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Complex Transactions Under Uncertainty

Brazil's Machine Tool Industry

Andrew Stone

Despite intense economic and policy uncertainty and slow courts, Brazilian machine tool firms can conclude complex contracts with customers. The new institutional economics helps explain how.

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Summary findings

Drawing on the new institutional economics, Stone's study of Brazil's machine tool industry extends an earlier study of the garment industry in two ways.

First, it broadens the original study to a second industry, which could either confirm or amend the original conclusions.

Second, it looks at the effect of economic uncertainty and expensive formal means of resolving conflict on an industry where enforceable contracts appear necessary for normal business transactions. The machine tool industry is characterized by longer-term contracts and by commitments of resources to products that could not easily be sold to another customer (asset specificity).

More formalistic approaches to law and development would suggest that only a legal system that enforces promises in a "knowledgeable, sophisticated, and low-cost way" would allow transactions in this industry (Williamson). By contrast, the new institutional economics looks at other means of governing agreements — including what Oliver Williamson describes as "bilateral efforts to create and offer hostages."

The results show that, while the Brazilian machine tool industry has suffered from a reduction in protection and the effects of a turbulent macroeconomic environment, long-term contracts for specialized equipment are unexpectedly secure.

Responses to an enterprise survey show that problems with formal conflict resolution rank low, although the machine tool industry is characterized both by greater compliance with formal rules and by greater reliance on specific, long-term contracts than the garment industry. In fact, machine tool firms report a higher rate of customers honoring orders and making timely payments than do garment firms.

Compliance is indeed assured by a sort of "exchange of hostages." The supplier's hostage is the irretrievable investment of physical and human capital in a product difficult to sell to another customer. The customer's hostage is the specific technology bound up in the machine being produced and a payment system that ensures a substantial sunk investment in the machine by the time of delivery.

The only attribute of contracts that is frequently renegotiated is the indexation of payments, motivated by macroeconomic instability. Qualitative evidence suggests that this process adds substantially to transaction costs. Not surprisingly, machine tool producers, like their counterparts in the garment industry, place a high priority on a more stable macroeconomic and policy environment.

This paper — a joint product of the Private Sector Development Department and the Finance and Private Sector Division, Policy Research Department — is part of a larger effort in the Bank to promote a realistic assessment (through firm-level surveys) of constraints on private sector development. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Paulina Sintim-Aboagye, room N9-059, extension 37644 (17 pages). January 1994.

COMPLEX TRANSACTIONS UNDER UNCERTAINTY:

The Case of the Brazil Machine Tools Industry

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COMPLEX TRANSACTIONS UNDER UNCERTAINTY
The Case of the Brazil Machine Tools Industry

I. Introduction

This study of Brazil's machine tools industry extends an earlier garment industry study[1] in two dimensions:

First, it broadens the original study to a second industry, which could either confirm or amend conclusions made earlier on the basis of the garment sector; and

Second, it looks at the effect of economic uncertainty and expensive formal conflict resolution on an industry where enforceable contracts appear necessary for normal business transactions. The machine tools industry is characterized by considerably longer-term contracts and greater specificity of assets (explained below) than is the garment industry.

The results show that, while the machine tools industry has suffered from a reduction in protection and the effects of a turbulent macroeconomic environment, long-term contracts for specialized equipment are unexpectedly secure. Compliance is assured on the part of the supplier by his inability to sell the product to another customer, while payment by the customer is assured by her need for the product and a payment system that ensures a substantial sunk investment in the machine by the time of delivery. The only attribute of contracts that appears subject to frequent renegotiation is the indexation of payments, motivated by macroeconomic instability; a process that qualitative evidence suggests adds substantially to transactions cost.

II. Some Methodological Issues

Formalistic versus New Institutional Approaches The earlier paper observes that legal formalism, as embraced by the Law and Development literature[2], suggests that the key to efficient economic transactions lies in near perfect formal law and formal enforcement and conflict resolution mechanisms; while the New Institutional Economics suggests that important roles may be played by informal institutions, whose relative efficiency must be judged empirically. In the garment study, we asked whether the effectiveness in that sector of informal institutions such as credit checking mechanisms would suffice in a sector where producers had to make irreversible commitments of resources well before the final sale -- that is, where a transaction involved specific assets.

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[1] See Andrew Stone, Brian Levy and Ricardo Paredes, *Public Institutions and Private Transactions: The Legal and Regulatory Environment for Business Transactions in Brazil and Chile.* (World Bank Policy Research Working Paper 891, 1992)

[2] In the earlier paper, this literature was described as follows: "Law and Development" holds that rapid market-based economic growth depends on: a system of simple, transparent laws and regulations; consistent interpretation and enforcement (like cases are treated alike); just and rapid resolution of conflicts (justice deferred is justice denied); and a social attitude of respect for legal and regulatory institutions. The common law systems of England and the United States, as well as the civil legal systems of Western European countries are taken as ideals. Deviations from the ideal [are understood to] obstruct development. Ibid.

Surprisingly, one prediction of NIE is that formal law matters **less** for transactions involving specific assets (or with highly specialized characteristics) than those involving general ones, because of the time and expense required for formal legal enforcement. Oliver Williamson, in his classic discussion of contracts made in the context of "irreversible, specialized investment", observes:

> That the study of credible commitments has been relatively neglected is explained by the aforementioned assumption, common to both law and economics, that the legal system enforces promises in a knowledgeable, sophisticated, and low-cost way. Albeit instructive, this convenient assumption is commonly contradicted by the facts -- on which account additional or alternative modes of governance have arisen Bilateral efforts to create and offer hostages are an interesting and, as it turns out, economically important illustration.[3]

Buyer and seller exchange "hostages" in the form of down payments and specific technology provided by the buyer; and specific, sunk investments in physical and human capital on the part of the seller. These hostages ensure observance of the terms of the contract and provide a strong incentive for quick resolution of conflicts.

Thus, in a sense, legal formalism and NIE have near opposite predictions for the importance of the legal system in contracting in this sector. From a formalistic perspective, the higher the specificity of characteristics of the product, the longer the term of the contract, and the greater the risk in tying up resources in a particular transaction, the more need there would be for superior legal contracts and formal enforcement mechanisms to support them. NIE suggests that even under advanced legal systems, buyers and sellers will work out their own solutions to such problems, attempting to avoid the expense, delay and imprecision of court rulings.

<u>The Field Surveys</u> Forty-three firms were surveyed in two weeks of interviews in Sao Paulo State. Of these, three were deemed large, because they had 500 or more employees, 16 were medium, having between 100 and 500 employees, and 24 were small, having fewer than 100 employees. There were no microenterprises among our sample (although one firm had essentially laid off all its employees). Invaluable assistance was leant by ABIMAQ, a syndicate of industrial producers, which scheduled 33 of the interviews among its members. The other firms were added to the sample to counter the potential bias introduced by membership in a trade association.

As in the first study, our attention focused on the impact of Brazil's difficult environment on business transactions in four areas: **entry** and **regulation**, which concern business-government transactions; and **orders** and **credit**, which involve business to business transactions. The one significant difference from the earlier work was a set of questions concerning adjustments for inflation and payment schedules, questions particularly important for the longer term contracts of this industry. One cautionary note limits comparisons of the machine tools and garment sectors: machine tools enterprises had been hit hard by the recession and were surveyed one year after garment firms. Thus

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[3] Oliver Williamson, *The Economic Institutions of Capitalism* (New York: Free Press, 1985) pp. 167-8

the use of labor force size to categorize firm size may be deceptive: in better times, our sample would have comprised far fewer small firms and more medium and large ones.[4]

III. The Machine Tools Industry[5]

The machine tools sector was selected because of the asset specificity of many transactions in the industry. Its products are highly differentiated[6] and its high end is dominated by custom designed equipment. The machine tools industry is characterized by relatively long-term contracts (orders may typically take from two months to eighteen months to fill) and the commitment of a significant bundle of assets to specific transactions. Thus, a fundamental question of this study was what constraints policy, regulation and formal legal systems impose on business transactions in such an industry.

