VERTICAL INTEGRATION AND INSTITUTIONAL CONSTRAINTS ON FIRM BEHAVIOR: THE CASE OF THE GARMENT INDUSTRY IN EGYPT

Amirah El-Haddad[*] [**]
Department of Economics
Faculty of Economics and Political Science, Cairo University

ABSTRACT

Empirical analysis of vertical integration has mostly been restricted to developed countries. But the institutional context in developing countries is very different, so that factors other than those suggested by theories put forward with developed countries in mind may encourage or discourage vertical integration. Estimates made using a new data set of 257 Egyptian garment makers show that distinctive features of the Egyptian business environment are indeed the most significant determinant of vertical integration. On the one hand, given imperfect credit markets, limited access to finance restricts the possibilities for many firms to undertake the investment required to integrate. On the other hand volatile and uncertain market conditions make firms more likely to rely on the market for their inputs, hence, restricting vertical integration. However, transaction cost theories of vertical integration are not irrelevant in the developing country context; for example, high monitoring costs discourage integration while disputes over quality and temporal specificities encourage it. But there are nuances related to market segment. Producers of higher quality garments rely on imported textiles since the required fabric quality is not available domestically. Contrary to theoretical predictions, these producers do not integrate even if search and switch costs are high, but the opposite is true of producers relying on domestic suppliers.

---

[*] The author is thankful for partial funding by the United States National Science Foundation (NSF) for the survey on which this paper is based. The author would like to thank Howard White, Peter Murrell, Rachel Kranton, William Evans, Jeff Smith, John Mullahy, Ginger Gin, Christopher Woodruff, Birger Wernerfelt, Debie Minehart, Seth Sanders, and Scott Masten for valuable comments on an earlier version of this paper. Thanks are also due to Ali El-Din Helal, Aliaa El-Mahdy, Egyptian Exporters Association (ExpoLink) especially Mr. Mohamed Kassem for their practical support toward the project. The author would also like to thank numerous Egyptian businessmen and women for their time devoted to the questionnaire.

[**] Survey data for this paper are archived by the Inter-University Consortium for Political and Social Research http://webapp.icpsr.umich.edu/cocoon/ICPSR-STUDY/04270.xml)

1. Introduction

In the simplest presentations of neo-classical economics, firms can buy their inputs from a competitive market through costless transactions. However, the New Institutional Economics (NIE) argue that transaction costs may be sufficiently high for firms to decide to make, rather than buy, their inputs. Vertical integration, that is combining two or more stages of a production process under one firm, is as a key organizational structure that moderates those costs (e.g. Arrow (1975); Alchian *et. al* (1978); Willamson (1979) and Joskow (1985)).

The literature has focused on conditions that encourage vertical integration, giving less attention to conditions that may constrain vertical integration. This paper empirically examines both motivations to, and constraints on, vertical integration in the context of garment producing firms in Egypt. Two main issues are addressed. First, drawing on both existing theory and survey data, this paper presents an analysis of how economic and institutional constraints shape the incentive system and feed back into firms' choice of governance structure. Second, the differing theories are subject to joint empirical testing, avoiding the omitted variable bias which has plagued much of the literature.

The next two sections describe the variables which have been used in the literature as determinants of vertical integration. I also include factors identified as being important from intensive interviews carried out in preparation for survey design. The sections also summarize the variables used to measure these concepts (see Annex 1 for some of the questions themselves). Section 4 describes the data and 5 presents the model and results. Section 6 concludes.

2. Motivations for Vertical Integration: theory and variable definition

Both standard theoretical, and context-specific, factors provide the motivation for Egyptian garment firms to integrate backwards into fabrics production. These factors relate to (1) quality assurance; and (2) lock in and potential hold up.

Quality Assurance

Since the 1930s the textile and garment industry in Egypt has been protected by trade barriers. Imports of cotton yarn, fabrics and garments have been subject to bans and/or prohibitive tariffs. There are two implications of this policy for this analysis. First, the mass domestic garment market makes limited demands, i.e. neither fashion nor quality are that important. Second, an inefficient garment and upstream (textile) industry relative to that of a competitive market has been created for that segment of the market. However, there are exceptions to the limited demand. The export market is more demanding in terms of both quality and sensitivity to changing fashion. This was less so for Egypt's traditional markets in Eastern Europe, but has become a factor since firms began exporting to western markets. The same is true for the demand originating from the higher end of the domestic market where consumers are exposed to foreign products via travel and western media.

Thus, given Egyptian market conditions, quality is not a critical issue except for (1) exporting firms who are subject to importers' stringent quality control systems, and (2) firms serving the high-end of the domestic market. Consequently, producers for these two market segments may opt to integrate backwards into fabric production to ensure the desired input quality, which may not be available domestically.

The questionnaire asked about several measures of quality, each representing a different aspect of quality-related concepts. Disputes over quality mainly asked about the frequency with which the firm has had disputes over quality with its repeated (domestic/foreign) fabric suppliers prior to integration. The answer was given on a 5 point semantic scale from "absolutely no disputes" to "very frequent". Another quality measure is a categorical measure of whether the desired fabric quality was available on the market prior to vertically integrating. Another final measure is the percentage of garments exported to total sales.

Lock In and Potential Hold Up

Transaction Cost Theory (TCT) and Beyond: TCT has emphasized "lock in" and the associated "hold up" threat as the main determinant for vertical integration (e.g. Williamson: 1979, 1985). "Lock in" is a situation in which competitive situations between buyers and sellers are transformed into monopsonistic or monopolistic ones. "Hold up" hence refers to either buyers behaving opportunistically to exploit their monopsonistic powers or sellers behaving opportunistically to exploit their monopolistic powers (e.g. demanding a higher price than originally agreed on in the contract). In the context of backward integration, the latter is relevant. Once there is lock in there is potential for hold up; one way for a firm to free itself from the threat of hold up is to vertically integrate backwards into input production.

To the extent that the garment firm considers the quality level of its repeated fabric suppliers adequate, Egyptian garment producers are subject to "lock in" and potential "hold up" by their fabric suppliers via three channels: (1) search and switch costs, (2) temporal specificity, and (3) social and moral costs.

The first is search and switch costs. Search and switch costs render it difficult to change repeated suppliers simply because of the existence of transaction specific know-how and skills. The fact that skill transfer is difficult means that it will be costly for the garment producer to search for and switch to alternative suppliers, thus creating lock in and potential hold up. Hence, higher search and switch costs increase the likelihood for backward integration into fabric production.

The second channel is temporal specificity (see Masten *et al*. (1991); also Woodruff, 2002; Pirrong, 1993; and Hubbard, 1999). Situations that give rise to these kind of specificities are those in which "timely performance is critical, [thus] delay becomes a potentially effective strategy for exacting price concessions" (Masten *et al*, 1991:9). Two types of firms are subject

to this form of hold up by their fabric suppliers. The first are firms that serve the high end of the domestic market, whose production is strictly geared to the beginning of the season. The second are garment exporters, for whom timeliness is vital. Late delivery fines are sometimes specified per day in contracts between garment exporters and importers, or alternatively transport is transferred to the exporter in the form of air freight causing additional costs representing at least 10% of the total production cost of the exported merchandise. Accordingly, temporal specificity increases the likelihood for backward integration to avoid hold up. The third channel for potential hold up is more likely to be a factor in developing countries. This is the social and moral cost involved in replacing fabric suppliers. This cost would render it difficult for a garment producer to replace repeated suppliers. The cost of losing a friend or family rejection for cutting dealings with a relative is an example of social costs. To avoid lock in arising from social costs firms may vertically integrate.[1]

Modern Property Rights Theory (PRT): Asset Specificity à la Grossman, Hart and Moore: Modern PRT[2] revolves around the relative specificity of buyer and seller investments within an integrated firm with the possibility of the separate sub-units retaining management control (i.e. residual control rights) over their assets. Testing this theory requires information on sub-unit level governance, investments, incentives and decision-making processes. However, most firm-level surveys, including my own, deal with a single respondent, implicitly treating that respondent as the sole decision maker for the whole enterprise. Modern PRT cannot be formally tested with such a survey design. To test modern PRT would require a different questionnaire and survey design, applied only to a sub-sample of vertically integrated firms (which is too small in the sector under study to apply econometric analysis)[3]. However, in this analysis I use variables used in other papers to test a variant of the modern PRT.

Drawing on the analysis of both Woodruff (2002) and Hanson (1995), the argument adapted to the Egyptian context is that the less standardized a firm's products the larger the non-contractible investments in workmanship quality, design and distribution the garment producer undertakes to enhance his/her ability to obtain orders in the future. In contrast, based on interviews with producers, the fabric supplier appears to undertake a lower degree of non-

---

[1] This source of hold up hasn't been recognized by the vertical integration literature. Social relations are still regarded as peripheral to economic performance (Uzzi, 1996). Social costs, a sign for the existence of personalized exchange, may alternatively have no impact on vertical integration indicating the persistence of personalized exchange in the face of these costs.

2 Property rights theory (PRT) in its modern form began with the work of Grossman and Hart (1986); and Hart and Moore (1990) (hence GHM).

3 Whilst transaction cost theories have gained widespread empirical support (refer to Joskow, P.L. 1988; Shelanski, H.A. and P.G. Klein. 1995; and Masten, Scott E., ed. 1996 for reviews on the empirical literature); there has been little empirical work on the PRT as presented by GHM. As Whinston (2002) shows, the empirical literature on transaction cost determinants of vertical integration does not necessarily provide support for PRT; amongst the limited attempts to formally test PRT are Hanson (1995) and Woodruff (2002).

contractible investment, such as human capital investments, in its monitoring activity or know-how and skill accumulation. Hence, both the garment and the fabric manufacturers' investments are to some extent specific to the characteristics of the end product and, hence, in turn to the relationship. The fabric supplier can behave opportunistically, exploiting the vulnerabilities of the garment producer (who has already undertaken the larger specific investment). As above, potential hold up increases the likelihood of vertical integration.

Lock in and potential hold up is measured by asking if search and switch costs as well as social and moral costs involved in changing repeated fabric suppliers make it difficult for them to replace repeated suppliers. Two alternative measures of asset specificity are the fashion turnover rate and the percentage of garments sold to women.[4] Fashion turnover rate is given by the expected duration of market demand for a new style introduced by the firm.

