Network Stability and Organization Performance: Does Context Matter?

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Abstract

Research on public service networks (Agranoff 2007; Berry, et. al. 2004) has shown that network stability can bolster or dampen network performance, depending on the context in which the network operates (Provan and Milward 1995; Agranoff and McGuire 2003; Johnston and Romzek, 2007). Unfortunately, work thus far has only indirectly accounted for context, usually by examining the same types of networks in different settings and inferring about contextual effects. This paper expands on these findings by taking explicit empirical account of two key aspects of context - task complexity and resource munificence - for a particular type of network known as a debt management network. The findings support two basic claims about how context affects the stability-performance link. First, network stability has a non-linear effect on performance, and the nature of that non-linear effect is a function of the network's level of task complexity. And second, stability actually dampens the performance of networks operating in resource-rich environments.

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Introduction

The causes and consequences of delivering public services through multi-organizational networks rather than intra-organizational hierarchies are the subject of regular inquiry in public management (O'Toole, 1997; Milward and Provan, 2000; Pollitt and Bouckaert, 2000; Agranoff and McGuire, 2003). Much of that inquiry focuses on the relationship between network structure and the performance of both the network itself, and of the organizations that comprise it. These are crucial considerations because choices about network structure such as who to include in a network, how information is shared within the network, who controls network resources, and other concerns are in some cases the only aspects of networks subject to direct influence by public managers (Goldsmith and Eggers 2004; Milward and Provan 2006).[1]

A key aspect of network structure is stability, defined here as the same network members participating in prolonged network activity. That network stability affects network performance is a running theme in the networks literature (see Milward and Provan 2000). But different traditions of organization theory produce sharply different a priori expectations about precisely how and when stability matters. Transaction cost perspectives (see, for instance, Williamson 1999; Ostrom 1990; Axelrod 1984) suggest stability fosters repeated interactions among network members, which lowers transaction costs and enhances trust, which ultimately improves performance. By contrast, some traditions of organization theory suggest stability can in some cases promote rent-seeking and stifle innovation, which ultimately harms performance (see, among others, Gulati 1995; Tushman and O'Reilly 1997; Whitford 2007).

Recent work on public management networks has clarified some of this by drawing attention to the importance of context. As described later, there are particular circum-

[1] A related body of work seeks to understand how managing in networks differ from managing in traditional hierarchies (e.g. Agranoff 2007), and the circumstances under which certain types of network management activities can yield performance gains (O'Toole and Meier 2003; Hicklin, O'Toole, and Meier 2007). This paper focuses on management attempts to alter network structure, and the subsequent performance implications of that structure, rather than how managers operate within network structures.

stances where stability bolsters performance, and others where it does not. But to date, much of that work has only indirectly accounted for context.[2] The tendency has been toward in-depth, small N studies of the same types of networks in “different as possible” contexts, which has produced several important, but nonetheless tentative conclusions (Milward and Provan 1995; Agranoff and McGuire 2003; Agranoff 2007). In this paper I attempt to expand on these findings by accounting for network context more explicitly and on a much broader empirical scale. Clearly explicating how context matters sharpens our understanding of when and how network stability translates into value-added for public organizations. These insights have direct bearing on the theory and practice of network management.

To gain new leverage on this issue I shift attention toward “public debt management,” or the process by which public entities sell tax-exempt bonds to finance infrastructure and other large-scale capital projects.[3] In the second quarter of 2007 there were more than 2 million outstanding municipal bonds totaling more than $2.1 trillion issued by more than 50,000 distinct public entities (Downing and Zhang 2004; Federal Reserve Board 2007). Organizations that effectively manage their debt stand to realize substantial financial savings; ineffective debt management can be disastrous, as evidenced by the recent financial catastrophes in San Diego, Orange County, CA, Jefferson County, AL, and elsewhere.

Debt management is as complex and challenging as any process in contemporary public administration. Financial markets are volatile, new mechanisms for borrowing money and managing existing debt are constantly emerging, the regulatory environment is increasingly complex, and the political feasibility of borrowing money is fluid and at times unpredictable. Public organizations rarely possess the technical, analytical, and strategic

[2]Studies of managerial networking (Hicklin, O'Toole, and Meier 2007) and external stakeholder stability (Hicklin 2004), have more directly accounted for context, but those findings are only indirectly related to issues of network structure, which are the focus of this analysis.

[3]This is not the first study of how inter-organizational networks shape the financing of public infrastructure. See, for instance, O'Toole (1996).

expertise to effectively navigate this ever-changing contemporary debt management environment. This problem is typically solved by assembling a "debt management network" (DMN) comprised of a bond attorney, financial advisor, investment bank underwriter, and other professionals who each hold specialized knowledge about a particular aspect of the debt management process. These professionals integrate that specialized knowledge into a package of recommendations to the issuer on when and how to borrow the needed money. DMNs are therefore consistent with Agranoff and McGuire's description of the collaborative nature public management networks as "the process of facilitating and operating in multi-organizational arrangements to solve problems that cannot be solved, or solved easily, by single organizations" (2003, 4).

DMNs are an attractive setting to study the stability-performance link for two reasons. First, all DMNs strive to secure the lowest possible "cost of capital" for the issuer. And since cost of capital is measured through interest rates, each DMN in turn has a well-accepted performance metric. Second, DMNs have similar structural characteristics but vary widely with respect to stability.[4] Some are highly stable, comprised of the same members for long periods time over several different projects. But by contrast, some jurisdictions regularly rotate members out of their DMNs to promote innovation, provide internal checks and balances, and respond to changing political and market circumstances. Many fall somewhere in between. By examining the stability of members within these similarly structured networks, and then correlating that stability with the network's clearly identifiable performance metric, we can identify a clear relationship between network stability and performance.

My main innovation here is to examine this stability-performance link in a variety of contexts. DMNs are ubiquitous. Virtually every public organization of any size or

[4]Stability in this context refers specifically to personnel stability. Recent network typologies (Agranoff 2007) have brought attention to other types of stability, namely structural, mission, production, and procedural. DMNs are stable on each of these elements. We can reasonably assume DMNs are all comparable with respect to their mission, the process by which they are organized, the methods of communication within them, and the process by which the network reaches a consensus recommendation. That said, future work might consider in more depth these other aspects of stability.

consequence at some point borrows money to finance its projects and operations. By examining this performance-stability link in a variety of organizational and environmental contexts we are able to directly observe how key aspects of network context shape this stability-performance link. The literature thus far suggests that two aspects of context - task complexity and resource munificence - have important but generally unexplored implications for the stability-performance link. They are the focus of this analysis.