The machine tools industry[7] is one that has traditionally been regarded as technologically and strategically important to developed industrial economies. Since the late 1950s, Brazil's machine tools industry has enjoyed substantial protection as part of government import substitution and export promotion policies. The machine tools industry has enjoyed at least two booms -- one in the late 1970s (peaking in 1979 with production of $441.3 million, in 1980 dollars), and another in the late 1980s. Exports grew rapidly in the 1970s, peaking in 1981 in response to the Mexican oil boom. Yet the majority of production has always sold to the domestic market. While comprising only about 1% of world machine tools production, Brazil has been the largest producer among developing countries. Over 75% of this production takes place in Sao Paulo state. Recently, a combination of recession and reduction in these supportive policies have diminished and changed the industry substantially. Since about 1989, overall production has since been in serious decline.

Throughout most of the 1970s and 1980s, the machine tools industry enjoyed substantial protection. An import tariff on machine tools varied between 53 and 62 percent. Wogart estimates that total protection (including reduction of or exemption from important domestic taxes) totalled 88% in 1988. Furthermore, the government extended a large amount of subsidized credit (particularly from BNDES) for domestic purchases of domestically produced machines. Nonetheless, substantial

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[4] We experimented with basing firm size on the mid-point between peak employment and current employment, to counteract the effect of the current recession. Under this calculation, there were 5 large firms, 24 medium firms, and 14 small firms in our sample. However, subsequent examination did not yield systematic differences in variables by firm size under this assumption.

[5] Most of the information in this section is derived from Jan Peter Wogart and Uwe Corsepius, *Skill-Intensive Manufacturing in Development: The Case of Brazil's Machinery, Electrical and Electronics Sectors* (Mohr, Germany: Tubingen, 1990) pp. 5-52

[6] In 1980, product diversification in Machine Tools was higher than any other manufactured export sector, with 214 separate 8 digit BTN items in the commodity group. (In a distant second was Boilers, with 124 BTN items.) See Claudio Frischtak and Izak Atiyas *Industrial Regulatory Policy and Investment Incentives in Brazil* (Washington: World Bank, 1990) Restricted

[7] Machine tools are "power tools used in machining" [primarily metal]. In the Brazilian domestic market, automobile companies comprise the largest industrial customer.

exemptions and exceptions to this protection[8], combined with an export interest, kept Brazilian costs remarkably competitive overall (an average of 7% higher than world prices in 1978). Protectionist policies have harmed the industry in at least one important way: they have raised the price of components. In particular, due to a restrictive informatics law, electronic components required for computer numerically-controlled (CNC) machines cost far more in the Brazilian market than in OECD countries.[9]

Wogart (1990) describes the machine tools industry internationally as one that is typically characterized by a few large firms, concentrating on the production of whole machines, and many small and medium-sized firms that produce parts and components, frequently as subcontractors with or subsidiaries of the large companies. He suggests that Brazilian firms may not fully benefit from economies of scale in production, may be too vertically integrated, and may be overdiversified in their product lines. In Brazil, few firms qualified as "large" by the employment criteria set out in the garment sector study, and there are a number of medium-sized and small firms that are vertically integrated producers of finished machine tools.[10] Note that the high degree of vertical integration (evident from Wogart's work and interviews), by comparison to international norms and the low degree of subcontracting (available from the survey) appear symptomatic of a poor contracting environment. Yet it may also be explained by limited competition: Frischtak and Atiyas's 1990 study found moderate to high barriers to mobility and competition in the "made-to-order" machinery subsector due to "limited access to FINAME finance."[11] The extent to which FINAME picked incumbent winners in the machine tools industry is not entirely clear, but it clearly has influence both in who it finances and, in the context of rapid inflation, how quickly it provides finance for a given supplier's products.

IV. Business-Government Transactions

Entry and Registration Status Firms in this sector are, overall, older than those in the garment trade: the average age was 27 years. Consequently, entry data from the current study was sparse: only seven firms had recently registered or re-registered their firms. Of these, four had reverted from a public company (S.A.) to a limited liability company (Limitada). Those that used lawyers or other professional

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[8] Wogart observes that CACEX had extraordinary discretion over which capital goods imports were subject to the "law of similars", judgements on domestic content, and other regulations affecting protection.

[9] It is thus not surprising that the two leading complaints of our sample about inputs concerned the high cost of local goods (63% of firms identified this as a problem and the poor quality of local goods (40%). Larger firms are partially able to overcome this by importing, but then confront high duties. One third of large firms (i.e. one firm) and 25% of medium firms complained about import duties, while less than 5% of small firms identified this problem.

[10] "Large" is of course, a relative term. Wogart notes the predominance of small firms in the machinery sector. Brazilian firms may in fact be (or have been until recently) larger than their optimal size because of excessive vertical and horizontal integration, protection, and reliance on more labor-intensive technologies.

[11] Frischtak and Atiyas, *Ibid.*

facilitators reported no special problems with the process, with the exception of one firm that encountered some problems with approval by the environmental authority of Sao Paulo and one where the partners had disagreements that created legal complexities. Two firms were able to register as *limitadas* for $500 in about one month. One firm completed the re-registration process using its own personnel, going completely by the book, requiring nine months to complete the process.[12] Earlier work suggested that law and accounting firms use *despechantes*[13] to expedite registration for their clients. This firm's experience seems to confirm the efficacy and economy of using intermediaries as an institutional substitute.

One important trend was the movement away from public ("S.A.") corporate status towards private, limited liability status. The legal and bureaucratic requirements of S.A. status are widely regarded as excessive, and the investment environment apparently offers little compensation in terms of raising capital through public offerings of shares. Firms are particularly reluctant to publish their balance sheets, a requirement of S.A. status which they feel puts them at a competitive disadvantage.

Regulation Regulatory data affords a direct comparison between the garment and machine tools sectors. As in the garment sector, tax regulation imposed an enormous burden on firms in terms of accounting and filing requirements. Overall, machine tools firms found federal tax requirements the most burdensome area[14], in part due to a recent requirement (rescinded during the period of the survey) that companies file monthly balance sheets and income statements with their tax payments. This necessitated monthly inventories and nearly impossible accounting burden. Ranked responses suggest that large firms are the most troubled by taxes and, in particular, that **federal** taxes stand out as more difficult for large firms than for medium and small ones.

An important obstacle for machine tools businesses that did not appear in the garment sector was trade regulation. Fifteen firms (34% of the sample) volunteered that trade and foreign exchange regulations were a problem for them. Specifically, problems were encountered both importing and exporting. Furthermore, the informatics law had forced them to use far more expensive indigenous suppliers of computer numerical control (CNC) equipment. Thus, in discussing input problems, fully one third of the firms volunteered that the quality of domestic inputs was a leading constraint. Several firms praised import liberalization affecting components, but criticized the existence of a higher duty on foreign components than on finished foreign machine tools, with which they had to compete.

Perhaps because of the larger size of firms and of individual transactions, machine tools firms felt compelled to go "by the book" in their transactions, admitting to remarkably little informal behavior compared to the garment sector. This may explain why, in machine tools, labor regulations weighed

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[12] Of seven firms responding, two took one month to register, one took two months, one three months, one 14 weeks, one nine months and one -- which converted to an SA, took 2 years, in part due to internal problems.

[13] Literally, dispatchers, these "fixers" help individuals and businesses to work through or get around government regulations.

[14] State tax regulations came in second and labor regulations a close third. Had trade and foreign exchange regulations been included as an option, they would have been ranked fourth, with municipal tax regulations and building and property regulations completing the set.

most heavily on small firms, and least heavily on large ones: unlike the garment sector, there is no escape for small firms through informality.[15] Labor regulations may thus pose an entry barrier. Some 57% of firms acknowledged paying *jeitinhos*[16] (vs. 76% for the garment sector sample) yet, unlike the garment sector, few described the value of these payments as being a significant cost. In two cases, respondents reported having made significant payments to expedite foreign trade, where officials can delay critical shipments in and out of the country on technical grounds.

Figure 1 compares two measures of regulatory costs between garments and machine tools sectors: the percentage of proprietor's time and of employees' time expended on compliance activities. Overall, the percentage of proprietor's or senior management's time required for regulatory compliance activities was higher in the machine tools sector than in garments: 26.3% for medium firms and 19.2% for small firms vs. 13% and 15% in the earlier study. Perhaps because of the importance of trade regulations or because of the greater formality, regulations require more management time within the machine tools sector. However, the average percentage of employees' time required was slightly less: 4.2% overall versus 4.9% in the original study. However, both sectors compare unfavorably in this regard to the Chilean garment sector, which required only .4% of its fulltime labor force for compliance activities.