3. Constraints on Vertical Integration

The previous section showed that various transactions costs make firms want to integrate. However, several constraints or disincentives limit their ability to do so. There are five main obstacles to integration likely to be present in the Egyptian garment industry: (1) monitoring costs; (2) the desire to avoid risk (demand variability and sales uncertainty); (3) firm size; (4) financial constraints and credit market imperfections; and (5) the lack or presence of institutional substitutes.

Monitoring Costs: Agency Theory

Monitoring costs as a determinant of the "boundaries of the firm" is consistent with agency theory, team agency (Alchian and Demsetz, 1972) and measurement costs (Holmstrom and Milgrom, 1994 and Holmstrom, 1999). In a principal-agent framework an agent's private action affects the principal's payoff probability distribution through its effect on output. The principal's problem is the difficulty to separate out the agent's contribution from that of the state of the nature. In team agency the problem is the difficulty of singling out each agent's productivity from that of the other agents.

Fabric production involves a higher level of team production than garment production. Garment production involves a 1:1 sewing machine to worker ratio. Weaving and knitting on the other hand entail team production and joint use of equipment.[5]

---

4 Very similar measures have been used by Woodruff (2002) and Hanson (1995) to test the modern PRT.

5 Interview material shows that a large factory of 1,500 workers has 500 sewing machines but only 4 knitting machines.

Monitoring costs refer to the costs associated with the effort to single out workers' productivity and to measure accurately their contribution to output. Thus, these costs contain the learning costs of the new production process, the administrative and managerial costs associated with coordinating the different stages of production and distribution whilst ensuring that quality is adequate, that technical specifications are met and that production is on time. The larger these costs, the less likely are firms to vertically integrate. Indeed, vertically integrated firms devise sophisticated production tracking systems to enable them to monitor their workers. Several of the interviewees have indicated the hardship of monitoring workers in just one vertical stage of production let alone if add another stage.

Agency theory was represented by a question that asked if before producing their own fabrics the decision makers thought that monitoring workers undertaking fabrics production was a very difficult task (i.e. time, money and hassle involved in monitoring the workers).

Desire to Avoid Risk: Demand Variability and Risk Adjusted Property Rights Theory

Risk Adjusted Property Rights Theory: Hanson (1995) has argued that integrating backwards, as much as it alleviates hold up problems and opportunistic behavior by the input supplier (the fabric supplier in this case), will expose the buyer (the garment firm in this case) to a higher degree of "natural risk". Natural risk is risk arising from variance in the state of the nature Hanson (1995). Were the buyer to be facing uncertainty in the production environment (e.g. sales uncertainty), s/he would want to spread that risk (via asset ownership spreading, i.e. independent ownership). In an environment where risk spreading channels are imperfect or absent (e.g. equity markets, stock markets, and insurance markets), as is the case in nearly all developing countries including Egypt, the presence of demand or sales uncertainty[6] pushes garment producers (i.e. buyers) to desire spreading this risk. For many firms in Egypt, such uncertainty is prevalent. Asset ownership spreading (i.e. not integrating) as opposed to vertically integrating is the means through which garment producers spread this source of natural risk.

Demand Variability Theories: Both theory (e.g. Carlton, 1979, Chandler, 1977, Porter, 1980; and Blair and Kaserman. 1983) and case study evidence stress the importance of demand variability as a discouraging force to vertical integration. Why integrate and put all the eggs in one basket when variability in your sales is evident? Firms are less likely to integrate backwards when they face large fluctuations in downstream demand. When the industry setting is volatile, vertical strategies should entail insignificant degrees of internal transfer, lesser ownership stakes and fewer integrated activities (Harrigan, 1983). Using the input market in this context increases its risk-pooling benefits as opposed to integrating (Lieberman, 1991).

Both demand variability and sales uncertainty make firms prefer to rely on the market, rather than integrate, because of its risk spreading abilities. The variables used investigated the extent of the variability, as well as the uncertainty, of garment demand a firm faced in the years just preceding vertical integration.

Financial Constraints and Credit Market Imperfections

Theories of vertical integration have rather neglected financial constraints as a determinant. These constraints are exacerbated by credit market imperfections. Financial constraints are a lack of own funds combined with no access to credit. It is expected that this limitation be more severe for developing country businesses because of the relatively underdeveloped financial system. However, the role of informal credit,[7] including funds from family and friends, should not be underestimated, and may adequately substitute for formal credit. Limited access to finance restricts the possibilities for firms to undertake the investment required to integrate.

---

6 Sales uncertainty here refers to a situation where the realized value of sales is unexpected.

7 The role of informal credit in developing countries has been stressed in McMillan and Woodruff (1999).

Financial constraints are proxied by two alternative ways. The first inquires about the degree of agreement as to whether opening a fabrics production unit in the firm was perceived to be a very expensive undertaking prior to integration. The second measure was concerned with the extent of ease/difficulty with which a firm has access to finance, in case it wanted to add another stage of production, from each of 5 different channels.[8] The answer was given on a 11 point scale with 0 corresponding to the prior belief that it was impossible to obtain such funds from a particular channel and 10 representing that it was extremely easy.

Firm Size: Economies of Scale

A second factor not stressed in the vertical integration literature but evident from preliminary fieldwork is horizontal firm size. The higher the fixed investment cost involved in any additional vertical stage of production the more important is the scale of operations prior to integration. The larger the scale of operations preceding integration the more cost effective is vertical integration. This is a standard economies of scale argument which will apply if there are increasing returns to scale.

Financial firm size measures included issued capital, net assets and garment sales for the completed financial year just prior to integration. Since the year for which this value is given varies from one firm to another depending on each firm's year of vertical integration, consumer price indices and exchange rates were used to normalize these figures (constant prices, 2000).

Institutional Substitutes

Since many essential institutions, such as well functioning legal systems; equity, stock and insurance markets, are usually missing or malfunctioning in developing countries, individuals rely upon institutional substitutes to overcome this deficiency. Possession of power and access to foreign institutions represent such substitutes. Social networks, family ties and influential connections (e.g. with important government officials) could, for example, proxy for power and in turn for institutional substitutes. If a particular institutional substitute mitigates, for instance, the limited access to finance then one would expect a greater likelihood of vertical integration for firms that can utilize that substitute. If however, it mitigates an inferior legal system (e.g. Macaulay 1963; Haley 1997; Greif 1997; McMillan 1997; McMillan and Woodruff 1999) and so moderates supplier hold up threat, for example, then it would decrease the likelihood of vertical integration. Accordingly, institutional substitutes can be placed either with the motivations for or with the constraints on vertical integration.

---

8 The channels are: (1) Financial Markets & Intermediaries (Banks and Financial Markets), (2) Personal Savings and loans from family members or friends and relatives, (3) Company Retained Profits, (4) Mother Company Retained Profits, and (5) Sister Company or Branch Retained Profits

Institutional substitutes were proxied by three variables: (1) membership to the Egyptian garment commodity council, (2) percentage of foreign ownership, and (3) having a company lawyer. The first and third are proxies for access to power. Members of the "Garment Commodity Council" are non-elected (i.e. appointed by the minister). The Council is a quasi government institution established by the Ministry of Trade to act as a link between the industry and the Ministry. Under the council's umbrella garment producers discuss their problems in order to introduce recommendations to the minister of trade. Thus, members of the council are influential textile businessmen. Hence, membership to the council reflects on the possession of power.

Other variables

Other control variables included in the model are whether the company was listed on the stock market before integration, the extent to which it was believed that integrating may reduce a firm's tax burden, the firm's age, whether it is a family business and finally the percentage of fabrics provided by a sister company or a branch. Listing on the stock market is a measure of the level of sophistication of the management of a company (as well as access to finance and firm size, but these variables are already controlled for). Vertically integrating as opposed to purchasing through the input market, may be a way to reduce transaction cost through sidestepping additional taxes on inputs - so the believe that this is so may induce integration. Older firms maybe expected to be vertically integrated on account of industry experience, for instance. The same applies for family businesses, i.e. business owned by members of the same family for more than one generation.

4. The Data

The 257 sample firms were drawn from a 2003 sample frame of 2,500 private textile firms, after screening to verify information (that they did produce garments and location) through a telephone pre-survey. Since the research focuses on why garment firms produce their own fabric inputs, non-garment producing textile firms were excluded, leaving 1,418 firms. According to these data, nearly 95 percent of garment firms are concentrated in nine of the country's 27 governorates: Greater Cairo (Cairo, Giza, Kaliubiya), Gharbia, Alexandria, Sharkeya and El-Beheira. The sample covered all nine of these governorates. The survey was conducted through March-May, 2004.

The telephone pre-survey identified 421 firms as being operative and confirmed their contact details. Data from both the full sample frame of 1,418 firms and the one including the 421 firms showed the incidence of vertical integration to be limited (25%, 19% of all firms respectively). Hence, disproportionate sampling was applied. Disproportionate sampling implies sampling the two groups at different sampling rates to ensure having enough observations in the group of interest (i.e. the VI group) (Maddala, 1992). Specifically, all firms identified as being vertically integrated were purposefully included in the sample, with a random sample taken of the remainder.

5. The Model and Results

Models used in the existing literature suffer from two possible sources of bias. First, vertical integration is usually modeled as a function of the current values of the RHS variables, but many of these may be endogenous with respect to VI. Second, studies focus on the variable of interest and so suffer from omitted variable bias. The model presented here overcomes the first problem by using lagged values of the determinants. This makes theoretical sense, as it is the value of these variables at the time the decision to integrate was made which matter. The second problem is addressed since the model includes all determinants in a single equation.

The RHS variables have been described above, but a word is also needed about the dependent variable (descriptive statistics and the predicted sign of the independent variables on vertical integration. are in Annex 2). Much of the empirical literature measures vertical integration as a dichotomous variable (0/1): taking a value of 1 if the share of inputs produced internally rather than purchased exceeds a certain threshold.[9,10, 11] For example, Woodruff (2002) gives the value of 1 for the variable measuring integration if the manufacturer sells any portion of production through owned stores (in the case of forward integration) and Montverde and Teece (1982) give the value 1 if the firm produced 80 percent or more of a component internally. But, sixteen years ago, in his review of the empirical literature Joskow (1988) stated: "it is not clear why a continuous variable was not used." Accordingly, the dependent variable utilized here is a fractional response variable: the fraction of fabrics produced internally to the value of the firm's total fabrics' requirements (for its garment production) during the last completed financial year.[12] Close to half of all vertically integrated firms are fully vertically integrated, so that the dependent variable takes the value of 1 (i.e. they produce all their fabric inputs internally and so do not deal with the upstream market any longer). With respect to the other half (i.e. for whom $0<VI<1$) the fraction varies between .05 (5%) and .97 (97%). The median, which is also approximately the mean, is 0.54. With 16% of non-fully integrated firms integrated at exactly 0.5, that distribution is approximately normal.[13]

---

9 For the case of backward integration, which is what is analyzed here. An analogous formulation applies for forward integration.

