Networks Performance and Contractual Design: Empirical Evidence from Franchising

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Abstract

This article deals with the links between networks performance and the design of vertical contracts. It provides evidence broadly consistent with the hypothesis that within franchising systems, constraining contracts for the retailers favor a better performance at the network level.

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1. Introduction

Explaining business performance is one main issue of Industrial Organization. In this way, most investigations have focused on market structures. This paper is in the line of studies aiming at evaluating the influence of organizational forms on performance (in franchising: Krueger, 1991; Arrunada and Vazquez, 2003.) However, contrary to the preceding papers, our analysis level is not the production unit but the network.

More precisely, this article deals with the contractual design of relationships between producers and distributors. It provides evidence on the links between the features of vertical contracts organizing the distribution networks and the performance of these networks. The analytical framework is based on the results of the agency theory, which is useful to understand the structure of contracts (section 2). The empirical investigation is led on French franchising networks (sections 3 and 4). Concluding comments are set forth in section 5.

2. Analytical framework

The agency theory is a relevant framework to analyze the contractual organization of vertical relationships (Mathewson and Winter, 1984; Rey and Tirole, 1986). In this field, vertical restraints[1] are justified by various coordination problems[2]. Within a distribution network, one main concern for the upstream unit defining the contract is the retailers' potential opportunism. These theoretical results find evidence in the econometrics of franchising (Brickley, 1999; Arrunada and al., 2001).

On this basis, we assume that constraining contracts for the downstream units reduce vertical coordination problems. This involves a better functioning of the network, hence the following testable prediction: constraining vertical contracts favor the performance of the network.

[1] Vertical restraints are contractual provisions imposed by a producer to constraint the action of one or several retailers.

[2] Moral hazard, horizontal and vertical externalities.

3. Data and methodology

The data were collected in the 2003 yearbook of the French Federation of Franchise. Our sample consists of the 104 networks established on the French territory and members of the Federation.

3.1. The construction of an incentive global index

Six key provisions in vertical contracts are used to define the degree of constraint (table 1). We consider that contracts are more constraining when the royalty rate, advertising fee, amount of entry duties, initial investment and personal contribution (own funds excluding loans) required by the franchisor are high, and when contracts are of long duration. To homogenize treatments, we construct classes for the DURATION, ENTRY, INVESTMENT and CONTRIBUTION variables[3].

INSERT TABLE 1

Table 2 highlights some strong positive correlations, and conversely completely independent provisions. More precisely, contracts with no royalties usually enclose no advertising fee, a low entry duty, and are of short duration. We use a multiple correspondence analysis (MCA) to construct an incentive global index summarizing the six provisions. This index divides the contracts into two groups: less constraining versus highly constraining (see appendix).

INSERT TABLE 2

[3] Using Ward's method on squares of the Euclidean distances (Ward, 1963)

3.2. The use of the Heckman method

Many factors influence both the performance and the organizational choices. For this reason, management decisions are usually endogenous to their expected performance outcomes (Hamilton and Nickerson, 2003). This is why endogeneity and bias selection appear in the regression equation for performance.

The two-step Heckman method (Heckman, 1979) handles this problem. It consists first in estimating a probit selection equation for the strategic choice (here the degree of contractual constraint). This stage is used to calculate the non-selection hazard (inverse of Mills' ratio). In a second step, the regression equation for performance estimates an additional parameter representing the non-selection hazard. The significance – or not – of the inverse of Mills' ratio highlights the importance of the corrected selection bias.

3.3. Endogenous and explanatory variables

Tables 3 and 4 provide summary statistics for endogenous and explanatory variables. We retain the turnover of the network balanced by the size of this network as the performance indicator.

INSERT TABLE 3

INSERT TABLE 4

4. Econometric model and estimations

The probit selection equation (1) is used to calculate the inverse of Mills' ratio.

$$Prob\,(CONTRACT_i = 1\,/X_i) = c + \alpha\ OWNERSHIP_i + \sum_{m=1}^{6} \beta_m INDUSTRY_{m\,i} + \varepsilon_i \qquad (1)$$
$$i = 1, \ldots, 104$$

CONTRACT is 0 when the contractual design is less constraining and 1 when it is highly constraining. This equation needs at least one explanatory variable that affects the organizational choice (CONTRACT) but not directly the network performance. We choose the variable OWNERSHIP. It is indeed relevant to assume that the degree of constraint for the retailers in vertical contracts depends on the type of ownership in the network. This means a coherence in the upstream firm's organizational choices. In order to control sectorial effects, we also use a set of industry variables.

