 | 0.08 | 0.02 | 0.07 |

Note: N=96,188 for credit ratings; N=119,518 for all other variables (following listwise deletion of cases without capital asset data)

Table 3. Coefficients and Robust Standard Errors from the Regression (Ordered Logit Model) of Dun Credit Ratings on Organizational Attributes and Classification (N=96,188)

| | Model 1 | Model 2 | Model 3 | Model 4 |
|---|---|---|---|---|
| Independent Variable | | | 1870-1880 | 1889-1900 |
| Year (1870 = 0) | -0.114 (0.001) *** | -0.114 (0.001) *** | -0.154 (0.003) *** | -0.073 (0.002) *** |
| Assets ($1000s) † | 3.467 (0.019) *** | 3.468 (0.019) *** | 3.338 (0.027) *** | 3.956 (0.031) *** |
| Credit History (years) | 0.027 (0.002) *** | 0.027 (0.002) *** | 0.031 (0.004) *** | 0.021 (0.002) *** |
| Branch Distance (100s miles) | 0.299 (0.013) *** | 0.298 (0.013) *** | 0.222 (0.017) *** | 0.110 (0.026) *** |
| *Classification* ‡ | | | | |
| Drug Store | 0.088 (0.048) | 0.135 (0.049) ** | 0.136 (0.075) | 0.300 (0.073) *** |
| Dry Goods Store | 0.037 (0.044) | 0.046 (0.044) | 0.074 (0.059) | -0.161 (0.080) * |
| Farm | -0.046 (0.041) | -0.026 (0.041) | 0.043 (0.057) | 0.263 (0.070) *** |
| General Store | -0.219 (0.034) *** | -0.210 (0.034) *** | -0.112 (0.049) * | -0.152 (0.053) ** |
| Professional's Office | 0.407 (0.064) *** | 0.609 (0.088) *** | 0.554 (0.103) *** | 0.807 (0.172) *** |
| Saloon | -0.143 (0.064) * | -0.131 (0.064) * | -0.122 (0.091) | 0.031 (0.101) |
| Other Form | -0.090 (0.041) * | -0.064 (0.042) | 0.053 (0.064) | -0.009 (0.062) |
| Form Frequency | -0.052 (0.008) *** | -0.048 (0.008) *** | -0.023 (0.012) | -0.033 (0.012) ** |
| Hybrid | -0.145 (0.037) *** | -0.119 (0.038) ** | -0.030 (0.055) | -0.187 (0.058) *** |
| Ambiguous | -0.211 (0.032) *** | -0.210 (0.032) *** | -0.150 (0.054) ** | -0.191 (0.042) *** |
| Hybrid × Professional | --- | -0.465 (0.123) *** | -0.346 (0.160) * | -0.449 (0.226) * |
| *Legal Form* | | | | |
| Corporation | 0.023 (0.025) | 0.025 (0.025) | 0.043 (0.040) | -0.147 (0.034) *** |
| Partnership | -0.146 (0.025) *** | -0.145 (0.025) *** | -0.054 (0.037) | -0.205 (0.038) *** |
| Agency | -1.333 (0.219) *** | -1.331 (0.219) *** | -1.118 (0.314) *** | -1.837 (0.375) *** |
| *Owner Demography* | | | | |
| Family | 0.084 (0.037) * | 0.084 (0.037) * | 0.002 (0.059) | 0.096 (0.049) * |
| Female | -0.071 (0.060) | -0.070 (0.060) | 0.044 (0.083) | -0.117 (0.101) |
| *Local Market Conditions* | | | | |
| # of Firms (all) † | -0.033 (0.007) *** | -0.032 (0.007) *** | -0.065 (0.010) *** | 0.008 (0.010) |
| # of Firms (100s, same type) | 0.001 (0.009) | 0.002 (0.009) | 0.066 (0.021) ** | 0.015 (0.010) |
| County Population (1000s) | 0.004 (0.000) *** | 0.004 (0.000) *** | 0.005 (0.000) *** | 0.003 (0.000) *** |
| -2 Log Pseudo-Likelihood | 91907.35 | 91892.75 | 42123.71 | 44429.49 |
| Degrees of Freedom (model) | 30 | 31 | 31 | 31 |

* p < .05; ** p < .01; *** p < .001 (one-tailed tests for hypothesized effects, two-tailed otherwise)

† To reduce skewness, these variables were transformed using a natural log function.