The findings suggest that indeed, context matters. I find that network stability has a non-linear effect on performance, and the nature of that non-linear effect is a function of the network's level of task complexity. I also find, contrary to my a priori expectations, stability actually dampens the performance of certain networks operating in resource-rich environments.

The remainder of this discussion proceeds in five parts. The next section summarizes findings thus far on the stability-performance link, and how context is believed to shape that link. The next section describes debt management networks, with a particular focus on their advantages and disadvantages for studying the performance-stability link. The third section outlines the data and methods, and the fourth section presents the empirical results. The final section discusses the implications of these findings for the theory and management of public service networks.

Network Stability and Performance in Context

Perhaps no single issue has received as much attention in analyses of public organizations as stability (see Rainey 1997). Performance- enhancing characteristics of organizations like trust, innovation, adaptability, and others are thought to follow from stability of personnel, funding, leadership, and other aspects of organization life (O'Toole and Meier 2003). But well-developed counterpoints to this conventional wisdom have emerged that consider trust part and parcel to insularity, collusion (Langfred 2004), and even corruption (Butler, Fauver, and Mortal 2007).

Scholars have examined public service network stability through this same theoretical lens, and have reached two tentative findings. The first is that stability, measured in terms of both the organizations that comprise a service delivery network (McGuire 2002; Johnston and Romzek 2007) and those who comprise an organization's network of external stakeholders, is generally good for the performance of both the network itself (McGuire 2002; Johnston and Romzek 2007) and for organizations at the network's hub (Hicklin 2004).[5] At a glance, this would suggest stability is a correlate of network effectiveness.

But these same analyses also suggest stability's positive effect on performance is attenuated and contextualized. For instance, network instability has been shown to produce administrative and other costs that harm network performance in the near term, but network participants have been shown to effectively mitigate those negative effects over time (Johnson and Romzek 2007). Other work shows that managerial networking activity (as opposed to the structure of public service networks) has a generally positive effect on performance, but that positive effect is contingent upon personnel stability, management quality, and other characteristics of the network's focal organization (Hicklin, O'Toole, and Meier 2007). Even more compelling is the finding that stability of external stakeholders mitigates management's effect on organization performance (Hicklin 2004). Taken together, these results imply that network stability's effect on performance cannot be understood without proper attention to the context in which the network operates.

In this paper I focus on two particular aspects of context - resource munificence and task complexity. The network management literature highlights a wide array of context characteristics that warrant attention including resource stability, political support, the regulatory environment, and several others. Resource munificence and task complexity

[5]The array of network effectiveness indicators has gradually expanded to include the network's breadth of services and the cost per unit of service (Provan and Milward 2001), the emergence of legitimacy and self-regulation among network members (Raaij 2006), and the degree to which the network's benefits are equitably distributed (O'Toole and Meier 2004; 2007), among others. This paper takes a more traditional approach to effectiveness by focusing on perceptions of one crucially important stakeholder group - municipal bond investors.

were selected for this analysis principally because they have received attention in previous empirical work on networks, and, as described below, are crucial considerations for the particular type of public management network I consider.

Structure and Dynamics of Debt Management Networks

The process of financing a project in the public capital markets involves several key actors. That process begins when an "issuer" - usually a government, public authority, taxing district, or other entity - establishes roughly how much money it intends to borrow, for what purpose(s), and over what time period it intends to pay back the borrowed funds. The issuer must then find an "underwriter" to lend it those funds. Financial institutions ranging from small local banks to multi-national investment brokerages underwrite different types of bonds. The issuer's basic objective is to borrow the capital it needs at the lowest possible rate of interest, and the underwriter seeks to maximize its profit on the transaction.[6]

DMNs take on different characteristics depending on how the issuer chooses to engage an underwriter. In the most widely used format - known as negotiated sale - the issuer selects the underwriter before the bonds are sold. In most negotiated sales the underwriter advises the issuer on key aspects of the issuance process for several weeks preceding the sale. By contrast, in a "competitive" sale the issuer determines all the characteristics of the bonds in advance, and then holds a public auction to identify an underwriter. Financial institutions interested in supplying the needed capital submit bids, and in most cases the firm that bids the lowest interest rate is awarded the busi-

[6]Most bonds are financed by a group or "syndicate" of underwriters. Syndicates are necessary because there is no central exchange, such as the New York Stock Exchange for equities or the Chicago Board of Trade for commodities, where bond buyers are matched with sellers. Most investors buy and sell bonds through brokers who, through a variety of channels, have access to a large inventory of available bonds. Some brokers work directly for investment banks that underwrite bonds; when their parent bank finances a bond issue it relies on its brokers to sell those bonds to its network of investors. Other brokers are independent dealers who, through a variety of mechanisms, have access to various bond inventories. When bonds are sold to a syndicate a single underwriting firm, known as the "book runner" or "lead underwriter" coordinates the sale process and takes down a marginally higher profit in return.

ness.[7] The issuer-underwriter relationship in a negotiated sale is qualitatively different than in a competitive sale, and the networks that develop around these different types of sales are in turn not directly comparable. For that reason, I consider DMNs for negotiated sales separately from DMNs for competitive sales.

The economics of the bond issuance process encourage the involvement of other actors who augment this basic issuer-underwriter dyad. Virtually all issuers enlist an attorney, known as the "bond counsel," who is responsible for certifying the bonds meet state and federal tax code requirements, and to ensure the issuer provides investors with required financial information once the bonds are issued.[8] Most issuers do not issue enough debt to make a full-time bond counsel cost-effective, so a third-party law firm specializing in municipal securities law usually provides these services.

Many DMNs also enlist the help of a financial advisor (FA). The FA provides technical advice on most aspects of the issuance process. They advise the issuer on how to structure the principal and interest payments, what interest rate to expect, when to sell the bonds, and other concerns. Like bond counsel, it is rarely cost effective to maintain a full-time financial advisor, so most issuers bring an FA on board once they intend to issue debt.[9]

Technically, a new DMN must be convened each time an issuer intends to sell bonds.[10]

[7] There is an expansive literature in public financial management on these "method of sale" considerations. Basic microeconomic theory, and more than a dozen empirical studies, have shown that competitive sales result in a lower overall borrowing costs. And yet, more than 80% of all municipal bonds are sold through competitive sale. Why negotiated sales remain so popular is the source of ongoing inquiry.

[8] This reporting process is known as "continuing disclosure." It has grown more strenuous in recent years, to the point that many issuers have enlisted a second bond counsel - known as a "disclosure agent" - responsible exclusively for this required reporting. This practice is relatively new, so disclosure agents are not incorporated in this analysis.