In addition to time, a substantial number of firms require professional assistance to manage taxes or regulatory problems (see Table 1). As with garment firms, use of an external accountant declines with firm size, in part because of the economies of internalizing the function created by the

TABLE 1: Use and Cost of External Assistance with Tax and Other Regulation

	(A) % Using Accountant	(B) % Using Auditor or Consultant	Monthly Cost of (A) + (B) (in $ U.S.)
Small	42	33	702
Medium	6	60	1307
Large	0	100	4167
Overall	26	48	1010

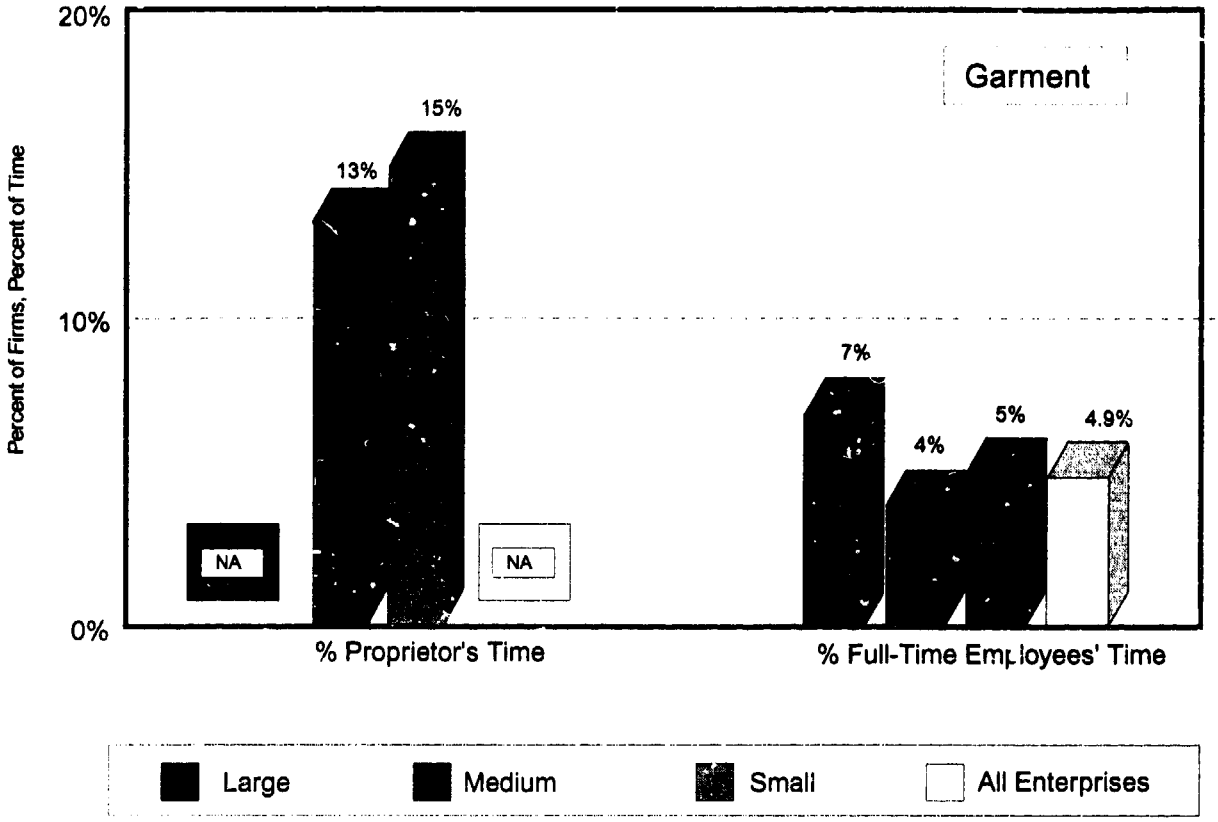
regulatory environment. However, we also asked machine tool firms about the use of auditors and accountants necessitated by tax regulation, and found that this increased with firm size. Thus, the overall expense of external assistance rose with firm size (although small firms' expense is

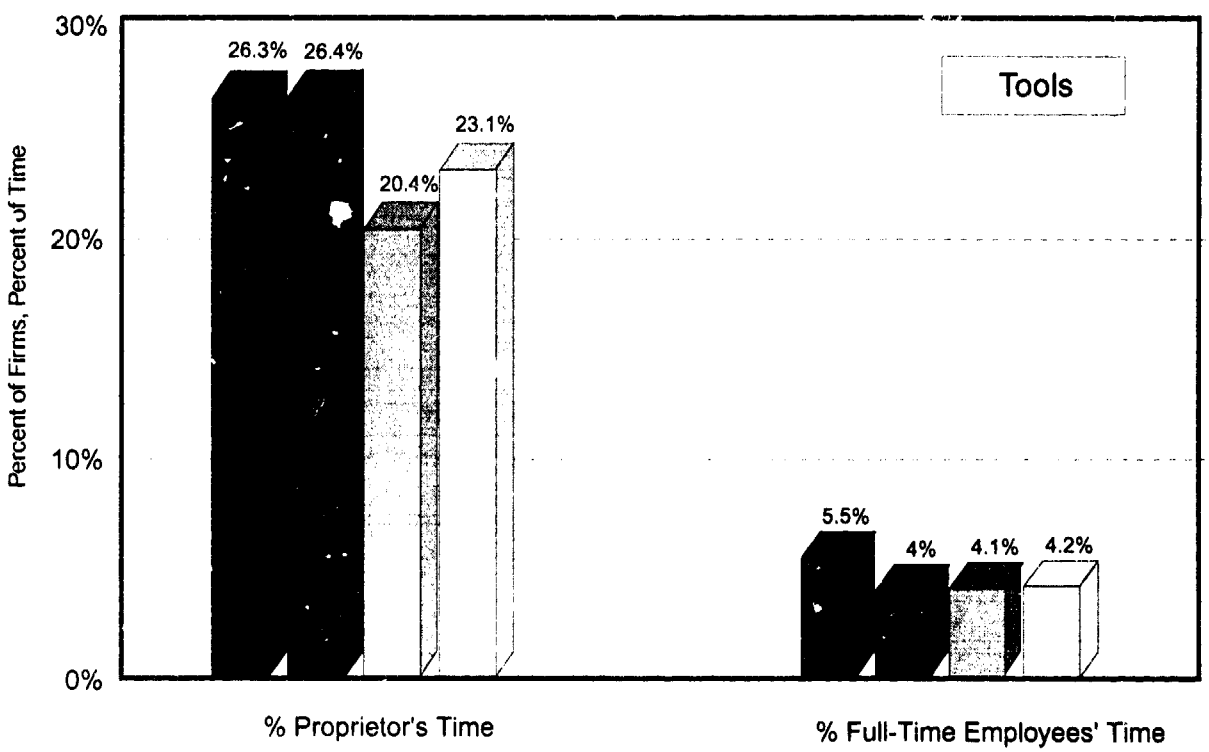
[15] By contrast, in the garment sector study, labor regulations were least binding for the very smallest Brazilian firms (a score of .47 for firms with 25 or fewer employees), more binding for larger small firms (.66), most binding for medium-sized firms (.70), and a considerably less binding for large firms (.56). In Chile, the scores were .28 for all small firms, .46 for medium firms, and .41 for large firms.

[16] meaning "little fix", a *jeitinho* is one of several words for bribes used to smooth relations between government officials and private enterprises.

Figure 1

Recurrent Costs of Compliance with Government Regulations





disproportionally large when normalized by fulltime employment). Over half the firms reported using a lawyer to deal with regulation. Most paid on a case by case basis, but of only four firms reporting a monthly charge, the average cost was $415.

Constraint scores assigned to regulatory constraints do not demonstrate a clear "threshold burden" like that discussed in the original study, but instead indicate regulatory disincentives to entry.[17] Table 2 details the average scores given by respondents to the severity of constraint imposed by three types of regulation relative to other constraints, with a score of zero for the least binding and a score of one for the most binding. Regulatory burdens are consistently identified as greater by very small than by small firms, and in two of three categories, very small firms rank constraints higher than do medium and large firms. In the case of labor regulations, the constraint score steadily declines with firm size -- suggesting the possibility of a high initial fixed cost to regulatory compliance.