10 An exception to this statement is Wernerfelt, (1997) who treated the dependent variable as continuous. Also, Hubbard, 2000 used a categorical dependent variable and so applied an ordered logit model.

11 The literature on franchising, which is a closely related literature to that on VI, has abandoned the use of dichotomous variables. The literature on chain franchising uses the % of units franchised (as opposed to company-owned) as its dependent variable.

12 The question was asked for garments serving the domestic market, then for garments serving the export market. The dependent variable is the aggregated fraction weighted by the percentage of garments a firm sells on the domestic market and that sold to the export market respectively.

13 There is a slight gap with no firm with vertical integration levels in the range .3-.5, giving the distribution a slightly bi-modal appearance. Skew ness is moderate (-.27) as is kurtosis (1.67)

Results

This section presents the results from a basic regression, containing variables pertaining to the different theories and factors discussed above. Next, three hypotheses are explored: (1) whether the fact that firms exporting their garment outputs has an effect on vertical integration (on account of quality concerns); (2) whether institutional substitutes mitigate the effects of transaction costs; and (3) how the effect of search and switch costs may vary according to whether the fabric supplier is domestic or foreign.

Results are presented first for the basic regression model, shown as regression (1) in Table 1, which includes all the main determinants discussed above. Where possible, the results are compared with those in the existing empirical literature, although some of the variables used here are innovations. Following this discussion, robustness and more nuanced hypotheses are examined through variations in sample and model specification.

Table 1 Maximum Likelihood Estimation Results

	Basic Regression	Size Measures		Asset Specificity	Quality Measures	Parsimonious		Other Controls
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Quality disputes	0.502	0.722	0.641	0.582		0.539	0.535	0.500
	(0.059)*	(0.083)*	(0.082)*	(0.012)**		(0.031)**	(0.035)**	(0.060)*
Search & switch cost	0.259	0.383	0.578	0.267	0.249	0.255	0.252	0.258
	(0.115)	(0.147)	(0.022)**	(0.103)	(0.127)	(0.122)	(0.122)	(0.113)
Social & moral cost	0.366	0.461	0.343	0.380	0.373	0.377	0.378	0.366
	(0.031)**	(0.085)*	(0.129)	(0.019)**	(0.022)**	(0.024)**	(0.021)**	(0.030)**
Temporal specificity (D)	1.758	2.006	2.272	1.678	1.532	1.761	1.756	1.758
	(0.001)***	(0.016)**	(0.010)***	(0.001)***	(0.001)***	(0.001)***	(0.001)***	(0.001)***
Fashion turnover rate	0.002	0.002	0.000		0.003			0.002
	(0.499)	(0.562)	(0.898)		(0.26)			(0.499)
Monitoring Cost	-0.284	-0.494	-0.333	-0.286	-0.270	-0.299	-0.296	-0.285
	(0.086)*	(0.030)**	(0.105)	(0.081)*	(0.088)*	(0.077)*	(0.092)*	(0.093)*
Demand variability	-1.036	-1.377	-1.049	-1.050	-0.990	-1.043	-1.041	-1.035
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Demand uncertainty	-0.483	-0.665	0.749	-0.479	-0.463	-0.468	-0.466	-0.484
	(0.025)**	(0.030)**	(0.005)***	(0.031)**	(0.025)**	(0.040)**	(0.036)**	(0.026)**
Log issued capital	0.583			0.552	0.510	0.572	0.568	0.584
	(0.000)***			(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Fabrics unit investment cost	-1.170	-1.651	-1.551	-1.072	-1.119	-1.164	-1.165	-1.173
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
% Foreign ownership	0.000	0.017	0.013	0.000	0.002	0.004	0.004	0.000
	(0.953)	(0.235)	(0.327)	(0.981)	(0.857)	(0.749)	(0.715)	(0.956)
Listed on stock market (D)	-0.893	-0.768	-1.041	-0.801	-0.821	-0.881	-0.888	-0.898
	(0.276)	(0.472)	(0.212)	(0.252)	(0.212)	(0.218)	(0.196)	(0.275)
Tax incentive	-0.046	0.104	0.050	0.010	0.038	-0.031		0.048
	(0.823)	(0.712)	(0.83)	(0.963)	(0.844)	(0.882)		(0.813)
% Fabrics provided by sister company or branch	-0.122	-0.139	-0.110	-0.118	-0.113	-0.113	-0.111	-0.122
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Net assets		0.573						
		(0.000)***						
Garment sales			0.682					
			(0.002)***					
Age								0.000
								(0.98)
Family inherited business (D)								-0.042
								(0.956)
Non-available desired fabric quality					0.232			
					(0.189)			
% sold to women				0.009				
				(0.309)				
Number of Observations	243	242	237	242	244	244	245	243
Log Likelihood	-44.815	-47.533	-47.376	-44.641	-45.602	-45.045	-45.066	-44.814

1) Following Papke and Wooldridge (1996), the conditional distribution of the dependent variable (VI) on the independent variables (X), E(VI|X)=G(.), is estimated by assuming a particular distribution of the conditional distribution, which is then estimated by maximum likelihood (MLE). The conditional distribution of VI on X is assumed to be the logistic distribution, i.e. $G(.)= (e^{Xb}/1+ e^{Xb})$.
2) Coefficients are marginal effects (percentages); p-values in parentheses, variables followed by (D) are dummy variables.
3) p-weights are used in all regressions.
4) Robust standard errors are specified in all regressions.
5) * significant at the 10% level ; ** significant at the 5% level; *** significant at the 1% level

Discussion of Results

Table 2 calculates the marginal effects using the coefficients from the basic regression both at the means (which gives a fitted value of VI=0.01), and at a level for the independent variables which gives a fitted value of the fraction integrated of around 0.5 (i.e. VI=50%). Precisely it shows marginal effects for a one standard deviation increase around the specified values of the regressors (either the mean[14] or the value selected to yield a fitted VI of 0.56). The table ranks the basic regression variables according to importance.

Table 2 Marginal Effects- of a One Standard Deviation Change in the X Variable - in % for Basic Regression Ordered by Importance

	Marginal effect of 1 SD change (x100)	
	At the means	At VI fit=.56
Demand variability	-0.67***	-34.15***
Log issued capital	1.56***	31.99***
Fabrics unit investment cost	-0.51***	-30.92***
% Fabrics provided by sister company or branch	-0.22***	-25.04***
Demand uncertainty	-0.71**	-14.52**
Temporal specificity (D)	0.63***	17.84***
Social & moral cost	0.60**	12.30**
Quality disputes	0.58*	11.87*
Monitoring Cost	-0.46*	-9.45*
Search & switch cost	0.45	9.15
Fashion turnover rate	0.23	4.33
Listed on stock market (D)	-0.15	-4.27
% Foreign ownership	0.00	0.28
Tax incentive	0.00	1.37

1) All marginal effects are shown for a one standard deviation increase from the mean and for the used regressor values respectively.
2) Variables followed by (D) are dummy variables
3) * significant at the 10% level ; ** significant at the 5% level; *** significant at the 1% level

The results show that a history of quality disputes does, as predicted, increase the likelihood of vertical integration: a one standard deviation increase in disputes over quality results in a 12 percent increase in the degree of integration (calculated at expected VI=0.5).[15] There are no

14 The marginal values given by STATA are for a one unit change around the mean for continuous variables, and a change from 0 to 1 for the two dummy variables. These marginal changes have been multiplied by the respective standard deviation for each variable to derive the figures given in Table 6.5.

15 Ordered categorical response variables (of n categories) may enter the regression in two ways: (1) as a single categorical variable, that is treating it as if it were a continuous variable or (2) as n-1 dummy variables corresponding to all but one of the n categories. The former is a restricted version of the latter, as it assumes equal increments between categories. This restriction was tested for all categorical variables in the model using a log-

directly comparable results in the existing literature. The literature has considered product idiosyncrasy and complexity, as opposed to the quality disputes variable presented here, these have been associated with relationship specific investments (i.e. lock in and hold up considerations), to which I now turn.

In my model, lock in and potential hold up are measured by variables capturing social costs and temporal specificity,[16] the first of which has not been considered in the literature before.[17] Both these variables are significant with the expected signs, with one standard deviation increase resulting in increase in the share of inputs produced internally of 12 and 18% respectively. This finding is in line with that of other studies examining the impact of temporal specificity on vertical integration; e.g. Masten, (1984); Hubbard, (1999).

Four sets of variables act as constraints on vertical integration: monitoring costs, financial constraints, the desire to avoid risk and if a company has a sister company or branch. All of these variables have the expected effect. A one standard deviation increase in monitoring costs reduces integration by 9%. Financial constraints are measured by two variables: perceived investment cost of opening up a fabrics production unit, which cuts vertical integration by 31%, and, as a proxy for access to own-finance, issued capital (logged), which increases in house production by 32%. The interpretation of the size variable is however complicated by the fact that it is also (1) a control variable, (2) may also pick up the effect of economies of scale as discussed in the theory section and (3) that it can be a proxy for other variables. The large correlation between all measures of financial size (issued capital, net assets and garment sales) and the average profits variable (0.50, 0.48 and 0.54 respectively) made me reasonably comfortable in considering size as another proxy for access to finance, hence, to financial constraints. However, given the three points above and since the correlation is not perfect one should treat the results of the size variable with caution.

The desire to avoid risk was measured by demand variability and sales uncertainty, which reduce integration by 34% and 15% respectively. Finally, firms that obtain their fabrics from sister companies, branches or both are less likely to be integrated: a one standard deviation

---

likelihood ratio test. In all cases the restricted model was accepted. These results are available from the author on request.

16 A third measure of lock in, related to search and switch costs, was insignificant in the basic model, but becomes significant when variations by market-orientation are allowed (see below).