The performance equation (2) is augmented with the inverse of Mills' ratio in order to compensate for sample bias.

$$PERFORMANCE_i = c + \underset{>0}{\alpha}\ CONTRACT_i + \sum_{m=1}^{6} \underset{\neq 0}{\beta_m}\ INDUSTRY_{m\,i} + \underset{\neq 0}{\gamma_1}\ AGE_i + \underset{\neq 0}{\gamma_2}\ DENSITY_i + \lambda_i + \varepsilon_i \qquad (2)$$
$$i = 1, \ldots, 104$$

with

α = parameter for the core explanatory variable

β = parameter for the industry indicators

γ = parameters for the other control variables

The symbols below the parameters indicate the predicted sign

λ = inverse of Mills' ratio

ε = term of error

i = network

m = industries

Estimates for INDUSTRY take the food sector as reference.

The estimates for (2) show that lambda is not significant[5], which means that there is no noteworthy selection bias. For this reason, we suppress the inverse of Mill's ratio in the final regression. In addition, the step-by-step downward selection leads us to hold the DENSITY variable back the regression. The final OLS results are given in table 5.

INSERT TABLE 5

5. Conclusion

The empirical results are broadly consistent with the hypothesis that there is a link between networks performances and the type of vertical relationships. The influence of the contractual design corresponds to the predicted sign: constraining contracts improve performance (by 0.4 M€ on average for a network characteristic retailer). In addition, the estimations highlight the significant influence of the sector and the age of the network on its performance (one additional year increases the mean performance by 0.031 M€ for a network characteristic retailer).

[5] Results available upon request.

Table 1. Contractual provisions used to construct the incentive global index

Designation	Definition (number of networks)	Mean	St-error	Min	Max
ROYALTIES	Royalties 0: no (18) 1: yes (86)	0.83	0.38	0	1
PUBLICITY	Advertising fee 0: no (41) 1: yes (63)	0.61	0.49	0	1
DURATION	Contract duration 0: ≤ 5 years (54) 1: > 5 years (50)	6.76	2.81	3	20
ENTRY	Entry duties 0 ≤15000 € (56) 1 >15000 € (48)	14. 881	12. 666	0	69
INVESTMENT	Initial investment of the retailer 0: < 100 K € (28) 1: 100 - 200 K € (35) 2: > 200 K € (41)	205.49	201.57	20	900
CONTRIBUTION	Personal capital contribution 0: < 50 K € (29) 1: 50 - 100 K € (40) 2: > 100 K € (35)	77.41	53.14	15	300

Table 2. Independence Khi-2 for contractual provisions

	ROYALTIES	PUBLICITY	DURATION	ENTRY	INVESTMENT
PUBLICITY	$9{,}81^{+++}$				
DURATION	$11{,}92^{+++}$	0,47			
ENTRY	$10{,}76^{+++}$	$7{,}77^{+++}$	$22{,}03^{+++}$		
INVESTMENT	1,51	2,61	$13{,}07^{+++}$	$18{,}00^{+++}$	
CONTRIBUTION	2,85	0,13	$17{,}88^{+++}$	$14{,}67^{+++}$	$25{,}14^{+++}$

+ Significant at the 10% level + + Significant at the 5% level + + + Significant at the 1% level

Table 3. Quantitative variables

Designation	Definition	Mean	St. error	Min	Max
PERFORMANCE	Turnover per network (in M€) / size of the network	0.91	1.53	0	14.22
OWNERSHIP	Number of owned units in the network / size of the network	0.31	0.3	0	0.93
DENSITY	Number of potential consumers per outlet (thousands of people)	70.39	74.34	1	500
SIZE	Size of the network = Number of franchisees per network	160.05	174.12	5	980
AGE	Age of the network (number of years)	19.75	10.45	2	53

Table 4. Dummy variables

Designation	Definition (number of networks)
CONTRACT	Dummy variable defining the type of contract 0: inciting (55) 1: constraining (49)
INDUSTRY	Dichotomous variables related to the belonging of the network in the sector. Auto services (11) Home equipment (20) Services for individuals (13) Textiles-Clothing (18) Hotel-Restaurant (20) Food (13) Leisure (9)

Table 5. OLS estimates

Variable	Coefficients	Standard error
Constant	- 0.49	0.47
Contract	0.40^{+++}	0.14
Auto services	0.44^{++}	0.19
Home equipment	0.53^{+++}	0.19
Services for individuals	0.33^{++}	0.16
Textiles-Clothing	0.35^{++}	0.17
Hotel-Restaurant	1.54^{++}	0.59
Leisure	0.47^{++}	0.21
Age	0.31^{E-01+}	0.18^{E-01}
Results corrected for heteroskedasticity		
Fisher probability = 0. 00117		
Number of observations: 104		