TABLE 2: The Burden of Regulatory Constraints by Firm Size

	Very Small Firms (<25 fulltime employees)	Small Firms (25-99 fulltime employees)	Medium Firms	Large Firms
Tax Bureaucracy	.71	.58	.72	.75
Labor Regulations	.68	.65	.57	.42
Other Bureaucratic Procedures	.54	.41	.49	.42

Figure 2 compares conflict resolution mechanisms used in the garments sector to those use in the machine tools sector. In general, machine tools firms are somewhat more likely than garment firms to pursue disagreements with the government and to use a formal appeals process or lawsuit in that dispute. This difference is most marked among small firms. There was a general perception that courts are now independent of the government, reflected in the fact that 85% of those who had pursued formal appeals or lawsuits would do so again in the future under similar circumstances. As with the garment sector, the larger the firm, the more likely it was to pursue formal legal appeal. However, even among small firms, the higher degree of formality of operations in this sector appears to imply a lower rate of informal conflict resolution, such as direct negotiation with an official or informal appeal to his superior.

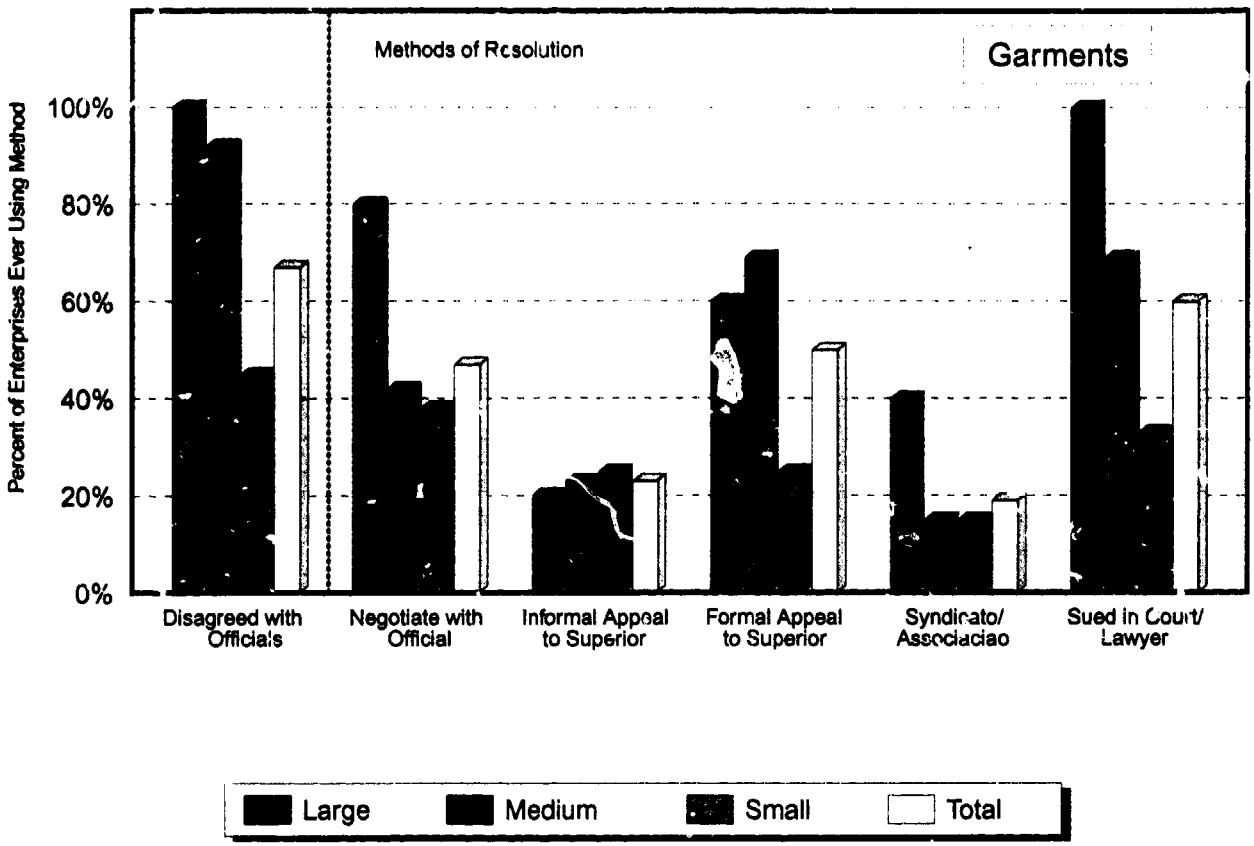
V. Business-Business Transactions

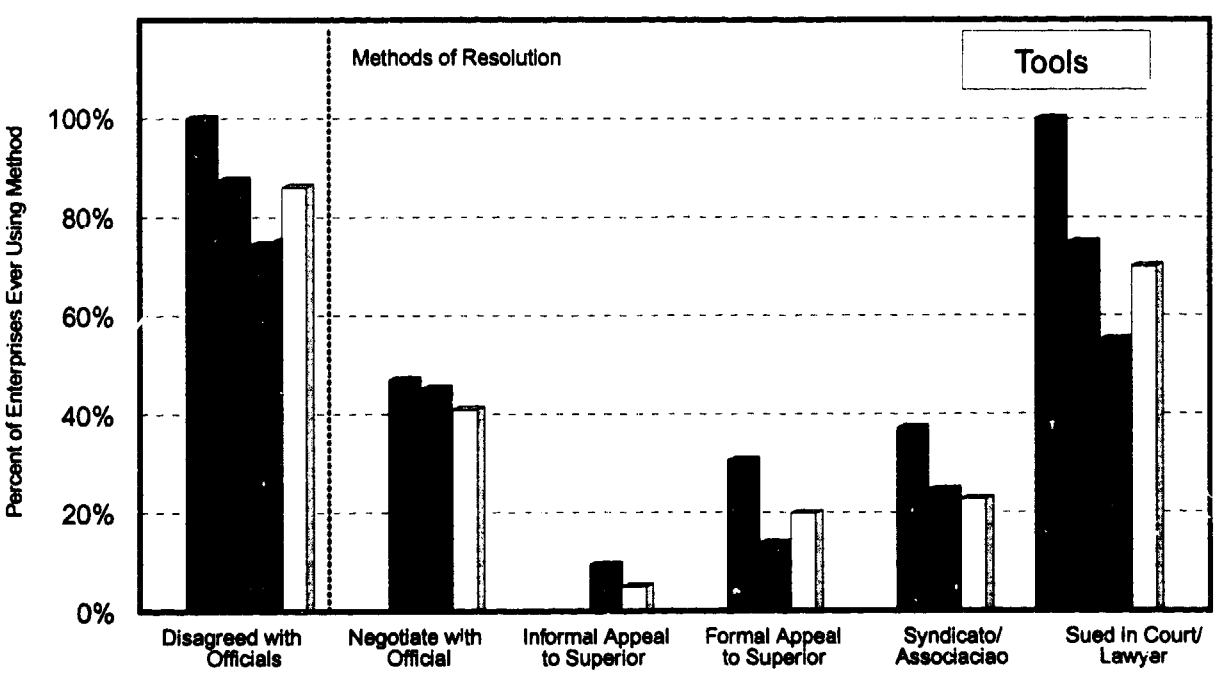
Renegotiation of orders: In the garments sector study, we raised the question of what the implications of Brazil's environment for business transactions for an industry requiring long-term commitments and transaction-specific investments. We inquired whether Brazil's institutional arrangements are adequate for firms to commit assets to production specific to another firm's demand, noting that any inability to commit resources to long-term inter-firm relationships could undermine the dynamism of private sector development. It may thus seem surprising at first that contracts were actually more reliable in the

[17] A threshold burden describes a sudden, discontinuous increase in costs encountered when a firm grows beyond a certain size or threshold. For a more detailed description, see Brian Levy, *Obstacles to the Development of Indigenous Small and Medium Enterprises: An Empirical Assessment.* (World Bank Policy Research Working Paper #588, February 1991)

Figure 2

Brazil: Conflict Resolution: Business - Government
(% with Disagreement, Methods of Resolution)





machine tools industry than in garments. Figure 3 illustrates an important difference between contracting in the machine tools as opposed to the garments sector: contracts are generally more secure in machine tools. Renegotiation rates are one third lower in normal times and over 40% lower in crisis times. Although the rate of renegotiation is still high (averaging 5% in normal times compared to 2.3% at all times for the Chilean garment industry), in machine tools renegotiations almost always involve adjustment of the inflation index and/or rescheduling of payments, rather than changes in the price, quantity or qualities of machines ordered.