17 Work in sociology focuses on social relations. For instance, Uzzi's work has put a very large weight on the effect of social relations on economic actions and outcomes in general (but not in the context of vertical integration) (eg. Uzzi (1996; 1999)

increase in the percentage of fabric inputs provided by a branch or a sister company reduces the share procured internally by 25%.[18]

Existing literature has found similar results to those reported in the previous paragraph in most cases, but not all. Several studies have looked at monitoring costs as a determinant of forward integration with reference to costs of organizing the sales force. Using this variable in an agency framework both Holmstorm and Milgrom (1991, 1994) and Anderson and Schmittlein (1984) find higher monitoring costs to provide a disincentive for integration. However, Wernerfelt (1997) found such costs to be insignificant.

Financial constraints to vertical integration have been neglected by both the theoretical and empirical vertical integration literature. However, firm size has been used in some studies as control variable. For example, Anderson and Schmittlein (1984) found that size is a significant determinant of the adoption of direct sales force (integration) as opposed to the use of a manufacturer's representative (i.e. using the market).

Contrary to my findings, Lieberman (1991) found no evidence to support the proposition that firms in the chemicals manufacturing industry are less likely to integrate backward when they face large fluctuations in downstream demand (i.e. demand variability). Other studies (e.g. Hanson, (1995), Anderson and Schmittlein, (1984)) find, as do I, that exposure to natural risk proxied by sales uncertainty discourages vertical integration, which is contrary to Williamson's predictions. [19]

Not all variables in the basic regression model are significant. This is true of asset specificity, measured by the fashion turnover rate (p-value=0.50), listing on the stock market, lock in caused by search and switch costs (p-value=0.12), tax incentives (p-value=0.82), and institutional substitutes proxied by foreign ownership (p-value=0.95), all of which are insignificant at the 10% level. The insignificance of these variables is not consistent with all existing literature, although the literature has not considered the tax incentive and institutional substitutes[20] variables. This inconsistency may be in part since virtually all existing literature contains only the variables of interest in the estimated models rather than all relevant determinants, and thus suffer from omitted variable bias, which may render genuinely insignificant variables significant. Nevertheless, there may also be other explanations. The

---

18 The branch/sister company factor is a control variable rather than a determinant of vertical integration. By definition, if a firm obtains some of its total input requirements from a branch/sister company it reduces the volume of those inputs it produces internally.

19 Though it is important to emphasize that Williamson stressed that uncertainty when coupled with asset specificity would encourage vertical integration (Williamson; 1979, 1983). When Anderson and Schmittlein interacted the two variables still there was no support for Williamson's prediction.

20 Which will be dealt with in the robustness checks sub-section.

insignificance of the tax incentives variable may indicate two things. The first is that tax incentives to vertical integration are not present in the garment industry. The second is that people do not respond to such incentives. From the open ended interviews it seems that the former is more likely. Listing on the stock market is insignificant as there were only 7 firms that were listed on the stock market, 3 of which are integrated. On the other hand, as explored below, some variables may become significant once a more elaborate specification is employed.

The existing empirical literature has widespread support for the importance of asset specificity. For example, Montverde and Teece (1982) examined "human asset specificity" in the automobile industry. They concluded that the larger the engineering effort required in designing a specific automobile part (their measure of human asset specificity) the more likely is this part to be internally produced rather than contracted out for. Masten (1984) measures "relationship specific investment" for an aeorospace firm by both the degree of design specificity and site specificity of each component it uses in production. He found that the larger the degree of specificity the more likely is the component to be produced internally.

Woodruff (2002) uses fashion turnover rate as a measure for investment specificity in the Mexican footwear industry in his analysis of forward integration into retail. He assumes that the retailer's non-contractible investment is larger and more important to the overall profits from the relationship than that of the manufacturer. Given these assumptions, while transaction cost theory predicts vertical integration,[21] modern property rights theory would predict a reduced likelihood of forward integration.[22] In contrast to my findings[23], Woodruff's results support the property rights theory.

Discussion

With respect to importance, some variables rarely considered in the vertical integration literature prove to be not only significant but among the most important determinants of vertical integration.[24]

---

21 On account of the mere existence of specific investments.

22 On account of the retailer's investment being the most important to the relation.

23 Note that my results didn't support either theory as fashion turnover rate is insignificant. Recall that, in contrast to Woodruff's (2002) study, the garment industry setting in Egypt didn't allow for a distinction between the TCT's and PRT's predictions. See section 4.1.2 Lock In and Potential Hold Up (Modern Property Rights Theory: Asset Specificity à la Grossman, Hart and Moore) for details.

24 ,some more so than others. Demand variability and uncertainty have been dealt with in the literature to some extent but nothing comparable on the effect of size or financial constraints on vertical integration.

These variables are market volatility (measured by demand variability), firm size (proxying for scale economies but also for access to finance and possibly other factors such as firm productivity) and financial constraints. The strong influence of these variables is to be expected in an environment such as that in Egypt where risk-spreading channels are imperfect or absent and where financial intermediaries function poorly.

In social network settings social and moral costs involved in replacing suppliers with whom one has personal or family ties with can be so high so as to restrain economic agents from attaining efficiency. By restricting their ability to switch to alternative suppliers, these costs operate via limiting economic agents' choice set. This reasoning is consistent with Uzzi's argument that embeddedness (the process by which social relations shape economic actions) yield positive returns only up to a threshold point, after which they become negative (Uzzi, 1996). Had there been no effect of social and moral costs on vertical integration this result would have implied the persistence of personalized exchange. One would have not been able to infer, however, whether the persistence of this type of exchange is efficient.[25] The results indicate that garment firms in Egypt react to these types of costs by vertically integrating which can be interpreted as a move toward efficiency.[26]

Temporal specificity is an important regressor (5th place): if delivery on time matters to the producer then they are likely to produce a greater proportion of their inputs internally. In the vertical integration literature, the problem of temporal specificity is generally seen as a hold up problem, whereby the supplier may exploit the producer's need to get the materials on time to improve the conditions of the contract (i.e. opportunistic behavior). However, the questionnaire question only revealed the importance of timely delivery and did not distinguish between whether the importance of timely delivery to the garment producer is associated with opportunistic behavior or with the inability of the fabric supplier to deliver on time on account of circumstances beyond their control.

During one of the interviews I conducted, the electricity went off 4 times throughout the 3 hour appointment (for a total period of 1 hour). The respondent explained that he cannot be harsh on his suppliers when it comes to timely delivery: "see how often we lose electricity, if this happens to him frequently even if he is serious and honors his word he cannot fulfill on time. It is simply out of his control." If so, then this case, and similar ones-though not all- would be in line with Fafchamps's (1996) argument that: "In all cases, delivery problems are blamed on shocks affecting suppliers and are treated by respondents as cases of excusable default." The inability to deliver on time is, as is poor quality (to be discussed in the next paragraph),

25 Kranton (1996) shows that personalized exchange can persist even when it is inefficient .

26 Kranton has also shown that the market (or generally any organizational structure) can persist even when it is inefficient (Kranton, 1996). But it is reasonable to assume that the transformation from complete personal exchange to either complete or partial integration is at the onset and so the dynamics of reaching the other extreme of vertical integration being inefficient are, at this point, still far reaching.

divorced from opportunistic behavior (i.e. lock in and hold up issues) but associated with the problems of production in a developing country. Not all firms are so concerned about timely delivery, nor do all firms face these production difficulties and therefore may excuse their suppliers. In addition, some firms may face a problem of moral hazard whereby they cannot distinguish between whether untimely delivery is due to excusable difficulties or supplier's failure to comply with the terms of the contract for no good reason. Hence, vertical integration is seen as a solution to delivery problems only for some of the firms.

The implication of the importance of the quality disputes variable is twofold. First, it reveals the importance of the segment of the market to which the garment firm belongs. If the firm serves the high end of the market, especially given the inefficiencies of the supporting industry caused by government intervention in trade policy, product quality considerations are essential. Second, a wide range of dispute resolution mechanisms in Egypt may be flawed.[27] It is more likely though that both considerations - market segment as well as disputes - jointly motivate vertical integration; which is consistent with the results. Similar to the quality disputes variable, temporal specificity also reflects the importance of market segment. Firms serving segments for which timely delivery is essential are more likely to integrate.

Based on the case study evidence, firms of differing degrees of vertical integration, ranging from none to fully integrated, stressed the absence of relationship specific investment-at least of physical asset specificity.[28] The regression estimates confirm that asset specificity (measured by fashion turnover rate) is irrelevant in the Egyptian garment industry (marginal β=0.0, p-value=0.499). As indicated in the previous section asset specificity has gained widespread empirical support.[29] This result confirms that in developing countries other factors come to play shaping the incentives for and against vertical integration. Economic theory, developed to fit developed country settings, does not provide sufficient insight into developing country environments. Finally, the insignificance of both search and switch costs and institutional substitutes, the former only moderately so (as significant at the 11% level) was somewhat expected. The search and switch cost variable aggregates across foreign and domestic suppliers and the institutional substitute's effect, as earlier mentioned, is more likely to operate interactively with other factors affecting integration. Both issues will be handled in what follows.

---

27 For a wide range of dispute resolution mechanisms refer to Hendley *et al.* , (2000); and Hendley and Murrell, (2003).

28 Relationship specific investments are investments that are specific to a particular relation in the sense that their value outside the relationship is greatly reduced.

29 For reviews of the literature see Joskow, 1988; Shelanski et al. 1995; and Klein 2004.

Robustness Checks

This section examines whether the results are robust to a variety of specifications and robustness checks.

Changing size variables to any other financial size variable such as net assets or garment sales prior to vertically integrating virtually leaves the basic result unaltered; regressions (2) and (3) in Table 1.

The percentage of garments sold to women prior to integration is used as an alternative measure for product standardization, hence to asset specificity. As described above the less the standardization the larger the specific investment and in turn the larger the hold up threat. Resembling the fashion turnover rate variable this measure is insignificant, and does not alter the basic regression result; regression (4).

Replacing disputes over quality with a variable measuring the extent to which desired fabric quality was available on the market prior to making the decision to integrate also maintains the basic result; regression (5). Dropping some insignificant variables such as fashion turnover rate and tax incentives, hardly alters the results; regressions (6) and (7).[30] And finally, including other controls such as age and a variable indicating whether the firm is an inherited family business does not alter the results; regression (8). [31],[32] The last regression shows both the age

30 Only 243 firms reported the size variable. I included a missing dummy for those observations missing this variable. Since (1) most of the missing observations belong to small, non-integrated firms of whom I have many already; (2) it hardly changed the results but (3) adds unnecessary co-linearity on the regression and reduces the degrees of freedom I decided to drop the dummy (regression results not shown).