‡ Grocery stores represent the omitted category. Professionals' offices include physicians, dentists, lawyers, justices of the peace, civil engineers, and architects. The models also include fixed effects for eight other common industry categories (coefficients not reported): blacksmiths, cobblers, commission merchants, confectionaries, grist mills, jewelers, millineries, and saw mills.

Table 4. Coefficients and Robust Standard Errors from the Regression (Logit Model) of Dun Credit Coverage on Organizational Attributes and Classification (N=119,518)

| | Model 1 | Model 2 | Model 3 | Model 4 |
|---|---|---|---|---|
| Independent Variable | | | 1870-1880 | 1889-1900 |
| Constant | 0.998 (0.087) | 0.937 (0.088) | 1.154 (0.152) | 1.801 (0.124) |
| Year (1870 = 0) | -0.033 (0.001) *** | -0.033 (0.001) *** | -0.013 (0.004) ** | -0.073 (0.002) *** |
| Assets ($1000s) † | 1.984 (0.030) *** | 1.984 (0.030) *** | 1.292 (0.030) *** | 3.742 (0.101) *** |
| Credit History (years) | 0.013 (0.002) *** | 0.013 (0.002) *** | -0.022 (0.006) ** | 0.014 (0.002) *** |
| Branch Distance (100s miles) | -0.134 (0.013) *** | -0.135 (0.013) *** | 0.025 (0.019) | -0.156 (0.021) *** |
| *Classification* ‡ | | | | |
| Drug Store | 0.754 (0.050) *** | 0.816 (0.054) *** | 0.393 (0.100) *** | 0.997 (0.066) *** |
| Dry Goods Store | 0.384 (0.059) *** | 0.386 (0.059) *** | 0.269 (0.082) ** | 0.516 (0.094) *** |
| Farm | 0.510 (0.069) *** | 0.519 (0.069) *** | 0.561 (0.105) *** | 0.325 (0.096) *** |
| General Store | 0.489 (0.030) *** | 0.491 (0.030) *** | 0.178 (0.057) ** | 0.636 (0.038) *** |
| Professional's Office | 0.289 (0.062) *** | 0.436 (0.077) *** | 0.069 (0.097) | 0.519 (0.133) *** |
| Saloon | -0.009 (0.043) | 0.005 (0.043) | -0.392 (0.072) *** | 0.106 (0.056) |
| Other Form | 0.075 (0.042) | 0.105 (0.043) * | -0.251 (0.077) ** | 0.222 (0.056) *** |
| Form Frequency † | -0.014 (0.010) | -0.007 (0.010) | -0.022 (0.017) | -0.010 (0.013) |
| Hybrid | 0.190 (0.043) *** | 0.231 (0.044) *** | 0.231 (0.075) ** | 0.199 (0.059) *** |
| Ambiguous | -0.092 (0.030) ** | -0.089 (0.030) ** | -0.218 (0.054) *** | -0.049 (0.038) |
| Hybrid × Professional | --- | -0.442 (0.129) *** | 0.285 (0.231) | -0.697 (0.187) *** |
| *Legal Form* | | | | |
| Corporation | 0.120 (0.036) *** | 0.119 (0.036) *** | -0.137 (0.066) * | 0.187 (0.044) *** |
| Partnership | 0.329 (0.033) *** | 0.329 (0.033) *** | 0.181 (0.056) ** | 0.421 (0.042) *** |
| Agency | -1.724 (0.096) *** | -1.725 (0.096) *** | -1.735 (0.141) *** | -1.768 (0.144) *** |
| *Owner Demography* | | | | |
| Family | -0.073 (0.053) | -0.073 (0.053) | -0.148 (0.100) | -0.093 (0.064) |
| Female | -0.304 (0.036) *** | -0.303 (0.036) *** | -0.082 (0.077) | -0.370 (0.043) *** |
| *Local Market Conditions* | | | | |
| # of Firms (all) † | -0.013 (0.006) | -0.012 (0.006) | -0.103 (0.012) *** | 0.023 (0.008) ** |
| # of Firms (100s, same type) | 0.037 (0.007) *** | 0.037 (0.007) *** | 0.022 (0.035) | 0.053 (0.008) *** |
| County Population (1000s) | 0.003 (0.000) *** | 0.003 (0.000) *** | 0.008 (0.000) *** | 0.002 (0.000) *** |
| -2 Log Pseudo-Likelihood | 84212.99 | 84201.99 | 27673.91 | 53755.55 |
| Degrees of Freedom (model) | 30 | 31 | 31 | 31 |

* p < .05; ** p < .01; *** p < .001 (one-tailed tests for hypothesized effects, two-tailed otherwise)

† To reduce skewness, these variables were transformed using a natural log function.