Responses to questions on inflation adjustment mechanisms suggest that considerable transactions costs are associated with agreement between buyer and seller on the index by which to adjust prices to inflation. While monopolists can dictate terms, most suppliers must negotiate with customers how payments will be adjusted over time. The inflation rate is highly unpredictable, and perceptions of past government manipulation and discontinuation of indices has led to suspicion about reliance on any one mechanism. Entrepreneurs would like to base their transactions on the dollar, but this is technically illegal. Nonetheless, a reported 11% of sales are based on some form of dollar agreement. The majority of sales, some 79%, are based on indexed prices. While many firms use a government index over the short term (e.g. 30 days), for longer term payments a variety of indices are used, sometimes through a weighted average (which is sometimes a disguised way to engage in the illegal practice of using pegging prices to the dollar). Some 15 different indices were cited to us as the basis for inflation adjustment. Reaching agreement on the index comprises an additional negotiation once price and other terms have been agreed upon. Renegotiation sometimes is stimulated by dissatisfaction by buyer or seller with the performance of an index against the actual inflation rate.

Nonetheless, as we observed at the outset, orders are more reliable in the machine tools industry than in garments. Machine tools tend to be more specialized to the needs of a particular consumer, giving somewhat symmetrical incentives to supplier and consumer to honor orders: the supplier will have some difficulty selling a machine to another customer, while the customer cannot operate her business without the specialized equipment, and the servicing and spare parts supply for existing equipment he may be have from the supplier.[18] Furthermore, suppliers "take hostages" on customized machine orders: they demand a downpayment averaging 25% of the value of the machine, and intermediate payments averaging a further 18%. In general, the greater the initial investment required by the producer and the more customized the machine, the higher the payments are before delivery.[19]

The data reveal a trend towards increased standardization of product. Firms report an increase in sales from stock from 24.2% of total sales before to 33% now, and a concomitant decrease in production on order from 67.7% to 56% of sales. This may be due less to contractual problems than to recession and restructuring. First, it is usually the larger machines that are purchased on order -- in the current economy, orders for such equipment are rare. Second, some firms are finding economies to larger production runs, hence more sales from stock. This is consistent with Wogart's observations, noted above. Nonetheless, there is a considerably higher percentage of sales on order in machine tools

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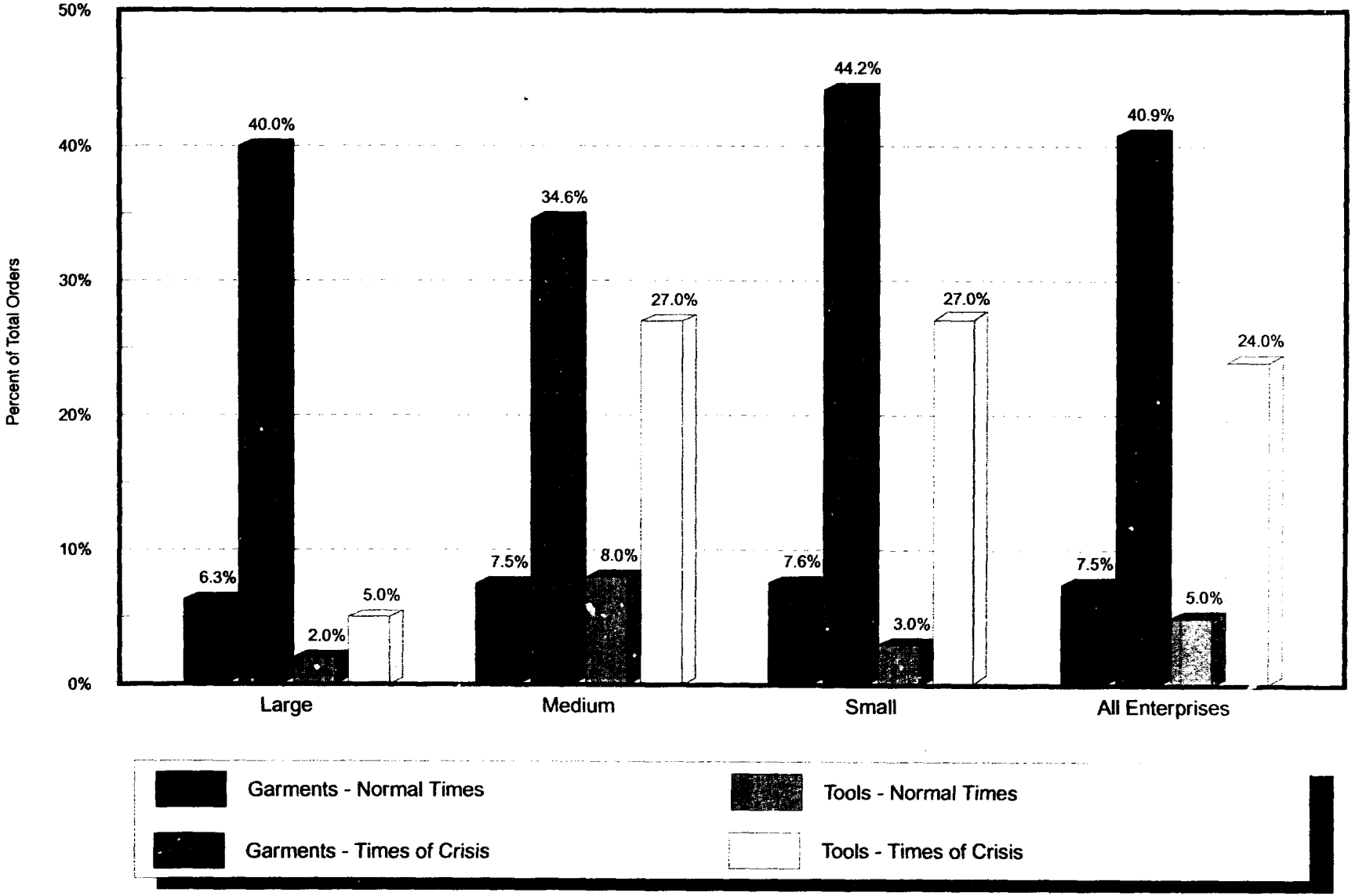
[18] Oliver Williamson, in his classic text *The Economic Institutions of Capitalism* (New York: Free Press, 1985), observes much the same phenomenon: "Inasmuch as the value of [specialized physical] capital in other uses is, by definition, much smaller than the specialized use for which it has been intended, the supplier is effectively committed to the transaction to a significant degree. The effect is often symmetrical, moreover, in that the buyer cannot turn to alternative sources of supply and obtain the item on favorable terms, since the cost of supply from unspecialized capital is presumably great." [p. 62] Williamson goes on to describe the commitment mechanism of "mutual hostage taking".

[19] Suppliers reported that down-payments and intermediate payments have shrunk during the current slump, due to their desperation to conclude sales.

Figure 3

Brazil: Renegotiation of Orders

Garment and Tool Sectors



than in the case of garments, and anecdotal evidence suggests that the degree of customization of these orders is far higher.

Credit Checking, Security and Conflict Resolution As in garments, in spite of a daunting process for formally pursuing collection of credit in the courts, nearly 90% of firms grant credit to new customers. Credit is assured through a variety of means other than formal collection procedures, including information, use of down payments, and the right of repossession. Figure 4 demonstrates that machine tool firms use similar means to those used by garment firms, though somewhat fewer firms apply each method. Aside from checking references and using credit agencies, 28% of firms check with banks about the record of new customers. This common method is informal and carries no explicit fee: it is attained through the establishment of an understanding between the manager of the machine tool firm and the bank manager.