31 The access to finance variable which may be better to use as a proxy for financial constraints compared to the fabrics unit investment cost variable, does not perform well. This is due to two reasons. The first is that it is highly correlated with both the size variable (0.24) as well as the demand uncertainty variable (0.19). The second reason has to do with the question itself. The question asked how difficult it would be to get finance from various sources if the firm wanted to expand vertically in any additional stage of production. The problem with this question is that firms that are already vertically integrated in fabrics would answer this question thinking about the finance necessary to vertically integrate in dying, for instance, a far larger capital investment undertaking compared to opening up a fabrics production unit, whereas a non-vertically integrated firm may think of integrating in fabrics or retail. Consequently, the answers are not comparable in terms of the amount of required funds each type of firm bases its answer on.

32 The average profits variable also didn't perform well (is insignificant) in several model specifications. The average profits variable indicates average profits throughout the establishment of the firm until the year it vertically integrated. It is a categorical variable ranging from very weak to very high. There are two reasons for this poor performance. The first is the high correlation between average profits and both the size variable (0.50) and the demand uncertainty variable (-.20). When substituting average profits for the size variable, profits become significant at the 13% level and when substituting it for both size and uncertainty, profits become significant at the

of the firm as well as the family business variable to be insignificant. The prediction was that both would increase the degree of vertical integration on account of industry experience. The latter variable, is a reasonable proxy for access to finance from family members. This insignificance maybe due to the fact that industry experience is expected to boost horizontal integration as much as it boosts vertical integration; the data available do not allow for this possibility to be investigated. In addition, maybe this is so as access to finance is already controlled for by both the investment cost and the size variables. Or it may simply be that these variables are not important in determining vertical integration in Egypt.

Exports and Vertical Integration

Exports (percentage of garments a firm exported before it integrated) are a quality measure since the quality required for export markets is mostly greater than that in the domestic market. But should exports substitute the quality disputes variable or complement it? The correlation coefficient between the two variables is 0.088 which suggests that exports include other aspects of quality "disputes over quality" did not capture.

Accordingly, I added exports to the basic regression (Table 3, Regression (9)). However, it is insignificant (p-value=0.31), which seems surprising. But the case study evidence provided insights as to how the export variable operates. For both the export market and the local high quality market, low quality fabric inputs can cause problems. There is, however, a crucial difference between the two groups. Exporters have the option of importing their fabrics. But those serving the domestic market are legally prohibited from this choice – they have to either buy locally or produce the fabric themselves. Hence, it is reasonable to expect that on the one hand exporters who imported their fabric requirements are less likely to integrate. This is so because they have already fulfilled the desired quality requirement. On the other hand, however, exporters who do not import their requirements are more likely to vertically integrate to ensure the desired quality (given all the upstream market inefficiencies associated with government intervention.)

Based on the above, I interacted the export variable with an import dummy that indicates whether a firm imported part or all of her fabric requirements.[33] Regression (1) shows that as expected (1) the export variable becomes significant on its own right; and (2) the sign of the interactive term's coefficient is negative indicating that a firm importing some or all of its

---

8% level. And so the size variable, in a way, proxies for both size and profits. The second is the tendency of most respondents, especially smaller firms, to not give an honest answer to this question. Profits are a very sensitive area and many respondents are concerned about tax authorities haunting them if they revealed their profits are high. Regressions are not shown.

33 The Import Dummy =1 if fabric imports>0

=0 otherwise

fabric requirements moderates the positive effect exports have on vertical integration (indeed it appears to nearly fully offset it).

There are no comparable results in the literature for this variable, it is a case specific variable and so should be utilized on a case by case basis depending on the institutional environment of the case under study.

Institutional Substitutes Interactive Terms

Institutional substitutes mitigate institutional deficiencies. And so if, for instance, a particular institutional substitute mitigates the limited access to or cost of finance then one would expect a larger likelihood for vertical integration in its presence. Conversely, if it mitigates an inferior legal system by providing an alternative dispute resolution mechanism it would reduce the likelihood for integration via reducing the positive effect of, for instance, disputes over quality on vertical integration. Accordingly, I interact the foreign ownership variable - proxying for foreign institutions[34]- with both the fabric unit investment cost and quality disputes variables; regression (11).

Indeed, foreign ownership moderates the negative effect that high investment costs have on vertical integration. The marginal coefficient on the interactive term is significant at the 1.5% level and is positive (β=.037, p-value=0.015, z=2.43) compared to the negative coefficient of the investment cost variable (β=-1.277, p-value=0.000, z=-4.85). Clearly then foreign ownership eases financial constraints to vertical integration even if this effect is quite modest. But the effect of foreign ownership on disputes is not significant, although it has the expected sign (β=-.398, p-value=0.446, z=-0.76).

With respect to membership to the garment commodity council there is a problem with the reliability of this variable. The council was not established before many of the firms were established or before they integrated. This manifests itself in a mean value of only .026 (7 firms) for this variable prior to integration compared to .071 (19 firms) currently.[35] I, therefore, interact the current (as opposed to before integration) membership status with both fabric unit investment cost and the quality disputes variables; regression (12).

---

34 Foreign institutions are considered an institutional substitute since they substitute for domestic institutions such as the domestic legal system or domestic financial intermediaries.

35 This is a dummy variable, taking the value of 1 if a firm is a member and 0 otherwise.

Table 3: Exports, Interactive Institutional Substitutes & Disaggregated Search & Switch Cost

	Basic Regression (1)	Including % Exported (9)	Including % Exported & Imports Interaction (10)	Foreign Ownership Interaction (11)	Garment C. Council Interaction (12)	Disaggregated Search and Switch Cost (13)
Quality disputes	0.502	0.491	0.478	0.456	0.319	0.010
	(0.059)*	(0.084)*	(0.084)*	(0.11)	(0.194)	(0.959)
Search & switch cost	0.259	0.192	0.207	0.235	0.219	
	(0.115)	(0.271)	(0.236)	(0.128)	(0.13)	
Social & moral cost	0.366	0.417	0.388	0.360	0.287	0.282
	(0.031)**	(0.025)**	(0.040)**	(0.036)**	(0.071)*	(0.045)**
Temporal specificity (D)	1.758	1.742	1.687	1.799	0.017	1.659
	(0.001)***	(0.002)***	(0.003)***	(0.001)***	(0.000)***	(0.000)***
Fashion turnover rate	0.002	0.002	0.002	0.002	0.002	0.000
	(0.499)	(0.511)	(0.504)	(0.464)	(0.319)	(0.576)
Monitoring Cost	-0.284	-0.320	-0.321	-0.298	-0.265	-0.119
	(0.086)*	(0.061)*	(0.072)*	(0.090)*	(0.107)	(0.335)
Demand variability	-1.036	-1.028	-1.010	-1.024	-0.948	-0.669
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Demand uncertainty	-0.483	-0.458	-0.488	-0.548	-0.520	-0.459
	(0.025)**	(0.032)**	(0.022)**	(0.013)**	(0.009)***	(0.010)***
Log issued capital	0.583	0.532	0.560	0.586	0.512	0.439
	(0.000)***	(0.001)***	(0.001)***	(0.000)***	(0.000)***	(0.000)***
Fabrics unit investment cost	-1.170	-1.178	-1.176	-1.277	-1.235	-1.005
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
% Foreign ownership	0.000	0.001	0.002			-0.007
	(0.953)	(0.934)	(0.859)			(0.454)
Listed on stock market (D)	-0.893	-.948	-0.835	-0.916	-0.830	-0.961
	(0.276)	(0.255)	(0.335)	(0.296)	(0.303)	(0.016)**
Tax incentive	0.046	-0.041	-0.088	-0.075	-0.024	0.089
	(0.823)	(0.835)	(0.669)	(0.723)	(0.905)	(0.63)
% of fabrics provided by sister	-0.122	-0.116	-0.119	-0.126	-0.120	-0.076
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
% Exported		0.009	0.018			
		(0.313)	(0.078)*			
% Exported*Import Dummy			-0.016			
			(0.186)			
Foreign ownership DM*finance				0.037		
				(0.015)**		
Foreign ownership DM*disputes				-0.398		
				(0.446)		
Foreign ownership dummy (D)				-1.072		
				(0.236)		
Membership to council*disputes					0.078	
					(0.891)	
Search & switch cost w.r.t. domestic suppliers						0.349
						(0.032)**
Search & switch cost w.r.t. foreign suppliers						-0.406
						(0.137)
Missing dummy (domestic)						-0.773
						(0.193)
Missing dummy (foreign)						-13.227
						(0.006)***
Membership to council*finance					19.151	
					(0.112)	
Current membership to Garment Commodity Council(D)					-1.230	
					(0.080)*	
Observations	243	243	243	243	243	243
Log Likelihood	-44.815	-44.384	-43.861	-44.057	-43.262	-39.314

1) MLE as specified above, coefficients are marginal effects (percentages), p values in parentheses, variables followed by (D) are dummy variables.
2) p-weights are used in all regressions.
3) Robust standard errors are specified in all regressions.
4) significant at the 10% level ; ** significant at the 5% level; *** significant at the 1% level

Membership to the council definitely moderates the discouraging effect high fabric unit investment cost (proxying for financial constraints) has on vertical integration. The marginal coefficient on the interactive term is significant at the 11.2% level and is positive (β=19.151, p-value=0.112, z=1.59) compared to the negative coefficient of the investment cost variable (β=-1.235, p-value=0.000, z=-4.36). The effect of membership to the council on financial constraints is relatively large and indicates that influential members of the council have a less severe financial constraint. Precisely, the coefficient on the investment cost variable increases from -1.23 to 17.916 (-.012345+.1915076) indicating that an increase in the investment cost variable actually increases vertical integration, and does not decrease it. As for its effect on quality disputes, membership to the council has an insignificant effect (p-value=0.891, z=0.14). Using current membership as opposed to membership prior to vertical integration, however, gives rise to an endogeneity problem.[36] Therefore, results involving membership to the council should be taken with caution. Once again, no comparable results are to be found in the empirical literature either because these factors are not important in developed country settings, or they are simply believed not to be important and/or because of the tendency in the literature to limit the variables employed in econometric analysis.