[9] The majority of municipal bonds are now issued with third-party bond insurance. In the event the issuer is unable to make its required payments on the bonds, the insurer will make those payments on its behalf. Insurers are not actively involved in the actual debt issue, but are an important node in these networks. The vast majority of municipal bond issues are insured by one of four major providers: the Financial Guarantee Insurance Corporation (FGIC); the Municipal Bond Insurance Association (MBIA); Radian, Inc.; and Ambac, Ltd.

[10] That DMNs are so easily dismantled is both an advantage and a disadvantage with respect to the generalizability of DMNs for other types of public management networks. It is advantageous because the discrete nature of each DMN allows for precise measures of network stability. But as much of the networks research has shown (see Provan and Milward 2001: 420-422), the process of changing network structures is far more complex, and influenced by inertia, political circumstances, and other factors that

In practice, issuers approach this process of dissolving and reconstituting their DMNs in different ways. Some retain the same network members for most issues, and rotate members out of the network only on rare occasions. Others maintain distinct, specialized networks for different types of bond issues. Others prefer to retain one network member and build a new network around that member for each new issue. Others have policies requiring that certain network members rotate out of the issuer's network after a certain number of issues. These "mandatory rotation" policies follow from the claim that occasional change within the network promotes innovation.

Therefore, my basic unit of network analysis is a three node network comprised of an underwriter, bond attorney, and when applicable, a financial advisor. This analytical strategy requires two basic assumptions. First, it is assumed members join the DMN with the intent of collaborating and integrating their individual expertise into the overall network's activities. Network success is therefore determined in part by both the quality of information each network member brings to bear on the collaboration, and on how well the network integrates each of its member perspectives. Second, it is assumed network members share the common objective of providing the issuer the lowest possible cost of capital. Recent work on DMNs has suggested otherwise (see Justice and Miller 2005; Harris and Piwowar 2007), but that work is largely anecdotal and based on networks with extraordinary outcomes. With these assumptions established, we can consider how network stability across multiple bond issues affects network performance, and how that stability-performance link varies within different network contexts.[11]

have at best an indirect effect on decisions about DMN members. This is not inherently problematic because the principal question under examination here is how stability affects network performance, which does not necessarily require any direct measurement of the cost or challenges of changing network members. Nonetheless, any attempt to study the level of network stability or instability necessary to produce optimal network performance will have to directly account for the challenges and costs of changing network members.

[11] An alternative theoretical approach not used here is to view DMNs through the lens of "relational contracting" (Bertelli and Smith 2005; Bovaird 2006). I assume here that DMNs function as true networked arrangements, even though they are truly nothing more than three separate contracts with individual service providers. How managers manage those contracts and the interrelationships among them over time are potentially fruitful areas for future research.

DMNs have advantages and disadvantages as a setting for studying the network stability-performance link. They are advantageous because they have a clear and widely accepted performance metric, and because much like the prevailing structural model of public management (see O'Toole and Meier 1999), we can control for a broad range of factors known to affect that performance. Those factors are described later.

The principal disadvantage is that the mechanism by which stability translates into improved network performance is unclear. Consider, for instance, McGuire's (2002) typology that divides network management activities into four categories: activating, framing, mobilizing, and synthesizing. Public managers operating within DMNs engage in all four of these activities. They determine in large part when to activate certain network nodes, and which among the many potential service providers will occupy those nodes for a particular bond issue. They frame the network's task in terms of the basic objective of achieving the lowest possible cost of capital, but also in terms of secondary objectives like accessing a particular segment of the capital markets, providing local or regional businesses the opportunity to participate in the issue, or the need to produce a particularly innovative solution to a debt management challenge. They can single-handedly mobilize certain constituents in support or opposition to potential debt management strategies. And they facilitate the process of synthesizing each network members' individual contribution to the network's collaborative recommendations. The analysis presented in this paper does not illuminate whether managers carry out these activities differently in stable vs. unstable network environments, or how, if at all, managers influence those outcomes (O'Toole 1997).[12]

[12]This analysis is also limited to the network's "first order zone" (Marsden 1990, 439), or the assumption that the relationship between two network participants is direct, and not influenced indirectly through other nodes. Anecdotal evidence suggests there are certain DMN circumstances where this assumption does not hold. For instance, financial advisors must in many cases coordinate with bond counsel to address certain types of financial disclosure issues. Instead of interacting directly, both the advisor and the counsel acquire the financial information needed to address disclosure issues from the issuer's external financial auditor. The auditor's influence on DMN activities, however noteworthy, is not captured in the measures of network stability presented here. For this analysis I assume the first order zone assumption applies to DMNs, but future qualitative work will further explore the robustness of that assumption.

Theory and Evidence on the Stability-Performance Link

DMNs were, perhaps surprisingly, among the first public service networks to receive systematic attention in the general public administration literature. That attention was motivated in part by widely-noted debt management problems among a few large entities, most notably the Washington Public Power Supply System, the New Jersey Turnpike System, and New York City's near bankruptcy (Miller 1990). Post hoc analysis revealed those problems were largely attributable to a paucity of internal oversight and information sharing among key DMN members. This motivated public financial management scholars to bring new theoretical and empirical tools to bear on how DMNs ought to function in order to prevent these sorts of problems in the future.

Most of the work that followed was grounded in the "set" theory of inter-organizational networks. One of that theory's basic claims is that stable networks produce "rich links" among network members, which increase the likelihood of symbiotic interactions, which are ultimately good for performance (see Golembiewski 1964; Evan 1966; Landau 1969; Miller 1992, 122-128).[13] But the empirical evidence suggested otherwise. Although the theory was never tested in actual debt management scenarios, experimental work on small work teams showed that, in fact, stable teams tend to foster insularity, and that unstable teams actually learn faster in certain problem-solving situations.[14]

With time, this lack of empirical support for set theory led research on debt management networks toward a theory closely aligned with organizational sensemaking (Weick 1995), garbage can theory (Cohen, March and Olsen 1972), and other (at the time, at least) unorthodox theories of decision-making. Dubbed "alternative theory" (Miller 1992), it asserts that variability in DMN performance flows from differences in how stakeholders choose to interpret information relevant to the network's decisions.[15] From this

[13] For a contemporary perspective on the role of redundancy in inter-organizational relations see Weick and Sutcliffe (2001).

[14] For a contemporary perspective see Langfred (2004).

[15] On this point also see Hildreth (1996).

new perspective came several predictions about DMN behavior. Most relevant to this analysis is that a DMN's recommended strategy will follow from a shared interpretation of current bond market conditions, regardless of whether that interpretation is consistent with the issuer's stated financial management objectives.