Yet although credit is common, it is extended on a relatively small part of the value of machinery. In the past, over three quarters of the price of a machine tool was paid for by FINAME (the Agency for Industrial Finance), a government program of subsidized finance for capital goods. Currently, FINAME finances 50% of the price of many machine tool sales, a significant reduction from earlier levels of up to 80%. As noted above, an average of 43% of the value of customized machines must be paid well before delivery. So, generally, supplier credit is extended on only 5 to 10% of the total value of the machine (although the situation is different with some lower-value, serially-produced machines).

Final payment is guaranteed several ways. First, the customer depends on the supplier for service and parts for the machine. Thus the customer has a powerful incentive to maintain a good relationship with the supplier (and vice versa: parts and maintenance were the only business some firms were doing during the recession). Second, the typical contract for customized machinery includes a clause under which the manufacturer retains title to the machine tool until final payment is made. A customer who has paid from 50 to 95% of the value of a machine thus has a strong disincentive to lose that investment. In this regard, the formal legal system does seem to act as guarantor of property rights: several businesses reported isolated incidents of having reclaimed machinery with formal authorization or even with the accompaniment of a police officer.

Thus, the cases that end up in cartorio[20] were generally reported to be those involving less valuable standardized machines or parts. In fact, there is a significant negative correlation between the percent of production produced to order (which is likely to be customized) and the percent of transactions in which payments are late ($r=-.36$, significant at the 5% level). Even thus qualified, the rate of protest of *duplicatas*[21] to the *cartorio* (an officially sanctioned credit collection and information agency) is considerably lower in the machine tool industry (1.7% of transactions) than in the garment sector (4% of transactions) (see Table 3). However, in the machine tool sector, fewer of those customers reported to cartorio pay in cartorio, hence the incidence of court cases is about the same as in the garment sector as a percentage of total transactions (.1% of all transactions). One possible explanation is that machine tools firms reserve the cartorio for customers in genuine financial hardship,

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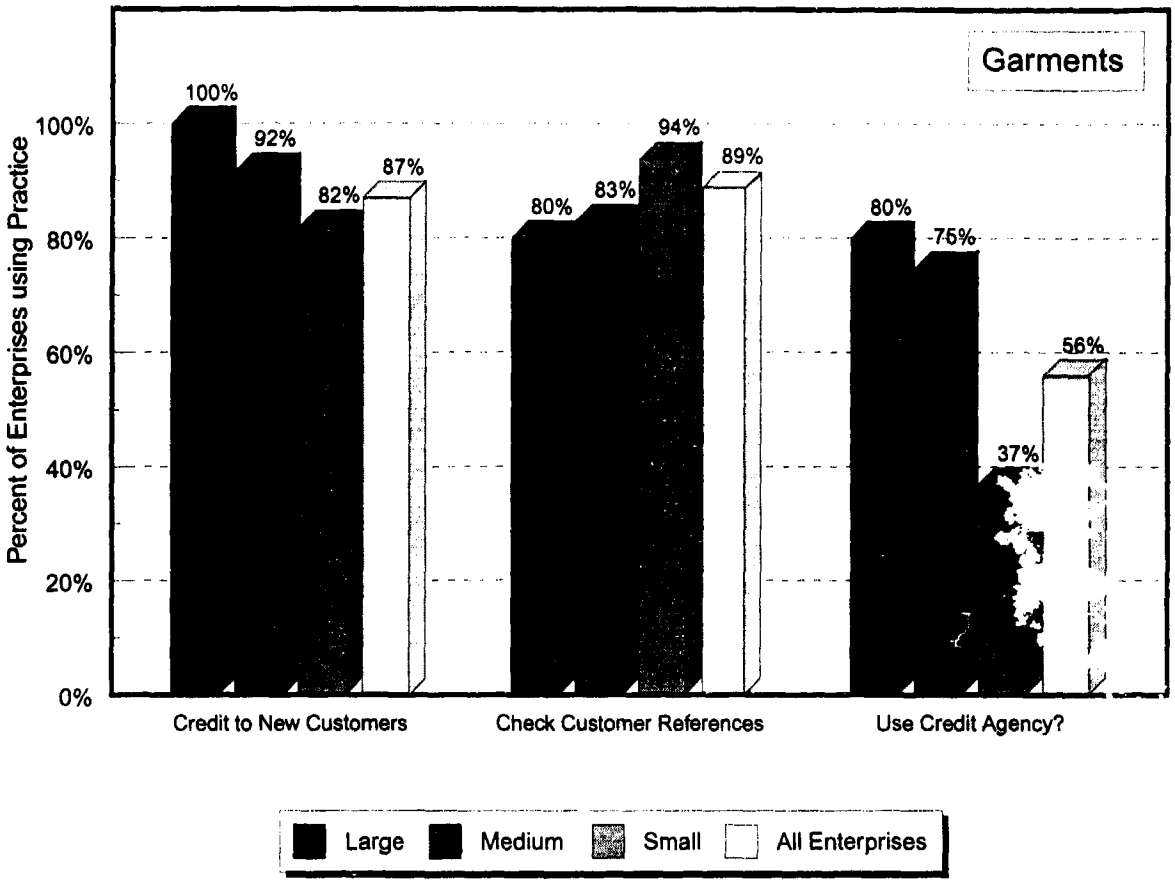
[20] *Cartorios* are publicly sanctioned offices. They come in two major types: judicial (courts) and extra-judicial (essentially notaries). The extrajudicial cartorios are publicly granted private, highly profitable businesses, oligopolized by a few families for many generations. There are five types of extra-judicial cartorios. In this study, the relevant cartorio is the *tabelionatos de protesto de titulos*, where bad debts and bad checks can be "protested".

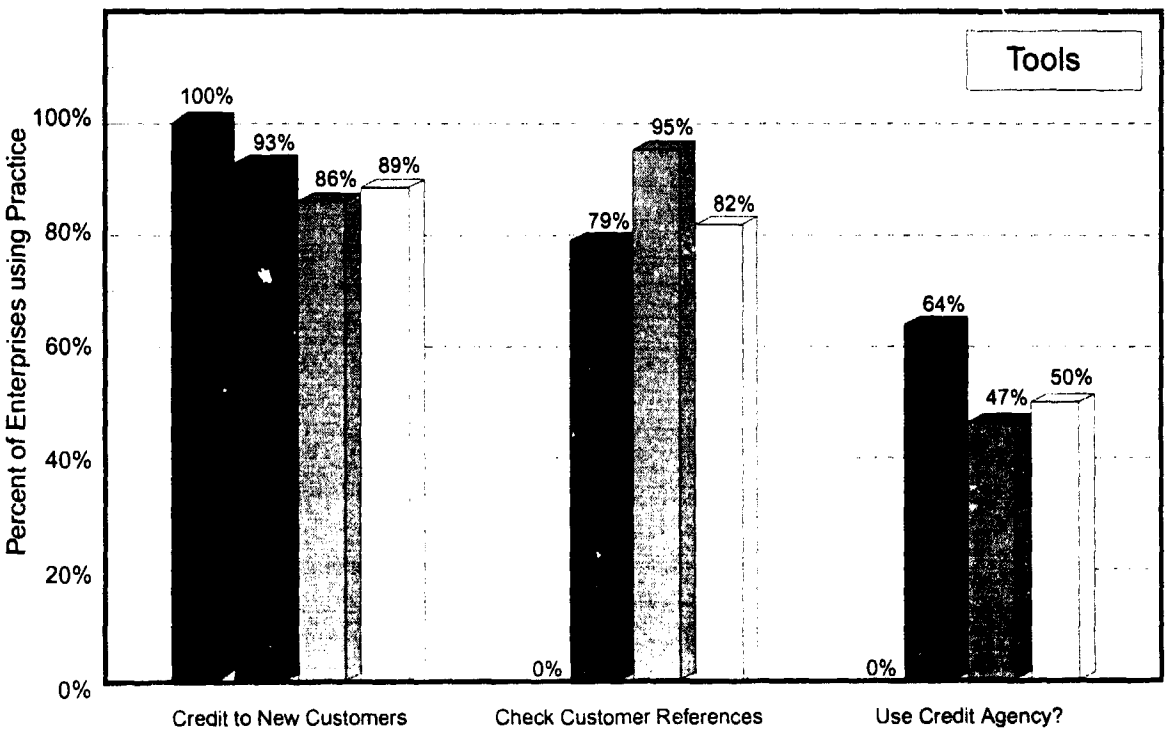
[21] *Duplicatas* are signed invoices acknowledging receipt of goods. In the garment industry, they were an important means for suppliers to extend customers credit, and could be discounted by suppliers with banks to obtain short-term finance.