Different Market Segments: Disaggregated Supplier Search and Switch Costs

The prediction for supplier search and switch costs is that high search and switch costs - a sign for lock in - stimulate a potential hold up threat which garment producers would respond to by vertically integrating. It was clear from the interviews that, regarding vertical integration, garment producers behave differently depending on whether they are dealing with a domestic or a foreign fabric supplier. The data were collected in a disaggregated manner, providing search and switch costs with respect to both domestic suppliers and foreign suppliers separately. Instead of using the aggregated, weighted[37]search and switch cost variable appearing in regression (1), I use two variables (1) search and switch costs with respect to domestic fabric suppliers; and (2) search and switch costs with respect to foreign suppliers. Prior to integration, some firms dealt solely with domestic suppliers others with foreign ones and the rest dealt with both types of suppliers. Accordingly, each firm will have at least one non-missing disaggregated search and switch cost variable.[38] So as not to lose those observations for which one of these variables is missing, I included two missing dummy variables.[39] One dummy is a search and switch costs dummy for foreign suppliers and another is for domestic suppliers.

---

36 One cannot distinguish whether members of the council are integrated because they had a less severe financial constraint or whether they have a less severe financial constraint because they are integrated.

37 The weight used for the domestic (foreign) search and switch cost variable is the % of the total value of fabric requirements purchased, prior to integration, from domestic (foreign) suppliers.

38 Either search and switch costs with respect to foreign suppliers or search and switch costs with respect to domestic suppliers.

39 A missing dummy, DUMX for variable X takes the value of 1 if X=missing and 0 otherwise, i.e.

DUMX =1 for X=missing

The results (Table 3, regression (13)) show that the presence of high search and switch costs increases the likelihood for vertical integration only if the garment firm was dealing with repeated "domestic" fabric suppliers. Whilst if the repeated suppliers were foreign (i.e. the fabric was imported prior to integration) then, contrary to theoretical expectations, the presence of search and switch costs does not increase the likelihood for vertical integration (p-value=0.137, z=-1.49).

There are two plausible explanations to this phenomenon. The first is that when foreign institutions ensure contract enforcement with respect to quality and delivery for a contracted price, suppliers' opportunistic behavior is deterred, reducing the necessity of garment firms to integrate. Hence, the presence of search and switch costs with respect to foreign suppliers does not imply that they actually behave opportunistically rather it merely indicates that there exist trust and security in the relationship between the garment firm and its repeated foreign fabric supplier.[40] In other words, there is lock in not followed by hold up. This may not be the case with respect to domestic suppliers when domestic institutions do not guarantee the same level of enforcement.[41]

The second explanation relates to market segment. If search and switch costs are high with respect to domestic suppliers the garment firm is able to ensure the desired quality of fabrics if it vertically integrates. However, if there exist search and switch costs with respect to foreign suppliers, giving rise to hold up, internal production of fabric inputs may not be a sensible response as the firm cannot match the desired quality level. It is likely that the two aforementioned justifications jointly explain the difference in significance of the search and switch cost variable depending on the nationality of the supplier.

Two variables loose their significance in regression (11), which may be explained by the multicollinearity introduced by the missing dummies for foreign and domestic suppliers. Since the dummy represents observations (firms) that, for example, do not deal with foreign suppliers there is a systematic relationship between the missing dummy and vertical integration hence also with the other variables in the equation, which are also meant to have a systematic relation with vertical integration. This co-

---

=0 otherwise

X itself is replaced with any constant number if X is missing. Hence, a new variable Z is generated such as: Z = constant for X=missing

= X otherwise

Both Z and DUMX are added to the right hand side variables of the regression.

40 In fact, several of the interviewees stated that they hope that Egyptian suppliers respect their on time delivery and quality commitments as much as foreign suppliers do.

41 Or alternatively, when work ethics are different. But one cannot distinguish whether economic agents are responding to the incentive structure or because they genuinely rather behave non-opportunistically.

linearity undermines the significance of monitoring costs and quality disputes. [42] It is also plausible that the foreign search and switch cost variable is picking up (part of) the quality effect of the quality disputes variable.

6. Conclusion

This paper has examined the determinants of vertical integration in the Egyptian garment sector. This conclusion summarizes the major arguments that have been made. First, it is argued that the institutional setting matters. This section first reviews key features of the institutional context facing Egyptian garment producers, and how these features affect vertical integration. The following section discusses specific theories in more detail, and the extent to which they are supported by my results. Finally, I review the methodological innovations this paper has adopted in modeling vertical integration.

Importance of the Institutional Setting

Since the 1930s, the textile and garment industry in Egypt was both protected by trade barriers and largely controlled by the public sector. Until the 1980s, these policies resulted in the large domestic market being served by largely uncompetitive industries with little regard for quality. However, the 1990s brought about several changes. Economic liberalization paved the way for expansion of a privately owned garment sector, though not fabrics, which largely remains in government hands. Liberalization and increased media access exposed middle class Egyptian consumers to rapidly changing Western fashions, increasing the quality demands they made on Egyptian producers. At the same time the collapse of Egypt's traditional export destinations in the Eastern European Block caused exporters to look elsewhere, that is to more demanding Western markets. These changes created a quality gap. The quality of fabric input required by the higher segment of the garment industry could not be satisfied by the domestic fabrics industry; not only quality, but the uncompetitive traditional fabric industries could not comply with the timely delivery required by firms producing for export to markets with four or more fashion seasons a year.

This institutional setting induced the desire for vertical integration in the garment industry in order to ensure the desired input quality. This is especially so, as firms serving the domestic market were legally banned from importing their fabric inputs. The above argument is picked up through the following five variables: disputes over quality, importance of timely delivery, percentage exported (interacted with a dummy for fabric imports), and search and switch costs with respect to domestic suppliers. The results revealed that, with no exception, all these factors provide the impetus for firms to desire integration; in other words, given this particular institutional setting, it is these aspects, which render vertical integration efficient.

---

42 The missing dummy for foreign supplier search and switch cost takes on the value of 1 if the firm did NOT deal with foreign suppliers, i.e. if it only dealt with domestic suppliers before integration. The correlation coefficient equals (-.30) between the dummy and quality disputes and equals (0.20) with monitoring costs. Both coefficients are large.

While some firms manage to integrate others do not. Two forces operate in different directions – in one direction constraining the ability to integrate and in the other facilitating it – which on balance determine to which group a firm belongs, i.e. integrated or not.[43] First are forces that hinder the ability to or limit the desire to integrate. Some of these forces are consistent with existing economic theory on vertical integration and others - despite potentially applicable in other settings - have not been considered by economic theory on vertical integration. These constraints may well be more acute in a developing country such as Egypt where certain market imperfections are present (e.g. credit market imperfections). Second are forces that can mitigate these constraints notably the presence of institutional substitutes. The next subsection will discuss in more detail the results of the study relating the results to economic theory on vertical integration.

The Relevance of Theory

This study has found that some variables commonly held to be important determinants of vertical integration were not so in the case of the Egyptian garment industry, whereas other variables, which are not normally considered, do matter.

While evidence was found in support of demand variability theories and risk adjusted property rights theory, agency theory, financial constraints, economies of scale, moral costs towards repeated suppliers and aspects of quality concerns, no evidence was found to support asset specificity; i.e. the modern property rights theory.[44] In other studies, asset specificity[45] (the core of TCT and MPRT on vertical integration) is usually at the top of the list for determinants of vertical integration. However, the results presented here show it to be insignificant.

Features of the Egyptian business environment are the most significant determinant of vertical integration. Importance analysis confirms that - in order of importance - demand variability, firm size, financial constraints, sales uncertainty, social and moral costs and market segment (proxied by disputes over quality and the importance of timely delivery to the garment producer) are the most important determinants of vertical integration in the Egyptian garment industry. On the one hand, limited access to finance prevents many firms from undertaking the investment required to integrate. Firms with larger issued capital (or garment output or net assets) prior to integration are more likely to produce their own fabrics, both on account of better access to finance, including retained profits, but also to exploit economies of scale. On the other hand, volatile and uncertain market conditions - such as demand variability and sales

43 And if integrated then to what extent.

44 Or this aspect of transaction cost theory as opposed to human asset specificity for instance.

45 The reader may think that the social and moral cost variable is a proxy for asset specificity on account of its introduction to lock in with a specific supplier. However, there is a crucial difference, the presence of moral costs associated with changing repeated suppliers merely implies the limitation of the garment producer's choice to switch to alternative suppliers due to these types of costs. Rather than limitation due to the 1) opportunistic behavior on the supplier's part to exploit the lock in position the garment producer is in 2) or due to the incurring of relationship specific investments of any type, whose return will be reduced outside this particular relationship.

uncertainty – make firms more likely to rely on the market, hence, discouraging vertical integration. However, social and moral costs do not constrain firms from choosing to integrate if it is efficient to do so. In addition, contrary to quality concerns, monitoring costs hamper the ability for vertical integration.

As argued in the previous subsection, higher quality (in terms of both product quality and timely delivery) garment producers possess higher degrees of vertical integration in order to ensure the required quality level. This finding arises out of the Egyptian setting described above. The research has also introduced other context specific determinants. First, there are some nuances related to market segment. Producers of higher quality garments rely on imported textiles since the required fabric quality is not available domestically. Contrary to theoretical predictions, these producers do not integrate even if search and switch costs are high. But the opposite is true of producers relying on domestic suppliers. An interpretation of this result is that foreign institutions ensure contract enforcement with respect to quality and on time delivery so that suppliers' opportunistic behavior is deterred, reducing in turn the necessity of garment firms to integrate. This may not be the case with respect to domestic suppliers when domestic institutions do not guarantee the same level of enforcement. This result shows support for human asset specificity and is consistent with Transaction Cost Theory.

Second, garment producers in Egypt serving the domestic market are legally not allowed to import their inputs. This has brought about an additional measure that introduces another aspect of quality: exporters that do not rely on the import market for their inputs. Those hold higher degrees of vertical integration.

Institutional substitutes, whether regarded as context specific or general determinants, mitigate some of the aforementioned institutional deficiencies. In Egypt, both foreign ownership and membership to the garment commodity council play an important role through moderating the negative effect limited access to and high cost of finance have on vertical integration.

In conclusion, other factors than traditional factors considered in the vertical integration literature are just as important. This has two implications. The first relates to theory. Theories actually are more likely to complement each other than to compete against one another. The second, however, is empirical. Existing and future empirical work focusing on only one explanation for vertical integration suffers from omitted variable bias.