In-depth case studies of actual DMNs (Justice and Miller 2005) support this basic idea. A highly salient, recent example is the widespread adoption of options and derivatives.[16] These case studies show that an issuer's willingness to embrace these strategies is determined almost entirely by underwriters' hammer lock on the interpretation of key information about current and future market conditions. Other DMN participants rarely question those interpretations or their implications. At the extremes, some suggest, this leads DMNs to function more like organized anarchies than rational decision-makers (Justice and Miller 2005).

At a glance, insights from this literature about the network stability-performance relationship are inconsistent with findings from other areas of public management. Unlike Provan and Milward (1995), McGuire (2003), Hicklin (2004), and Johnston and Romzek (2007), all who find in some way that instability harms performance, the DMN literature to date shows that instability can in some cases bolster performance, and that certain kinds of stability lead to poor performance and even diminished accountability for public resources. As a result, any attempt at a generic hypothesis about the DMN stability-performance link would be shortsighted.

For that reason we turn to context, which as previously mentioned, is known to induce various sorts of non-linear effects on the stability-performance link. Two aspects of context - task complexity and resource munificence - are relevant to both DMNs and the extant literature on public management networks. These two contextual aspects are the focus of this analysis.

[16]Put simply, these are complex financial instruments that allow an issuer to save on their interest costs by borrowing and reinvesting additional money. They carry substantial risk, though, because if interest rates move in unanticipated ways, the issuer must make additional interest payments.

Task complexity is a recurring theme in work on the performance implications of managerial networking. Most of this work examines networks of public school officials, and measures task complexity with respect to the number of poor, minority, and other students who pose unique challenges to school performance. To date this research has generally concluded that networking activities improve organization performance, and that rate of improvement is greater for schools with more complex tasks. But to date, whether task complexity has the same implications for the stability of actual network structures (as opposed to networking activity) has gone unexplored.

I focus here on two aspects of task complexity in the DMN context. The first is simply the amount of money being borrowed. An inverse relationship exists between the size of a bond issue and the number of underwriters capable of providing the needed capital for that bond issue. This forces the DMN to respond to a more stylized group of investor demands, thus heightening the unpredictability, potential volatility, and subsequent complexity of the debt issuance process. Size is measured by simply subsetting the eventual sample of issues into quintiles according to the amount of money borrowed in the issue.[17]

The bond's "pledge," or the revenues designated for its repayment, also captures a key element of complexity. Most municipal bonds are supported by one of four four different types of pledges: 1) unlimited general obligation bonds, which are backed by the issuer's full taxing powers and are in turn have the best overall credit quality of all municipal bonds; 2) limited general obligation bonds, which are supported by the jurisdiction's taxing powers, but not its full faith and credit, which makes them slightly less creditworthy than unlimited general obligations; and 3) revenue bonds, which are supported by a particular revenue stream and are therefore less predictable and less creditworthy than general obligation bonds. Similar to the issue's size, an inverse relationship exists between the security of a bond's pledge and the breadth of the population of investors

[17]The amount of money borrowed in the issue is also known as its "par value."

willing to invest in the issue. This ultimately means a more complex process, and perhaps constrained policy options on the best possible borrowing strategy. I measure this element of complexity by examining the stability-performance relationship for unlimited general obligation, limited general obligation, and revenue bonds, respectively.[18]

Here I propose a hypothesis derived from O'Toole and Meier (2004) who find that managerial networking has a generally positive effect on performance, but that relationship is subject to several non-linear trends induced by key environmental characteristics including task complexity measures. Presumably, we will observe a similar effect for network stability because the same gains from more intense networking - repeated interactions, trust development, lower transaction costs, etc. - will also emerge in stable networks. What is unclear is the direction of those curvilinear relationships. As a result, I hypothesize that network stability will have a positive effect on network performance, but the strength of that effect will be different in environments of high and low task complexity relative to environments of moderate task complexity.

Resource munificence has been a concern across the contemporary public management literature, and became a central concern in the network management literature when singled out in Provan and Milward's (1995) seminal piece on the determinants of network effectiveness. They suggested networks embedded in resource-rich environments would be more effective overall, but would also exhibit more variability in that effectiveness, than networks embedded in resource-poor environments (27). Miller (1993) also highlighted the importance of resources. He speculated that comparatively poor organizations would have greater incentives to learn quickly in order to realize efficiency savings and other wealth gains. This desire for learning and institutionalization of knowledge would, presumably, incentivize network stability.

From these findings I derive a second testable hypothesis: network stability will have a positive effect on network performance, and that effect will be stronger in resource-poor

[18]For more on these distinctions and their implications see Sharp 1986.

environments than in resource-moderate or resource-rich environments.

Resource munificence is proxied here by the issuer's bond rating. Bond ratings are provided by the major credit rating agencies - Moody's, Standard & Poor's, and Fitch, IBCA - and are designed to inform investors about the likelihood an issuer will default (i.e. not make the required payments on the bond). The rating agencies consider several factors in making that determination, including the issuer's budget reserves and slack resources, tax rates, repayment histories on past debt issues, and other factors that reflect the issuer's underlying financial capacity.[19] Ratings are assigned on a basic four-tiered system. "AAA" rated bonds have virtually no chance of default. This rating is held by not more than a few hundred issuers throughout the country. "AA" rated bonds hold a slightly higher, albeit still negligible chance of default. "A" rated bonds are the lowest rating still considered "investment grade," or generally safe. "BBB" rated bonds are considered "non investment grade," and are thought to carry a much higher default risk. These rating categories therefore provide a clear, ordinal measure of resource munificence.[20]

[19]The rating agencies are also thought to consider non-financial characteristics such as political stability, financial policies, and management quality. How much these non-financial factors affect credit ratings is the source of some debate in public financial management (see, for instance, Johnson and Kriz 2005; Krueger and Walker 2007). For this analysis I assume credit ratings are driven principally by financial characteristics.

[20]Three points about these rating scales bear mention here. First, incremental differences exist within each rating category. Moody's and Fitch modify their ratings with a numeric indicator. For example, a bond rated Aa1 has higher rated than an Aa3. Standard and Poor's uses plus and minus modifiers. So for instance, an AA+ rated bond has better credit quality than an AA- or simple AA rated bond. As is often the convention in the public debt management literature, for the sake of simplicity in the eventual analysis, I combine these ratings into the broad categories mentioned above. Second, I include in the analysis the highest of the issuer's three ratings. Different ratings for the same issuer by different rating agencies (a phenemenon known as a "split rating") are not uncommon, but rarely differ by more than a notch or two. These differences are usually due to slight variations in the methodologies employed by the different rating agencies. And third, the rating scales do go below BBB to include BB, B, and CCC rated bonds. Property tax supported bonds such as those examined in this analysis rarely receive these ratings.