Figure 4

Brazil: Credit and Credit Checking

Garment and Tool Sectors





and who are therefore less likely to be able to pay in cartorio. Needless to say, the number of court cases per firm is much lower, as the number of transactions per firm is much lower in machine tools than in garments. Furthermore, machine tool firms are less likely to have sued for any non-credit reason: while 54% of responding garment firms reported having been involved in such a suit in recent years, only 35% of responding machine tool firms reported such a history.

TABLE 3: RESOLUTION OF LATE PAYMENT OF DEBT (in 'normal times')

	MACHINE TOOLS	GARMENTS
Of all duplicatas:		
% of Total Paid Late	9.0%	8.0%
% of Total Paid Late and Reported	1.7%	4.0%
% of Total Paid Late, Reported, and Not Paid in Cartorio	.3%	.3%
% of Total Resulting in Law Suits	.1%	.1%

VI. Constraints to growth and future operation: The priority placed on obstacles faced by the machine tools industry largely confirmed the rankings identified by garment firms. Figure 5 demonstrates that the top tier of three constraints, the second tier of three constraints, and the lowest tier of three constraints are identical between the two industries. As with garment firms, we asked Brazilian machine tools entrepreneurs to rate various obstacles to growth and future operation on a 1 to 5 scale, with one meaning "no obstacle", three meaning "a moderate obstacle" and five meaning a "severe obstacle." These values are normalized on a zero to one scale in Figure 5. Their ratings again gave priority, not to those constraints directly related to legal and regulatory institutional reform, but rather to those pertaining to overall economic management. The three factors seen as the greatest obstacles to reform are policy uncertainty, price instability and inflation, and the high level of taxes. The second tier of obstacles relates to tax bureaucracy, labor regulation and the high cost of financing. Respondents placed obstacles related to the formal legal system and formal conflict resolution (i.e. renegotiated contracts, payment arrears and debts owed) at the end of a long list of complaints. Once again, our research establishes that reform of formal legal systems and formal conflict resolution mechanisms is not a priority for Brazilian business. Figure 6 recalls how different Brazil is from a country with more stable macroeconomic management -- Chilean firms demonstrated a greater homogeneity of scores between responses, and placed an input-related factor as their leading constraint.

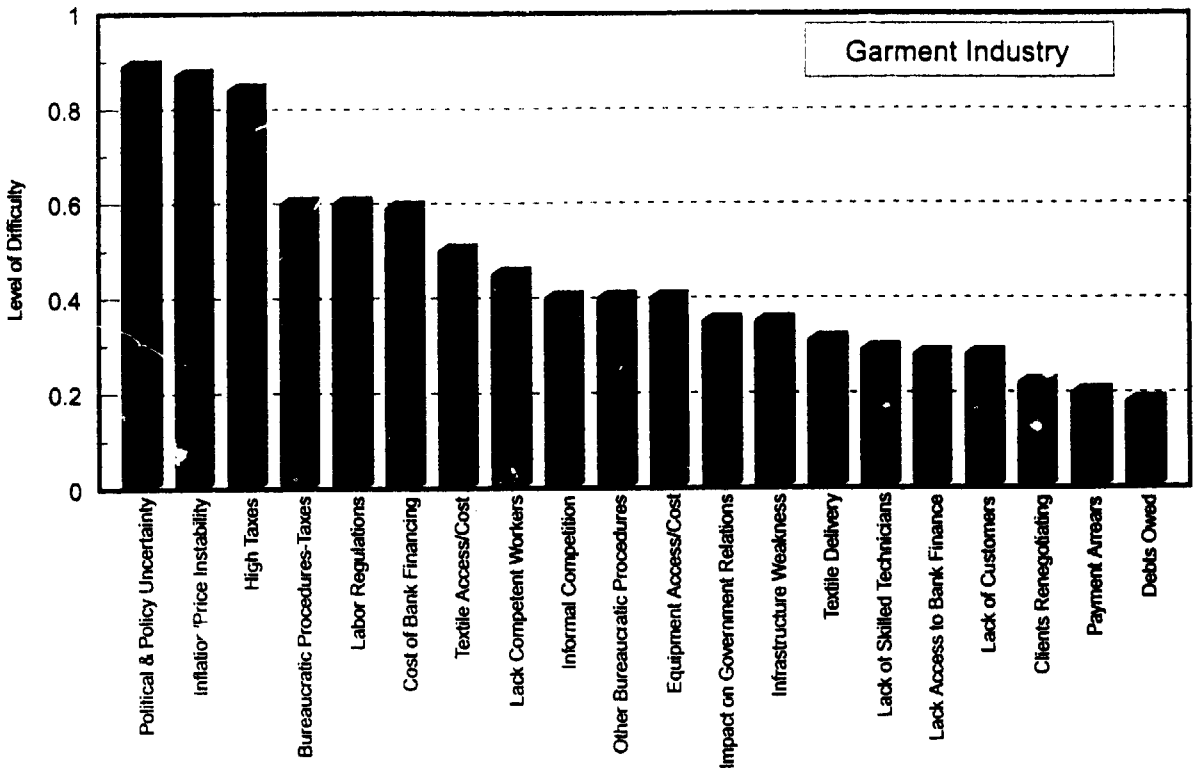
VII. Conclusions: As in the case of the garment study, we find evidence contradicting the prediction of legal formalism that formal institutions centrally constrain private sector development. Such an approach misdirects attention away from the most constraining obstacles in the business environment. Overall, the findings from the machine tools industry appear, instead, to confirm two conclusions of the earlier garment sector study:

1) Institutional substitutes for superior regulation and formal legal processes facilitate the resolution of conflict in business-government and business-business transactions.

2) Overall macroeconomic instability due to unpredictable changes in prices and policies and a high fiscal burden on formal enterprises impose binding constraints on the growth and

Figure 5
Brazil: Obstacles to Enterprise Growth

(normalized)