Model Specification and Choice of Technique

Unlike many other empirical studies to date, rather than focus on a particular theory of interest, the model used here includes variables suggested by the full range of different theories. Hence, observing how they all perform when placed jointly in the same analysis. In addition, other variables are added which reflect the institutional setting facing firms operating in a developing country such as Egypt. These latter variables capture - among other things - the presence of financial constraints, social costs and scale economies (firm size). The paper avoids the omitted variable bias problem in existing studies as a result of focusing on one or at most two theories of interest. This limited focus jeopardizes the validity of study findings as omitted

variable bias can result in "false significance". Indeed, even though financial constraints, social costs and institutional substitutes may have a stronger impact in a developing country such as Egypt, these determinants are by no means confined to developing countries and accordingly should be included in developed country models for their validity in these settings to be tested.

The modeling approach adopts two innovations: (1) use of fractional response models, and (2) avoiding endogeneity. The dependent variable is measured as the degree of vertical integration (i.e. fraction of fabric inputs which are produced in house rather than bought) rather than as a dichotomous variable as has previously been mostly the case.[46] The endogeneity problem which has plagued the literature is partially avoided as data were collected on decision-maker perceptions and firm characteristics in the year(s) preceding integration so that nearly all regressors are pre-determined.

The findings from this study thus have a clear implication for future research: studies of the determinants of vertical integration need to incorporate the full range of determinants suggested by theory in addition to factors which are specific to the institutional context being studied. Failure to do this, both invalidates the empirical results and limits progress in identifying the full story as to why firms integrate. There is thus considerable scope, for further research on the underlying causes of vertical integration.

Finally, it is important to note a number of things. First, is that the findings of this study pertain to a certain type of integration, to one country and to one industry, so that care should be taken in generalization. Second, results pertaining to the garment commodity council and to the percentage of fabrics provided by a firm's sister company or branch should be treated with caution for possible endogeneity associated with regressing current vertical integration status on current firm characteristics. Lastly, the results of the size variable should also be treated with proper caution for the possibility of this variable proxying several concepts. Finally, whilst the approach used has reduced problems of endogeneity and omitted variable bias, the continued presence of such problems cannot be ruled out.

REFERENCES

Alchian, A. and H. Demsetz (1972). Production, Information Costs, and Economic Organization. *American Economic Review* 62, 777-795.

Alchian, A., B. Klein, and R.A. Crawford (1978, October). Vertical Integration, Appropriable Rents, and the Competitive Contracting Process. *Journal of Law and Economics*, 21, 297-326.

Anderson, E. and D.J. Schmittlein (1984). Integration of the Sales Force: An Empirical Examination. *Rand Journal of Economics* 15, 385-395.

[46] The results show that this change makes a difference to the results, even though in my case only half of the firms which are integrated (12 percent of the whole sample) have non-integer levels of integration (i.e. 0<VI<1). Corresponding probit and logit regressions are available from the author upon request.

Arrow, K.J. (1975). Vertical Integration and Communication, *Bell Journal of Economics*, 6, 173-183.

Blair, R.D and D.L. Kaserman (1983). *Law and Economics of Vertical Integration and Control.* Academic Press, New York.

Carlton, D. (1979).Vertical Integration in Competitive Markets Under Uncertainty. *Journal of Industrial Economics*, 27(3), 189-209.

Chandler, A.D. Jr. (1977). *The Visible Hand: The Managerial Revolution in American Business.* Belknap Press of Harvard University Press, Cambridge, Mass.

Fefchamps, M. (1996). The Enforcement of Commercial Contracts in Ghana. *World Development,* 24 (3), 427-448.

Greif, A. (1997). *Contracting, Enforcement, and Efficiency: Economics Beyond the Law.* In Bruno, M. and B. Pleskovic (Eds.), Annual World Bank Conference on Development Economics 1996. The World Bank, Washington, DC, 239-265.

Grossman, S. J., and O. D. Hart (1986, August). The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration. *Journal of Political Economy*, 94(4), 691-719.

Guigale, M., and Mobarak, H. (1996). The Rationale for Private Sector Development in Egypt. In M. Guigale and H. Mobarak (Eds.). *Private sector development in Egypt*, Egypt: The American University Press.

Haley, J.O. (1997). Relational Contracting: Does Community Count?*, in Japan: Economic Success and Legal System,* in Harald Baum (Ed.). Berlin: de Gruyter.

Hanson, G. H. (1995, May). Incomplete Contracts, Risk, and Ownership. *International Economic Review*, 36(2), 341-363.

Harrigan, K. (1983). Strategies for Vertical Integration. Lexington, MA: Lexington Books.

_____. and J. Moore (1990, December). Property Rights and the Nature of the Firm. *Journal of Political Economy*, 98(6), 1119-1158.

Hendley, K., P. Murrell and R. Ryterman (2000). Law, Relationships and Private Enforcement: Transactional Strategies of Russian Enterprises. *Europe-Asia Studies,* 52(4), 627-656.

Hendley, K. and P. Murrell (2003). Which mechanisms support the fulfillment of sales agreements? Asking decision-makers in firms. *Economic Letters*, 78, 49-54.

Holmstrom B. (1982). Moral Hazard in Teams, *Bell Journal of Economics,* 13, 324-340.

_____ and P. Milgrom (1991). Multitask Principal Agent Analysis: Incentives, Contracts, Asset Ownership, and Job Design, *Journal of Law, Economics and Organization,* 7, 24-51.

_____ and P. Milgrom (1994, September). The Firm as an Incentive System. *The American Economic Review*, 84(4), 972-991.

_____ (1999). The Firm as a Subeconomy*, Journal of Law, Economics, and Organization* 15(1), pp. 74-102.

Hubbard, Thomas (1999). How Wide is the Scope for Hold-up Based Theories? Contractual Form and Market Thickness in Trucking, *National Bureau of Economic Research (NBER)*, *Working Paper* 7347.

Joskow, P.L. (1985). Vertical Integration and Long Term Contracts: The Case of Coal-Burning Electric Generating Plants*, Journal of Law, Economics and Organization*, 1, 33-80.

_____. (1988, Spring). Asset Specificity and the Structure of Vertical Relationships: Empirical Evidence. *Journal of Law, Economics, and Organization*, 4(1), 95-117.

Kranton, R. (1996). Reciprocal Exchange: A Self-Sustaining System, *American Economic Review*, 86 (4), 830-851.

Klein, P.G. (2004). The Make or Buy Decision: Lessons from Empirical Studies. *Contracting and Organizations Research Institute, University of Missouri-Columbia, Working Paper* 2004-07.

Lieberman, M.B. (1991). Determinants of Vertical Integration: An Empirical Test. *Journal of Industrial Economics*, 39 (5), 451-466.

Macauly, S. (1963). Non-Contractual Relations in Business: A Preliminary Study*, American Sociological Review*, 28(1), 55-67.

Madalla, G.S. (1992). *Introduction to Econometrics* (2nd edition). Englewood Cliffs: Prentice Hall International.

Masten, S.E. (1984). The Organization of Production: Evidence from the Aerospace Industry*, Journal of Law and Economics*, 27, 403-417.

_____ (1996). *Case Studies in Contracting and Organization.* New York: Oxford University Press.

_____. (1991) J.W. Meehan and E. A. Snyder. The Cost of Organization, *The Journal of Law Economics and Organization*, 7, 1-25.

McMillan, J. (1997). Markets in Transition, in D.M. Kreps and K. Wallis (Eds.). *Advances in Economics and Econometrics: Theory and Applications: Seventh World Congress.* Cambridge: Cambridge University Press.

_____. and C. Woodruff (1999). Interfirm Relationships and Informal Credit in Vietnam, *The Quarterly Journal of Economics*, 114(4), 1285-1319.

_____. and C. Woodruff (1999). Dispute Prevention Without Courts in Vietnam, *Journal of Law, Economics and Organization,* 15(3), 637-658.

Montverde, K. and D. Teece (1982). Supplier Switching Costs and Vertical Integration in the Automobile Industry, *Bell Journal of Economics*, 13(1), 206-213.

Papke, L.E. and J.M. Wooldridge (1996). Econometric Methods for Fractional Response Variables With an Application to 401(K) Plan Participation Rates, *Journal of Applied Econometrics*, 11(6), 619-632.

Pirrong, S.C. (1993). Contracting Practices in Bulk Shipping Markets: A Transactions Cost Explanation, *Journal of Law and Economics*, 36(2), 937-976

Porter M.E. (1980) *Competitive Strategy.* Free Press, New York.

Shelanski, H.A. & P.G. Klein (1995, October). Empirical Research in Transaction Cost Economics: A Review and Assessment. *Journal of Law, Economics, and Organization*, 11(2), 335-361.

Uzzi, B. (1996). The Sources and Consequences of Embeddedness for the Economic Performance of Organizations: The Network Effect, *American Sociological Review*, 61(4), 674-698.

Uzzi, B. (1999, August). Embeddedness in the Making of Financial Capital: How Social Relations and Networks Benefit Firms Seeking Financing, *American Sociological Review*, 64, 481-505.

Wernerfelt, B. (1997, October). On the Nature and Scope of the Firm: An Adjustment-Cost Theory. *The Journal of Business*, 70(4), 489-514.

Whinston, M. D. (2001, May). Assessing the Property Rights and Transaction-Cost Theories of Firm Scope. *American Economic Association*, 91(2), 184-188.

_____ (2002). On the Transaction Cost Determinants of Vertical Integration, *Journal of Law, Economics and Organization*, 19(1), 1-23.

_____ . (1979, October). Transaction Cost Economics: The Governance of Contractual Relations. *Journal of Law and Economics*, 22(2), 233-62.

Woodruff, C. (2002, October). Non-contractible investments and vertical integration in the Mexican footwear industry," *International Journal of Industrial Organization* Volume 20 (8), 197-1224.