A Model of Debt Management Network Performance

Throughout the past several decades students of public financial management have developed what we might call a "Standard Model" of the determinants of interest rates on municipal bonds. Here I augment that basic model with measures of DMN stability in an attempt to isolate the network stability-performance link. I then subset the data according to the context factors of interest - task complexity and resource munificence - to determine whether that stability-performance link is subject to any non-linear behavior induced by context. In this section I outline the standard model and, how it was augmented with the network stability measures, and the data used to test this new hybrid model of DMN performance.

The Standard Model of Municipal Bond Interest Costs

The Standard Model of interest rates is comprised of three basic categories of variables. A full discussion of these variables and the rationale for their inclusion in the model is outside the scope of this discussion, but interested readers are encouraged to consult Simonsen and Robbins (1996) and Kriz (2003) for further discussion of the model's development over time.

The dependent variable in the Standard Model is some measure of the bond's interest rate. Effectively measuring interest rates is an ongoing challenge in the public financial management literature. That challenge stems from the fact that most municipal debt is not issued as individual bonds, but rather as packages of multiple bonds, usually with different sizes and different repayment periods. Underwriters typically submit a single bid that reflects the interest rate they expect to earn for purchasing that total package of bonds. Identifying that interest rate involves a series of mathematically complex and data intensive calculations. How those calculations are executed seems to vary across different regions and different types of issuers, and that variation has substantial implications for public finance and fiscal policy (Robbins and Simonsen 2001; Robbins, Simonsen, and

Jump 2005).

Recent work on public debt management circumvents this problem by focusing on one particular bond within each bond series (see, for instance, Allen and Dudney 2006; Allen and Sanders 2004). This procedure identifies a proxy interest rate on the overall bond series without the data and computational challenges of calculating the overall interest rate. For this analysis I focus on the bond in each series that will mature ten years after the entire series of bonds was issued. The ten year bond tends to equate to the bond series' overall interest rate, making it an ideal choice. The particular interest rate measure I use is the "reoffering yield," or the bond's stated annual interest rate (known as the "coupon rate"; this rate does not change over the life of the bond) adjusted to reflect the price at which it was first sold to the underwriter. Bonds that are less attractive to investors tend to sell at a "discount," meaning the investor acquires them at less than their full face value. Bonds purchased at a discount still earn the same fixed interest rate, which increases the effective interest rate, or "yield" that the investor earns for holding the bond. The reoffering yield on a ten year bond provides a good overall approximation of the interest rates on the overall bond issue. For that reason I employ it as the dependent variable for this model.

The Standard Model includes three categories of independent variables. The first are the issue's credit quality characteristics. This includes the previously mentioned bond rating. Higher bond ratings indicate lower default risk, which results in a lower interest rate. It also includes a dummy variable indicating whether the issue is covered by third party bond insurance. Insurance further decreases default risk, thus lowering the bond's expected interest rate.[21]

Several characteristics of the bond issue itself also affect its expected interest rate.

[21] The rate of default on municipal bonds is infinitesimally low. For instance, a recent study by Moody's found that during the past 20 years less than one percent of municipal bonds have defaulted during any given year, compared to an annual default rate of between five and ten percent for certain corporate bonds. It also found that during this same period there were no defaults of bonds rated AA or higher. Nonetheless, default risk remains a topic of widespread discussion in the literature on municipal debt.

The size of the issue is expected to increase the interest rate, given that larger issues are of interest to a smaller segment of the investor community. The intended purpose of the borrowed funds is also an important consideration. Bonds for general public purposes enjoy broader support among key stakeholders, thus lowering their likelihood of default, which makes them more attractive, which results in a lower required interest rate. By contrast, as mentioned, bonds for which the borrowed proceeds will fund both specific and general purposes will have narrower support, thus increasing their prospective interest rate. A unique type of bond known as a "refunding" issue is used to refinance outstanding debt. These bonds are typically issued when market interest rates are low, thus lowering their expected interest rate.

The bond's method of sale is another crucial consideration, and a source of substantial debate in the public financial management literature. As mentioned, the general view is that competitive sales result in lower interest rates than negotiated sales.

For this same reason, we expect bonds issued by special districts, rather than general purpose governments, to sell at higher interest rates. Specialized projects from specialized jurisdictions do not necessarily enjoy the same level of public support and access to a tax base as general purpose issues.

The third category of independent variables are other factors unrelated to the issue's credit quality or characteristics. Most important among them is the overall market interest rate, which is consistently among the most important factors affecting interest rates on individual bonds. I measure the market interest rate as the value for the Bond Buyer 20 index (a market index of municipal bond yields) for the week the bond was sold into the market. Issuers that go to the market more regularly have been shown to procure lower interest rates for a variety of reasons (see Bland 1985). I measure experience as the number of times the entity issued bonds during the period of analysis.

Bonds that enjoy a unique tax status known as "bank qualification" also tend to trade at lower interest rates. This status was created as part of the Tax Reform Act of

1986, and is designed to maintain the marketability of smaller issues that do not attract attention from large, national underwriters. Bonds that carry this designation are more likely to be held by commercial banks rather than individual investors, resulting in an expected decrease in borrowing costs (see Wasylenko 1992).

The interest earned on most municipal bonds is exempt from federal and state income taxes. There are, however, certain types of municipal bonds for which the interest earnings are not exempt from federal income taxes. These bonds are less desirable, and investors in turn demand higher interest rates to make them attractive.

And finally, bonds containing a "call feature" are expected to require higher interest rates. A call feature allows the issuer to repay some or all of the borrowed proceeds in advance of the stated repayment date. This creates uncertainty about precisely how much interest the investor will earn for holding the bond, which will lead the investor to demand a higher interest rate.

Tables 1 and 2 report descriptive statistics for the 6,100 debt issues that comprise the final sample. They show the sample is well-distributed with respect to these variables, and that a slight majority of the bonds included in the sample are general obligation, insured, A rated, general obligation unlimited, sold competitively, are bank qualified, and contain a call feature.

Measuring Network Stability

Network stability has been defined several ways, so I employ several different network stability measures.

The first is a series of variables indicating the stability of particular network members. More specifically, I calculate the percentage of the issuer's total dollar volume of bonds issued throughout the three years preceding each debt issue, and then determine the percentage of that volume in which the most frequently appearing underwriter, counsel, and financial advisor appear. The resulting variable is a percentage between one and one hundred that reveals how frequently the issuer included the same members in its DMNs.[22]

The second group of measures pertain to the stability in the overall network. One is simply a dummy variable indicating whether the entire network was retained from the previous bond issue. The second is the percentage of the dollar volume of the issuer's previous issues in which the total network participated. This distinction between frequency of issues and dollar volume of issues is essential because certain issuers go to the market infrequently but for large sums of money.