‡ Grocery stores represent the omitted category. Professionals' offices include physicians, dentists, lawyers, justices of the peace, civil engineers, and architects. The models also include fixed effects for eight other common industry categories (coefficients not reported): blacksmiths, cobblers, commission merchants, confectionaries, grist mills, jewelers, millineries, and saw mills.

Table 5. Coefficients from the Regression (Heckman Selection Model) of Dun Credit Ratings on Organizational Attributes and Classification (N=96,188)

| | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| Independent Variable | | 1870-1880 | 1889-1900 |
| Constant | 0.987 (0.000) | 0.951 (0.000) | 0.945 (0.023) |
| Nonselection Hazard (λ) | 0.549 (0.002) *** | 0.539 (0.002) *** | 0.549 (0.002) *** |
| Year (1870 = 0) | -0.015 (0.000) *** | -0.023 (0.001) *** | -0.010 (0.000) *** |
| Assets ($1000s) † | 0.726 (0.002) *** | 0.753 (0.005) *** | 0.708 (0.002) *** |
| Credit History (years) | 0.002 (0.000) *** | 0.004 (0.001) *** | 0.003 (0.000) *** |
| Branch Distance (100s miles) | 0.028 (0.002) *** | 0.038 (0.003) *** | -0.026 (0.004) *** |
| *Classification* ‡ | | | |
| Drug Store | -0.009 (0.008) | 0.034 (0.014) * | -0.024 (0.011) * |
| Dry Goods Store | 0.011 (0.010) | 0.017 (0.013) | -0.028 (0.017) |
| Farm | 0.019 (0.009) * | 0.015 (0.015) | 0.058 (0.015) *** |
| General Store | -0.064 (0.006) *** | -0.029 (0.010) ** | -0.063 (0.008) *** |
| Professional's Office | 0.041 (0.010) *** | 0.078 (0.014) *** | 0.035 (0.015) * |
| Saloon | -0.042 (0.008) *** | -0.013 (0.015) | -0.025 (0.011) * |
| Other Form | -0.004 (0.006) | 0.020 (0.011) | -0.008 (0.011) |
| Form Frequency † | -0.006 (0.001) *** | -0.003 (0.002) | -0.009 (0.002) *** |
| Hybrid | -0.034 (0.006) *** | -0.013 (0.011) | -0.047 (0.011) *** |
| Ambiguous | -0.071 (0.006) *** | -0.038 (0.011) *** | -0.073 (0.008) *** |
| *Legal Form* | | | |
| Corporation | 0.069 (0.006) *** | 0.039 (0.014) ** | 0.082 (0.008) *** |
| Partnership | -0.009 (0.006) | -0.007 (0.011) | -0.023 (0.007) ** |
| Agency | -0.298 (0.028) *** | -0.296 (0.044) *** | -0.304 (0.036) *** |
| *Owner Demography* | | | |
| Family | -0.002 (0.009) | -0.020 (0.015) | 0.019 (0.011) |
| Female | [ IV ] | [ IV ] | [ IV ] |
| *Local Market Conditions* | | | |
| # of Firms (all) † | -0.017 (0.001) *** | -0.023 (0.002) *** | -0.013 (0.002) *** |
| # of Firms (100s, same type) | -0.001 (0.001) | 0.020 (0.005) *** | -0.001 (0.001) |
| County Population (1000s) | 0.001 (0.000) *** | 0.001 (0.000) *** | 0.001 (0.000) *** |
| -2 Log Pseudo-Likelihood | 178681.74 | 66193.58 | 111338.24 |
| Degrees of Freedom (model) | 29 | 29 | 29 |

* $p < .05$; ** $p < .01$; *** $p < .001$ (one-tailed tests for hypothesized effects, two-tailed otherwise)

† To reduce skewness, these variables were transformed using a natural log function.