ANNEX 1: SELECTED SURVEY QUESTIONS

<table>
<tr><td>Variable</td><td>Corresponding Survey Question</td></tr>
<tr><td>Vertical Integration</td><td>
With respect to fabrics used for garments sold on the domestic market: During the last completed financial year/prior to internal production of fabrics, what percentage of total requirements of these fabrics did you produce internally, what percentage did you purchase from domestic producers and what percentage did you purchase from foreign producers (i.e. imported)?
<table>
<tr><td colspan="3">The Domestic Market</td></tr>
<tr><td></td><td>Last Completed Financial Year (1)</td><td>Prior to Internal Production of Fabrics (2)</td></tr>
<tr><td>Internal Production</td><td>%</td><td>0%</td></tr>
<tr><td>Domestic Suppliers</td><td>%</td><td>%</td></tr>
<tr><td>Foreign Suppliers</td><td>%</td><td>%</td></tr>
<tr><td>TOTAL</td><td>100%</td><td>100%</td></tr>
</table>
With respect to fabrics used for garments sold on the export market: During the last completed financial year/prior to internal production of fabrics, what percentage of total requirements of these fabrics did you produce internally, what percentage did you purchase from domestic producers and what percentage did you purchase from foreign producers (i.e. imported)?
<table>
<tr><td colspan="3">The Export Market</td></tr>
<tr><td></td><td>Last Completed Financial Year (1)</td><td>Prior to Internal Production of Fabrics (2)</td></tr>
<tr><td>Internal Production</td><td>%</td><td>0%</td></tr>
<tr><td>Domestic Suppliers</td><td>%</td><td>%</td></tr>
<tr><td>Foreign Suppliers</td><td>%</td><td>%</td></tr>
<tr><td>TOTAL</td><td>100%</td><td>100%</td></tr>
</table>
</td></tr>
<tr><td>Quality Disputes</td><td>Prior to producing your own fabrics, how frequent did you encounter disputes over quality with your domestic/foreign fabric suppliers? 5 point scale from “absolutely no disputes” to “very frequent”.
Note: the variable is a weighted average, where the weights are the % of domestically purchased fabrics and the % of imported fabrics in total fabrics requirements.</td></tr>
<tr><td>Non-available desired fabric quality</td><td>Give the level of dis/agreement with the following statement: The answer was given on a 6 point scale from “strongly disagree” to “strongly agree”.
Prior to producing your own fabrics, it was difficult to find the fabric quality level and specifications that match your standards on the domestic market.</td></tr>
<tr><td>Supplier Search & Switch Costs</td><td>Give the level of dis/agreement with the following statement: The answer was given on a 6-point scale from “strongly disagree” to “strongly agree”.
Prior to producing fabrics internally, search and switch costs involved in altering fabric suppliers, rendered it difficult for you to switch from any of your repeated (domestic/foreign) fabric suppliers at the time.</td></tr>
<tr><td>Fabric Supplier Social Cost</td><td>Give the level of dis/agreement with the following statement: The answer was given on a 6 point scale from “strongly disagree” to “strongly agree”.
Prior to producing fabrics internally, social and moral costs involved in altering fabric suppliers, rendered it difficult for you to switch from any of your repeated (domestic/foreign) fabric suppliers at the time (e.g. the cost of losing a friend, family rejection for cutting dealings with a family supplier or a supplier who is a family friend).</td></tr>
</table>

Variable	Corresponding Survey Question
Fashion turnover rate	In the years prior to producing your own fabrics, on average, how long did you expect the demand on a new style the company will be introducing to the market during its first few years of integration persist? Codes: 1.Day 2. Week 3. Month 4. Year 5. Season Note: Answer was converted to weeks.
% sold to women	% of garment sales to women in the last completed financial year prior to vertical integration.
Monitoring Cost	*Give the level of dis/agreement with the following statement: The answer was given on a 6 point scale from "strongly disagree" to "strongly agree".* Prior to producing your own fabrics you thought that monitoring workers undertaking fabrics production is a very difficult task. (i.e. time, money and hassle involved in monitoring the workers)
Demand Variability	In the years prior to producing your own fabrics, on average, how variable did you expect the demand on your products to be during the first few years of integration? The answer was given on a 6 point scale from "absolutely invariable" to "very variable".
Uncertainty	Was this sales value (remind the respondent of his sales answer)….? 1) Absolutely expected 2) Expected 3) Somewhat expected 4) Somewhat unexpected 5) Unexpected 6) Absolutely unexpected
Size Variables	In the given years, how much was the value of the company's issued capital (garment sales; net assets)? 1=£E 2=$
Fabric Unit Investment Cost	*Give the level of dis/agreement with the following statement: The answer was given on a 6 point scale from "strongly disagree" to "strongly agree".* Prior to producing your own fabrics, you thought that opening up a fabric production unit in the company is a very expensive undertaking (that refers to all investment costs of buying the machines, the extra space required, preparing the space as well as any other costs involved in opening up the fabric production unit).
Access to finance	Prior to producing your own fabrics internally describe on a scale from 0 to 10 your belief as to the degree of difficulty in obtaining the necessary funds, from each of the indicated sources, to add another stage of production to the basic stages of production of the company. Such as: 0……10
	Describes your prior belief that it was impossible to obtain the necessary funds from this source of finance / Describes your prior belief that it was extremely easy to obtain the necessary funds from this source of finance
	1) Financial Markets & Intermediaries (Banks and Financial Institutions) 2) Personal Savings and loans from family members or friends and relatives 3) Company Retained Profits 4) Mother Company Retained Profits 5) Sister Company or Branch Retained Profits
Average Profits	Compared to garment firms that were in the market at the time, what estimate would you give your profits, on average, since establishment until the year the firm integrated (i.e. from yyyy to yyyy)? 1. Very weak 2. Weak 3.Somewhat weak 4.Somewhat high 5. High 6. Very High
% Foreign ownership	% of foreign ownership in the last completed financial year prior to vertical integration.

Variable	Corresponding Survey Question
Stock Market Status	If company was listed on the stock market prior to vertical integration. 1. Yes 0. No
Tax Incentive	*Give the level of dis/agreement with the following statement: The answer was given on a 6 point scale from "strongly disagree" to "strongly agree".* Prior to producing your own fabrics, you thought that producing fabrics internally**,** instead of purchasing them from the market, may reduce the company's tax burden.
% Fabrics provided by sister company or branch	% of value of firm's total fabric requirements currently provided by a sister company or branch.
Family Inherited Business	Is this company considered an inherited family business? (not necessarily literally inherited, father may be -thanks are due to God (Alhamdu li Allah) – still alive.) 1. Yes 0. No

Annex 2 Variable Statistics

	Mean			Standard Deviation			Minimum			Maximum			Expected sign
	VI	Non-VI	All	VI	Non-VI	All	VI	Non-VI	All	VI	Non-VI	All	
Degree of VI													
All firms: 0≤VI≤1	0.78	0.00	0.19	0.30	0.00	0.36	0.05	0	0	1	0	1	
0<VI<1	0.53	n.a.	n.a.	0.30	n.a.	n.a.	0.05	n.a.	n.a.	0.97	n.a.	n.a.	
Quality													
Quality disputes	3.87	2.96	3.17	1.08	1.09	1.16	1	1	1	5	5	5	+
Non-available desired fabric quality	4.57	3.20	3.53	1.51	1.73	1.78	1	1	1	6	6	6	+
Lock in & hold up (TCT)													
Search & switch cost	4.62	3.37	3.67	1.57	1.67	1.73	1	1	1	6	6	6	+
Social & moral cost	3.45	2.92	3.05	1.85	1.55	1.64	1	1	1	6	6	6	+
Temporal specificity (D)	0.91	0.83	0.85	0.28	0.37	0.36	0	0	0	1	1	1	+
Lock in & hold up (MPRT)													
Fashion turnover rate (in weeks)	111.81	48.02	63.24	171.08	85.35	114.78	4.4	1	1	522	522	522	+
% sold to women	29.74	44.69	41.15	33.51	44.83	42.84	0	0	0	100	100	100	+
Agency Theory													
Monitoring cost	3.19	4.46	4.16	1.36	1.58	1.62	1	1	1	6	6	6	-
Desire to Avoid Risk													
Demand variability	2.59	4.83	4.29	1.30	1.29	1.61	1	1	1	6	6	6	-
Demand uncertainty	2.45	3.51	3.26	1.17	1.46	1.47	1	1	1	6	6	6	-
Firm Size													
Issued capital (in logs)	13.04	9.83	10.60	2.61	2.20	2.68	8.07	5.90	5.90	17.86	18.65	18.65	+
Net assets (in logs)	14.64	11.66	12.40	2.63	2.32	2.72	8.73	6.82	6.82	19.76	18.74	19.76	+
Garment sales (in logs)	16.04	12.07	13.07	2.76	2.36	3.01	9.27	6.56	6.56	23.21	19.36	23.21	+
Financial constraints													
Fabrics unit investment cost	3.69	5.67	5.20	1.49	0.75	1.29	1	2	1	6	6	6	-
Access to finance	9.36	8.06	8.37	1.41	2.83	2.62	5	0	0	10	10	10	+
Institutional substitutes													

	Mean			Standard Deviation			Minimum			Maximum			Expected sign
	VI	Non-VI	All	VI	Non-VI	All	VI	Non-VI	All	VI	Non-VI	All	
Membership to Garment Commodity Council (D)	0.00	0.04	0.03	0.00	0.19	0.17	0	0	0	0	1	1	+/-
Current membership to Garment Commodity Council (D)	0.21	0.04	0.08	0.41	0.19	0.27	0	0	0	1	1	1	
% of foreign ownership	8.62	2.08	3.64	28.31	13.37	18.24	0	0	0	100	100	100	+/-
Lawyer (D)	0.21	0.34	0.30	0.41	0.47	0.46	0	0	0	1	1	1	+/-
Current lawyer (D)	0.57	0.35	0.40	0.50	0.48	0.49	0	0	0	1	1	1	
Other controls													
Listed on stock market (D)	0.05	0.02	0.03	0.22	0.15	0.17	0	0	0	1	1	1	+/-
Tax incentive	3.00	2.56	2.67	1.52	1.44	1.47	1	1	1	6	6	6	+
% of fabrics provided by sister company or branch	1.55	1.24	1.32	11.84	9.39	10.00	0	0	0	90	90	90	-
Age	22.31	20.68	21.07	13.75	13.40	13.48	2	1	1	57	69	69	+/-
Family Business (D)	1.67	1.73	1.72	0.47	0.45	0.45	1	1	1	2	2	2	+/-

1) Level of (dis)agreement variables are coded from "strongly disagree=1" to "strongly agree=6". For the disputes question the answers were coded "absolutely no disputes=1" to "very frequent=5"
2) All variables refer to the period prior to integration with the exception of the percentage of fabrics provided by sister company and/or branch.
3) VI= Vertical Integrated, TCT=Transaction Cost Theory, MPRT=Modern Property Rights Theory
4) Variables followed by (D) are dummy variables.
5) n.a.= not applicable