Overall network performance might be different when both members of a highly stable dyad within a network are unfamiliar with the third network member. To account for this dynamic I calculate a measure of "dyadic" stability - a proportion where the network's total issue volume across all issuers in the sample is the numerator, and the sum of the three dyadic issue volumes across the entire sample is the denominator. Lower percentages indicate the dyads in the network worked together frequently, but outside the DMN in question. The highest possible score is 33%, which indicates all three dyads within the DMN only collaborated in that DMN. This is akin to the concept of "multiplexity," or how regularly network members interact in different ways and in different settings outside the network being studied. It is also necessary to include such a measure for, as Miller (1990) points out, "Stability of a network implies both the permanence of its membership and the redundancy of its members' ties with others inside and outside the network."[23]

[22]I also calculated measures of stability among pairs of dyads, namely the percentage of the dollar volume of the issuer's previous issues in which the most frequently appearing underwriter-counsel, underwriter-financial advisor, and financial advisor-counsel dyad participated. None of these variables were statistically significant in the final regression models, and their estimates were nearly identical to those for the individual network members. Therefore, for the sake of simplicity and clarity of presentation of the final results, they are excluded from further discussion here.

[23]I also calculated measures of network density and centralization (Huang and Provan 2007, 442) which are related to stability. Unfortunately, scores on these measures were quite low because of the sheer number of DMN participants across the entire municipal market. Future work might attempt to examine centralization and density's effects on network performance within a particular segment of the municipal market, such as a state or region.

Table 3 presents the descriptive statistics for these measures. It shows that DMNs tend to involve the same members, as evidenced by the fact that mean participation rates over the period of analysis range from 70-90%. But at the same time, on average, issuers carry the same DMN into consecutive issues less than 12% of the time. Taken together, these trends suggest most issuers involve a small number of repeat players in the DMNs, but make regular, incremental substitutions in to the DMN from among that small group of go-to members. Equally interesting is the finding on multiplexity. Here we observe large variation, ranging from just over zero percent to the maximum possible score of 33%. These figures suggest wide variation in the degree of duplicity and extra-network connections that network members bring to each DMN interaction.

Data and Methods

At last count the municipal bond market totaled more than $2.1 trillion in outstanding debt (Federal Reserve Board 2007). This population is simply too large to effectively analyze, so a bond was included in the sample only if some part of its proceeds were designated for "general public purposes." This filter is appropriate because investor perceptions of bonds designed exclusively to finance particular purposes or services such as recreation centers, hospitals, schools, etc. will be determined mostly by expectations about the demand and level of public support for those particular services or projects. But bonds for "general public purposes," which includes public safety, road and bridge infrastructure, property tax-supported utilities, and other projects designed to benefit an entire community rather than a subset of citizens are more directly comparable. Several of the bonds included in the sample were backed in part by a particular revenue stream, and/or had a portion of their proceeds finance some particular project in addition to general public purposes. They are also noted as revenue bonds and "multiple purpose" bonds, respectively. Data were then collected on all bonds issued between 1999 and 2005 that met these criteria.[24] This produced an initial sample of 16,847 bonds issued by 7,758 unique issuers.

I then calculated the relevant stability measures for each DMN in three year blocks. The first block included 1999-2001, the second 2000-2002, the third 2001-2003, and the fourth 2002-2004. Three years is an appropriate time frame because it is long enough to include infrequent bond issuers, but not so long that it reflects any structural changes in the population of potential DMN participants. I then took each new bond issued between 2002-2005, identified the DMN that participated in it, and incorporated that DMN's stability measures for the three years preceding the issue. Thus, each observation in the dataset includes the interest rate on the new bond issue, the characteristics of that bond issue, and the stability characteristics for the previous three years of the DMN that participated in the issue. The final stability-performance estimations were conducted on 6,100 issues from 3,380 unique issuers involving 3,288 distinct DMNs.

With the dataset established I conducted the statistical analysis as follows. I first estimated the basic interest rate model. I then re-specified that model to include separately each network stability measure, and re-estimated the six new models resulting from those re-specifications. With those basic models established, I then split the dataset into 24 different subsets based on the context measures of interest. To control for task complexity the sample was subset into general obligation unlimited bonds, general obligation limited bonds, and revenue bonds, and also into the five different quitiles for issue size. To control for resource munificence the data were subset into AAA, AA, A, and BBB rated issues. Each of these 12 categories was then further subset into negotiated and competitive sales, creating a total of 24 unique subsets. I then estimated the six models for each of these 24 subsets, thus producing 144 unique estimates of network stability's effects.

[24]These data were collected from Bloomberg's Professional Service, which compiles data from dozens of proprietary sources. Bloomberg staff indicated that 1999 was the first year for which complete data on the municipal bond market are available.

These models were estimated with ordinary least (OLS) squares regression and robust standard errors to correct for any heteroskedasticity problems resulting from the inclusion of multiple bond issues from the same issuer. To account for state-specific regulatory and other influences I included state fixed effects in each specification. Basic regression diagnostics indicated these corrected models produce reliable, unbiased estimates of bond interest rates.

Results

Estimates of the Standard Model are reported in Table 4. These findings are generally consistent with previous iterations of this model. All coefficients are in their expected direction, and consistent with past findings, the variables with the single largest impact on borrowing costs are the market interest rate and the issue's tax status. The model explains more than half the variation in interest rates, which is also consistent with previous work.

Table 5 presents the findings from the basic models that include the network stability measures. Introducing these measures has no substantive effect on the significance, magnitude, or direction of the other independent variable coefficients, so for the sake of clarity I present only the network stability coefficients. The R^2 statistics are also nearly identical for both the Standard Model and the model specifications that include the stability measures, so those statistics are also excluded. Full model coefficients and model fit statistics are available upon request.

The coefficients reported in this and subsequent tables are the raw regression coefficient multiplied by 100. This allows us to discuss differences the impact of independent variables in terms of "basis points," or one one-hundredth of a percent. A few basis points can make a substantial difference in the amount of interest an issuer will pay on a bond. For instance, for a hypothetical 10 year, $1.2 million issue (the sample mean) with an annual interest rate of 5%, an issuer can expect to pay approximately $665,000 in interest over the life of the bond. That exact same bond issued at an annual interest rate of 5.2%, a 20 basis point increase, will accrue more than $692,000 in interest, an additional $27,000. But consider also that most municipal bonds are sold as "issues," or groups of 10-20 individual bonds of different sizes and maturity dates. If the previously mentioned 10 year bond were sold as part of a $12 million issue comprised of similar bonds, an across-the-board 20 basis point increase in the interest rate on the entire bond issue would equate to more than a quarter million dollars in additional interest payments.