+ Significant at the 10% level + + Significant at the 5% level + + + Significant at the 1% level

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Appendix: Multiple correspondence analysis

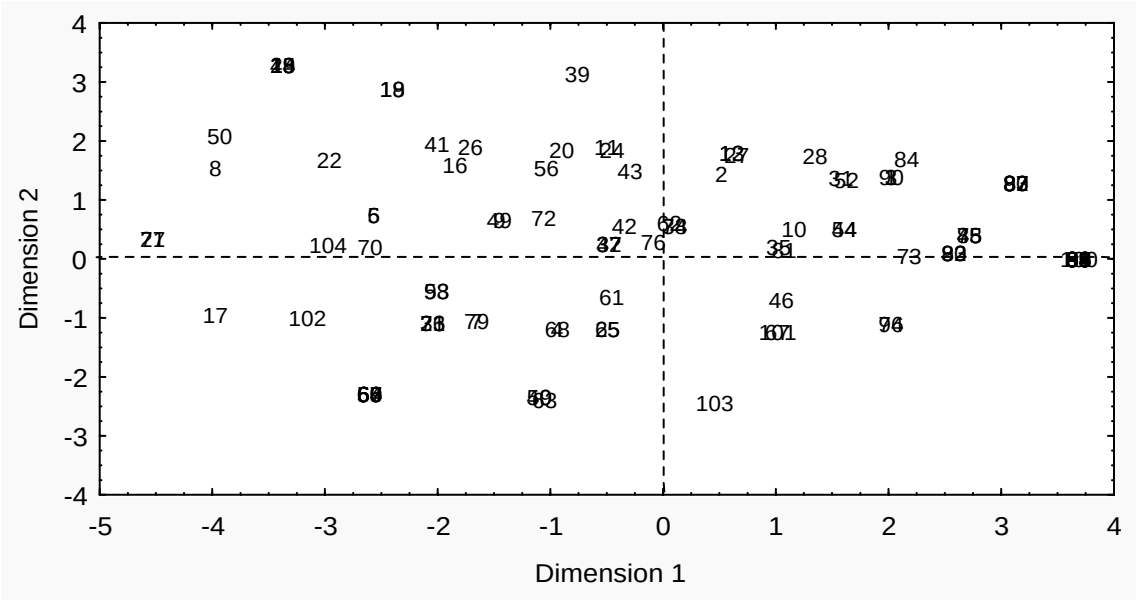
Table 6.Burt table for the six provisions

		ROYALTIES		PUBLICITY		DURATION		ENTRY		INVESTMENT			CONTRIBUTION		
		0	1	0	1	0	1	0	1	0	1	2	0	1	2
ROYALTIES	0	18	0												
	1	0	86												
PUBLICITY	0	13	28	41	0										
	1	5	58	0	63										
DURATION	0	16	38	23	31	54	0								
	1	2	48	18	32	0	50								
ENTRY	0	15	39	27	27	40	14	54	0						
	1	3	47	14	36	14	36	0	50						
INVESTMENT	0	5	23	8	20	21	7	21	7	28	0	0			
	1	8	27	17	18	20	15	22	13	0	35	0			
	2	5	36	16	25	13	28	11	30	0	0	41			
CONTRIBUTION	0	6	23	12	17	19	10	22	7	17	8	4	29	0	0
	1	9	31	16	24	27	13	22	18	9	14	17	0	40	0
	2	3	32	13	22	8	27	10	25	2	13	20	0	0	35

Table 7. Eigenvalues of the correspondence factor analysis from the Burt table

Total Inertia=,30436 Chi²=1139,5 df=169 p=0,0000				
Dimensions	Singular values	Eigenvalues	Perc. of Inertia	Cumulative perc.
1	0,3969	0,1576	51,77	51,77
2	0,2360	0,0557	18,30	70,07
3	0,1809	0,0327	10,75	80,82
4	0,1565	0,0245	8,05	88,87
5	0,1145	0,0131	4,31	93,18
6	0,0938	0,0088	2,89	96,07
7	0,0788	0,0062	2,04	98,11
8	0,0758	0,0057	1,89	100,00

Table 8. First factorial design (representation of the contracts)



Dimension 1 represents all the provisions from the less constraining on the left to the most constraining on the right. This dimension enables to “quantify” the contract of each network of the sample according to its level of constraint. It is then possible to create two groups.