‡ Grocery stores represent the omitted category. The models also include fixed effects for eight other common industry categories (coefficients not reported): blacksmiths, cobblers, commission merchants, confectionaries, grist mills, jewelers, millineries, and saw mills.

IV Variables are included as instruments in the selection equation.

Table 6. Coefficients from the Regression (Random Effects Model) of Dun Credit Ratings on Organizational Attributes and Classification for Repeat Observations (N=35,244)

| Independent Variable | Coefficient (SE) |
|---|---|
| Constant | 1.094 (0.027) |
| Year (1870 = 0) | -0.017 (0.000) *** |
| Assets ($1000s) † | 0.721 (0.002) *** |
| Branch Distance (100s miles) | 0.033 (0.004) *** |
| *Classification* ‡ | |
| Drug Store | -0.027 (0.016) |
| Dry Goods Store | -0.002 (0.016) |
| Farm | 0.005 (0.016) |
| General Store | -0.088 (0.011) *** |
| Professional's Office | 0.002 (0.022) |
| Saloon | -0.026 (0.019) |
| Other Form | -0.003 (0.014) |
| Form Frequency † | -0.010 (0.003) *** |
| Hybrid | -0.063 (0.013) *** |
| Ambiguous | -0.051 (0.011) *** |
| *Legal Form* | |
| Corporation | 0.109 (0.010) *** |
| Partnership | 0.008 (0.010) |
| Agency | -0.075 (0.080) |
| *Owner Demography* | |
| Family | -0.010 (0.014) |
| Female | 0.022 (0.019) |
| *Credit History* | |
| Length (years) | -0.003 (0.001) *** |
| Good (rating 2 or higher) | 0.200 (0.011) *** |
| Excellent (rating 1 or higher) | 0.523 (0.020) *** |
| *Local Market Conditions* | |
| # of Firms (all) † | -0.014 (0.002) *** |
| # of Firms (100s, same type) | -0.002 (0.002) |
| County Population (1000s) | 0.001 (0.000) *** |
| R-Square (Overall) | 0.839 |
| Fraction of Variance from Unobserved Proprietor Effects | 0.058 |
| Degrees of Freedom (model) | 32 |

* $p < .05$; ** $p < .01$; *** $p < .001$ (one-tailed tests for hypothesized effects, two-tailed otherwise)

† To reduce skewness, this variable was transformed using a natural log function.

‡ Grocery stores represent the omitted category. The models also include fixed effects for eight other common industry categories (coefficients not reported): blacksmiths, cobblers, commission merchants, confectionaries, grist mills, jewelers, millineries, and saw mills.

Table 7. Example of Entries in Handwritten Credit Ledger

| *Proprietor Name* | *Location* | *Classification* |
|---|---|---|
| D. A. FARR & F. M. WAGES | CHINQUEPIN GROVE | GENERAL STORE |
| Sept. ’73: Established but a short time, doing well, making money. Men of good character and habits, prudent and attentive to business. Wages is married and [a] farmer by occupation. Farr attends to the store. Wages owns real estate. The firm [is] estimated [to be] worth $6,000-$8,000. Good for moderate amounts. | | |
| Jan ’74: No change. | | |
| June ’74: Worth $6,000. Reliable. | | |
| Aug ’74: Dissolved. Succeeded by Farr and Smith. | | |
| FARR & SMITH | BUFORD | GENERAL STORE |
| Aug ’74: They are energetic, good standing and business capacity. Worth $3,000 or 4,000 but considered responsible. | | |
| March ’75: Established several years and doing but small business, of good character, are steady and attentive to business and considered responsible for small amount. Farr attends to the store. Smith is the railroad agent. Have some real estate and are estimated worth $1,000 to 2,000. Farr married, age 40. Smith single, age 30. | | |
| June ’75: Fair business capacity. Worth $3,000 or 4,000. Considered reliable. | | |
| Dec ’75: Considered reliable and estimated worth $3,000. | | |
| June ’76: Good businessmen, considered reliable. Estimated worth $4,000. | | |
| Jan ’77: Worth $3,000 and considered reliable. | | |
| April ’77: Reports Smith and Evans succeed Farr and Smith. Are not well established in business but are favorably spoken of. | | |

(Source: Ransom and Sutch, 2001: 310-312)