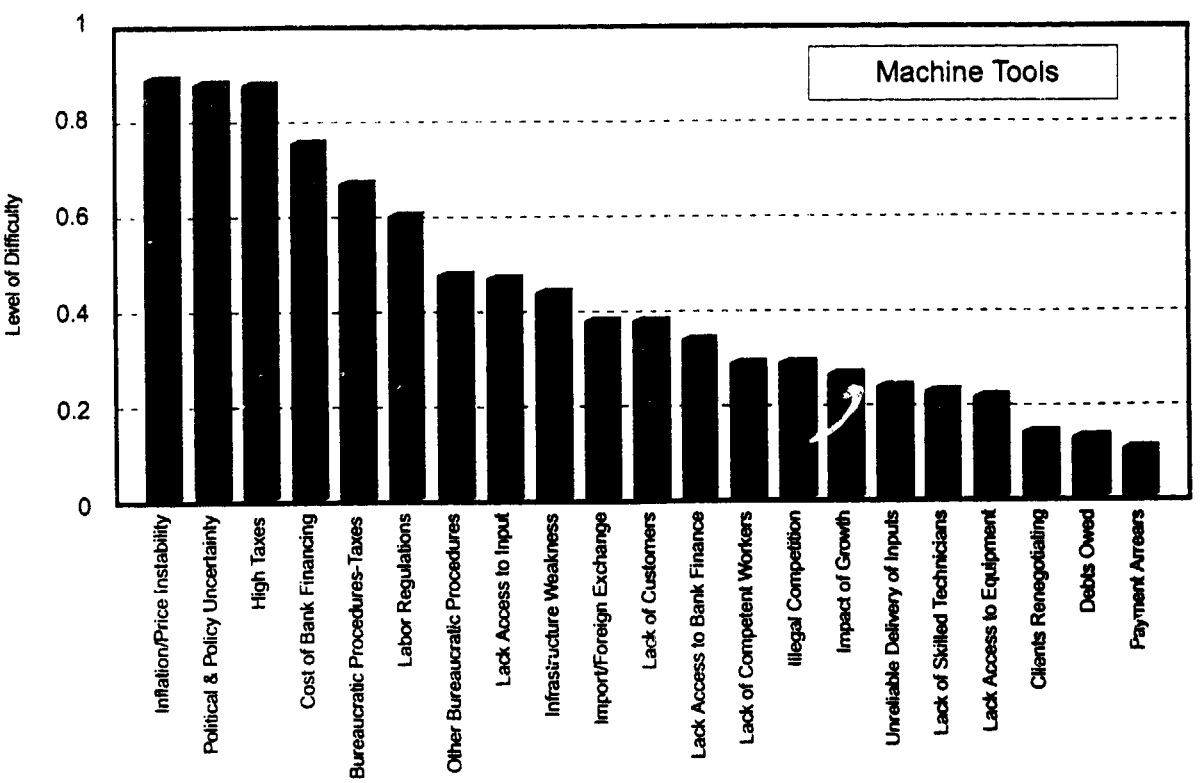
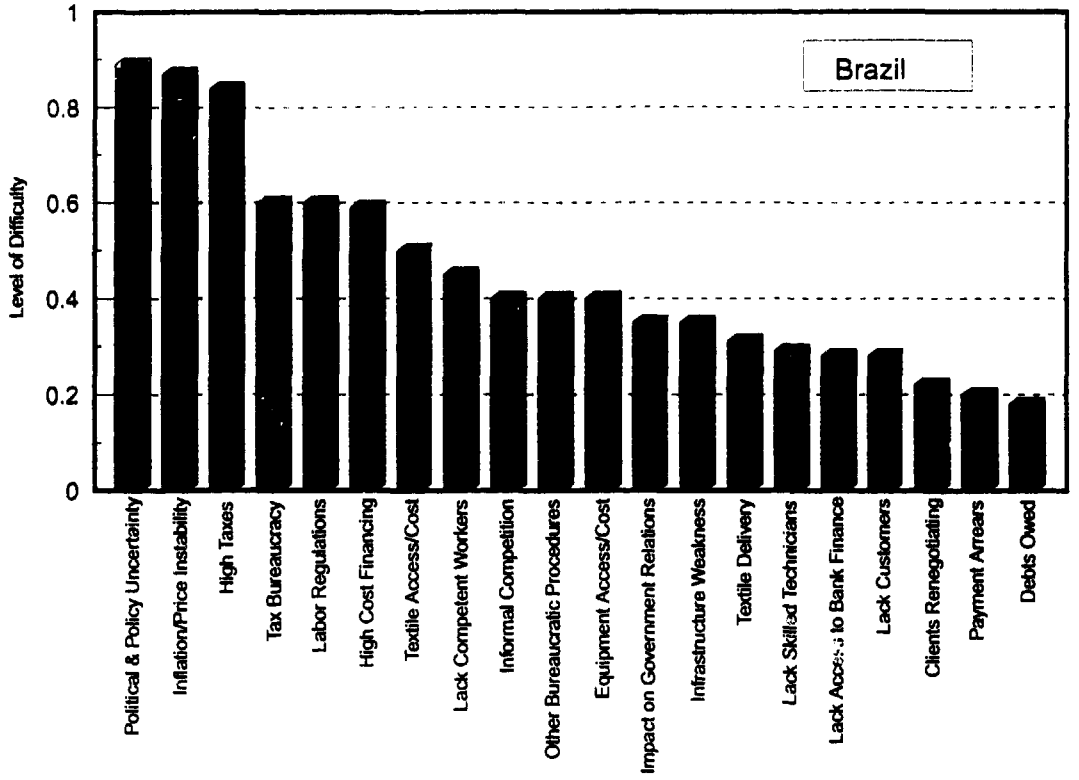
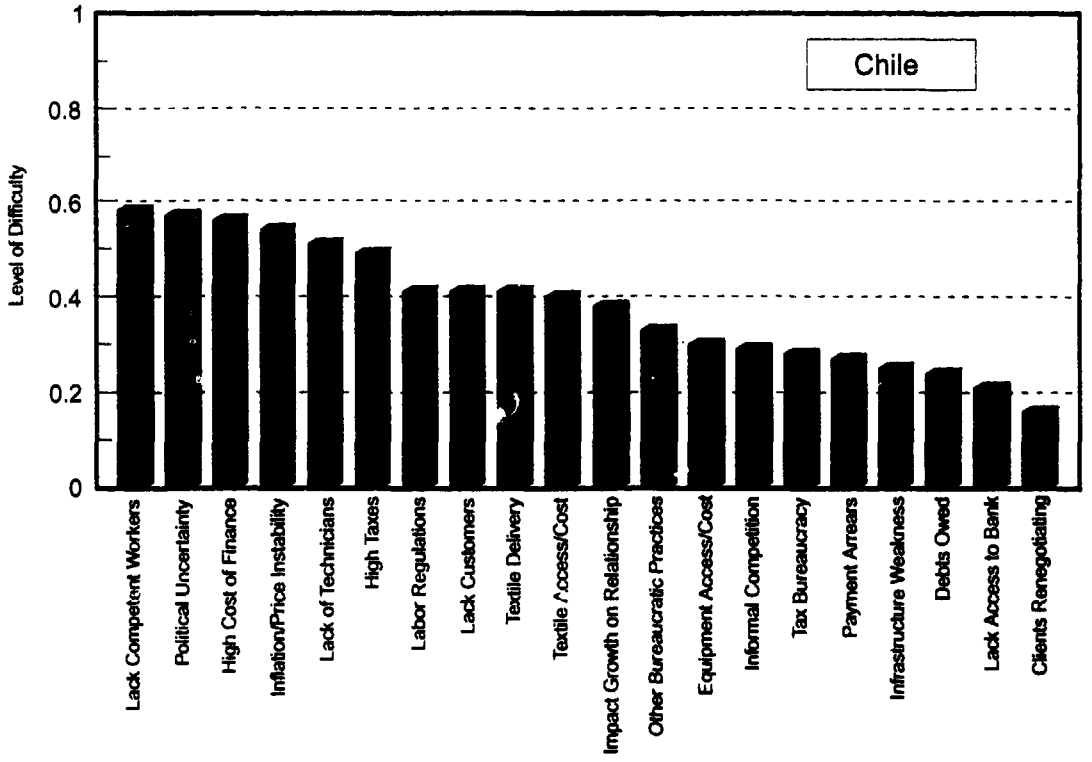


Figure 6

Obstacles to Enterprise Growth
(normalized)





operation of private enterprise in Brazil. Even once this constraint is relieved, other constraints (e.g. tax and labor regulation, access to inputs, infrastructure) are likely to be more binding on businesses than constraints related to formal conflict resolution.

We have seen that, even in a sector with less informal behavior and greater reliance on specific, long-term contracts, problems of formal conflict resolution rank low. The machine tools industry displayed two features quite distinct from the garment sector. First, machine tools firms manifested greater formality of operations, as evidenced by lower reported jeitinho payments, a higher usage of formal channels to challenge government rulings, fewer complaints about illegal behavior among other firms (or confessional tales about responding firms), and a slightly higher tendency to use the courts to resolve unpaid debts. Second, this sector, characterized by more asset specific transactions, displayed a higher rate of honoring orders and of timely payment. We believe this outcome is not suggested by a formalistic approach to business transactions, but is consistent with the literature on NIE. Formal legal conflict resolution mechanisms are too expensive to guarantee contracts in conditions of high asset specificity, therefore hostages are exchanged, and transactions proceed largely impervious to the formal legal environment.[22]

[22] Note: The Author would like to acknowledge the intellectual contribution of Brian Levy to this article, as well as the support and comments of Geoffrey Shepherd (LA1CO), Paul Holden (LATTF) and Mary Shirley (PSDFP). The survey would not have been possible without the collaboration of the trade association for the machine tools industry ABIMAQ and the special efforts of Drs. Aldo Pansiera and Casimeiro Taleskis. Jan Peter Wogart provided valuable background material on the machine tools industry. Finally, the author thanks Thomas Magyar for his vital assistance in carrying out the surveys and Charles Thomas for assistance in data entry and analysis.

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