The first column in Table 5 presents these model coefficients for the estimates based on the full sample of bond issues. The second and third columns present the model estimates for restricted samples of competitive and negotiated issues, respectively. The differences in the statistical significance, size, and direction of these coefficients across the different samples underscore the need to examine negotiated issues separate from competitive issues. For competitive issues we find underwriter stability and overall network stability have strong positive effects, but for negotiated sales those same variables are not statistically significant. For negotiated sales counsel stability has a large positive effect, but network stability appears to have no effect. In light of these findings, competitive and negotiated sales are considered separately throughout the rest of this analysis.

Tables 6 and 7 presents the estimates for the data subset according task complexity measures. For Table 6, GO Unlimited bonds are the least complex, and revenue bonds are the most complex. In Table 7 the smallest, or 1st quintile bonds are the least complex, and the largest, or 5th quintile bonds are the most complex.

Taken together, these findings provide tentative support for the first hypothesis - that network stability will improve performance, and that improvement will be curvilinear is partially supported. For negotiated sales, retaining the same DMN has a curvilinear effect. It lowers borrowing costs among the less complex issues and most complex issues, but has no effect for issues in the middle of the complexity scale. However, this same trend is not observed among the competitive sale issues, or when stability is measured in terms of dollar volume. In fact, in the competitive sale context network stability seems to harm performance among the lest complex issues, as evidenced by its significant positive coefficient in both the GO Unlimited and 1st quintile subsets. Some aspect of stability in negotiated sale networks - perhaps the more intensive interactions among network members in advance of the sale - produces qualitatively different and inherently better outcomes.

We also find that stability of individual network participants is not nearly as important once we account for task complexity. Counsel stability significantly increases borrowing costs across several of the models, but in general, stability of individual members is essentially inconsequential once we account for task complexity. We also observe, perhaps surprisingly, no clear pattern in the findings on multiplexity.

Table 8 presents the findings on network stability's effect controlling for resource munificence. As a reminder, a BBB rating indicates the lowest level of resource munificence, and an AAA rating indicates the highest level of resource munificence. Once again, multiplexity is inconsequential, and with the exception of underwriters, there is no clear performance implication for individual network member stability.

In the aggregate, these findings provide only weak support for the resource munificence hypothesis - that network stability will have a positive effect on performance, and that effect will be stronger in contexts of resource scarcity. Among BBB rated negotiated sales, network stability decreases the estimated interest rate more than 42 basis points. However, for A rated bonds stability has a strong and significant negative effect on performance, as it actually increases the estimated interest rate by nearly 20 basis points. We observe this same contrary effect on the competitive sale side. Among A and AAA rated competitive issues network stability increases borrowing costs by 14.3 and 36.45 basis points, respectively.

In fact, the overall support is much stronger for a corollary hypothesis - network stability improves performance when resources are scarce, but harms performance when resources are more abundant. The estimates for underwriter stability for competitive sale DMNs also support this claim.

Discussion

This research sought to test two claims about how context shapes the relationship between between network stability and network performance. Those claims were tested by incorporating a battery of network stability measures into a standard explanatory model of the performance of debt management networks. The first claim, network stability will improve performance and that improvement will be curvilinear depending on the network's level of task complexity, was partially supported. The second claim, that network stability would have a stronger positive effect on performance in resource poor environments, was also partially supported. I also found that stability of certain network members has its own performance implications, and that multiplexity does not appear to systematically affect performance.

These findings suggest a variety of directions for future theory building and empirical research. First and foremost, they show that indeed, context matters when studying the stability-performance link. Initial estimates from a broad sample of bond issues showed that the majority of the network stability measures had notable effects on performance. But once the data were split into samples designed to account for key aspects of context, that pattern of influence became less clear.

One of this study's clearest findings, that certain types of network stability actually harms performance in resource munificent environments, has important implications for contemporary public management. This finding is consistent with a growing literature that suggests networks in general, and stable networks in particular, have a propensity to distribute resources in ways that reinforce inequalities (O'Toole and Meier 2004, 2007). But these results show that crucial stakeholders, in this case municipal bond investors, appear willing in some circumstances to effectuate negative consequences in the form of higher interest rates if DMNs take actions that promote inequality.[25]

Whether those sorts of market-based consequences are in fact a response to the proverbial dark side of networks, and whether those consequences are sufficiently important to change network behavior, are questions that warrant future consideration.

Future work should also explore these interactions among stability, context, and performance with more precise measures. Task complexity measures that more directly account for the sources of that complexity such as changing political circumstances, highly-charged policy issues, exposure to volatile markets or prices, and others would allow us to better understand whether there are, in fact, circumstances of complexity where network stability yields positive performance gains. Better measures of context would also improve the reliability of these findings. For resource munificence in particular, a host of fiscal indicators including per capita income, outstanding debt burden, tax rates, and others would speak more directly to resource flows.

A key drawback to this study that could be addressed in future work is to consider stability of both the network, and the personnel within that network's focal organization. In the DMN case this would imply considering stability of the finance director, capital projects director, city manager, and other personnel that engage with the DMN. Expanding the definition of network stability to include intra-network stability would broaden our understanding of this crucial concept.

Future work might also take a different approach to studying performance. Although lowest cost of capital is the clearly accepted main objective for DMNs, there are other secondary objectives for which context might shape the stability-performance link differently. For instance, many elected officials see the debt management process as an opportunity to infuse the local economy with substantial public capital by encouraging

[25] The idea that capital will flow to its most efficient use - also known as the efficient markets hypothesis (Fama 1970)- is the source of perennial debate among students of financial markets. To the extent that efficient allocation of public capital is related to or even synonymous with equitable allocation, then this sort of "market discipline" provides a meaningful accountability on DMNs and other networks that rely on some sort of market mechanism to generate resources.

local and regional banks to underwrite their bonds. The key performance indicator under those circumstances is whether the DMN effectively places the bonds in the hands of the desired underwriters. We might also think of performance in terms of whether the DMN identifies the most appropriate borrowing solution given the issuer's current fiscal, political, and other circumstances. A unique twist on this same analysis would be to model through linear optimization or maximum likelihood techniques each DMNs choice of borrowing structure, and then determine whether network stability increases or decreases the distance between the issuer's actual and optimal debt management strategy.

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Table 1: Descriptive Statistics for Interest Rate Continuous Variables

	Mean	SD	Min	Max
Yield	4.29%	.69%	1.6%	7.2%
Market Interest Rate	3.79%	.30%	2.97%	4.53%
Experience	2.49	2.61	0	26
Size (thousands)	$1,200	$4,380	$4.5	$1,800,000
N = 6,100				

Table 2: Sample Characteristics for Interest Rate Model Qualitative Variables

Characteristic	Percent of Sample
Credit Quality Characteristics	
Unrated	28.78%
BBB Rated	6.20%
A Rated	30.30%
AA Rated	29.54%
AAA Rated	4.92%
Insured	55.07%
Issue Characteristics	
Public Purpose	85.46%
Refunding	9.40%
Special Purpose	5.13%
Multi-Purpose	38.50%
Negotiated Sale	39.26%
Competitive Sale	60.54%
GO Unlimited	62.41%
GO Limited	20.08%
Revenue	12.20%
Other Characteristics	
Bank Qualified	57.54%
Federal Taxable	3.1%
Special District Issuer	14.31%
Callable	85.44%
N = 6,100	

Table 3: Descriptive Statistics for Network Stability Measures

	Mean	SD	Min	Max
Financial Advisor Stability	92.18%	20.07%	0	100%
Underwriter Stability	73.85%	32.35%	0	100%
Counsel Stability	94.56%	17.44%	0	100%
Same Network	11.20%	31.54%	0	100%
Network Stability	71.23%	33.23%	0	100%
Multiplexity	8.02%	7.89%	.01%	45.51%
N = 6,100				

Table 4: OLS Estimates of Municipal Bond Yields

	Coefficient	SE	p value
Credit Quality Characteristics			
Unrated	.028	.005	.000
A Rated	-.212	.019	.000
AA Rated	-.243	.022	.000
AAA Rated	-.390	.048	.000
Insured	-.123	.0189	.000
Issue Characteristics			
Size	.031	.009	.000
Public Purpose	-.068	.031	.044
Refunding	-.091	.034	.008
Multi-Purpose	-.016	.016	.319
Negotiated Sale	-.117	.232	.614
Competitive Sale	-.220	.232	.344
GO Unlimited	-.382	.058	.000
GO Limited	-.338	.061	.000
Revenue Bonds	-.200	.062	.001
COP	-.431	.060	.000
Other Characteristics			
Market Interest Rate	.776	.02	.000
Issuer Experience	.001	.018	.985
Bank Qualified	-.069	.0197	.000
Federal Taxable	1.037	.050	.000
Special District Issuer	.083	.0192	.000
Callable	.760	.023	.000
R^2 = .574			
N = 6,087			

Table 5: OLS Estimate Coefficients for Network Stability's Effect on Network Performance - Base Models

Stability Measure	All Issues	Competitive Issues	Negotiated Issues
Financial Advisor Stability	14.2	-4.1	7.1
Underwriter Stability	9.3**	15.0**	-3.2
Counsel Stability	.3**	-13.4**	15.2**
Same Network	-4.2*	-3.4	-5.9
Network Stability	9.8**	11.7**	2.1
Multiplexity	-32.6**	-24.0	-45.8*
N	6,087	3,855	2,232
* = p $\leq$ .1, ** = p $\leq$ .05			

Table 6: OLS Estimate Coefficients for Network Stability's Effect on Network Performance by Type of Issue

	Type of Bond		
Stability Measure	GO Unlimited	GO Limited	Revenue
Negotiated Sales			
Financial Advisor Stability	10.4	6.7	-18.2
Underwriter Stability	-9.4	11.6	-14.5
Counsel Stability	19.2*	9.3	20.8*
Same Network	-7.5*	12	-9.2*
Network Stability	2.4	9.9	-10.5
Multiplexity	2.2	-25.3	-105.0**
N	1067	531	500
Competitive Sales			
Financial Advisor Stability	-1.2	1.8	-28.4
Underwriter Stability	14.9	19.3*	10.1
Counsel Stability	-11.5**	-24.2**	34.5*
Same Network	-5.3	11.8	1.8
Network Stability	11.3**	20.4	19.1
Multiplexity	-46.8**	5.8	113.6**
N	2721	681	271
* = p $\leq$ .1, ** = p $\leq$ .05			

Table 7: OLS Estimate Coefficients for Network Stability's Effect on Network Performance by Issue Size

	Size				
	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile
Negotiated Sales					
Financial Advisor Stability	6.7	-5.4	18.4	9.6	11
Underwriter Stability	-14.0	-28.9	19.8	18.8	7.6
Counsel Stability	31.6*	15.6*	-4.8	-.9	27.5*
Same Network	-5.0	-14.6**	6.3	-8.2*	4.2
Network Stability	-1.4	-21.8**	15.8*	5.2	14
Multiplexity	21.5	-42.8	-82.7**	-22.2	-.1
N	1067	531	500	477	478
Competitive Sales					
Financial Advisor Stability	-15.1*	11.3	2.2	-7.2	-3.2
Underwriter Stability	19.2*	12.6	8.3	3.5	3.5
Counsel Stability	4.6	-25.9*	9.7	-20.3*	-21.25**
Same Network	-1.6	-4.4	3.8	-10.3	-7.0
Network Stability	18.4*	7.6	7.19	-1.4	-1.0
Multiplexity	-19.6	5.4	-60.9	5.3	47.3
N	738	628	736	741	736

* = $p \leq .1$, ** = $p \leq .05$

Table 8: OLS Estimate Coefficients for Network Stability's Effect on Network Performance by Bond Rating

	Bond Rating			
	BBB	A	AA	AAA
Negotiated Sales				
Financial Advisor Stability	-37.5	16.5	13	-34.9
Underwriter Stability	-27.5	-19*	3.1*	-24.9
Counsel Stability	-23.1	16.4*	.5	-40.3
Same Network	6.2	6.2	3.6	19.2
Network Stability	-42.2*	19.9*	7.8	58.6
Multiplexity	-87.1	20.8	-30.7	57.7
N	102	560	497	39
Competitive Sales				
Financial Advisor Stability	-12.8	.9	.8	14.6
Underwriter Stability	26.7	12.6*	9.6*	38.9*
Counsel Stability	15.6	-1.4	-20.2**	-20.5
Same Network	5.0	-9.8	-7.2	36.5
Network Stability	21.3	14.3*	6.6	36.45**
Multiplexity	38.4	-14.3	-25.7	-85.8
N	277	1286	1305	261
* = p $\leq$ .1, ** = p $\leq$ .05				