

*International Alliances and the Performance of Indian Software  
Firms*

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### *Indian Software: Main Features*

- ◆ \$30.3 billion in total revenue in 2005-06.
- ◆ Most of the growth was achieved by exports – Compound Growth rate exceeded 40% from 1990 onwards.
- ◆ Software is India's single biggest export earner
- ◆ Indian software services exports exceed those of all other countries.
- ◆ Began by providing customized software services to customers abroad – Body Shopping - employees were located temporarily at the customer's place of business to do programming, testing, and maintenance.
- ◆ Software services remains the dominant output, accounting for more than 90% of the industry's sales revenue, rather than packaged software products.
- ◆ The Indian software industry is mostly home-grown. Foreign ownership of software operations in India is quite small – fewer than one-fifth

### *Marris Model of Growth*

Growth of demand:  $D_g = \gamma_1(d^*)$  (1)

Growth of Supply:  $S_g = \frac{I}{K} = \alpha \frac{\Pi}{K} = \alpha\rho$  (2)

Where  $\alpha \leq \alpha^*$

Cost of expansion:  $d = \gamma_2 \frac{1}{\rho}$  (3a)

Where it can be shown that  $\rho = \frac{\pi}{v}$

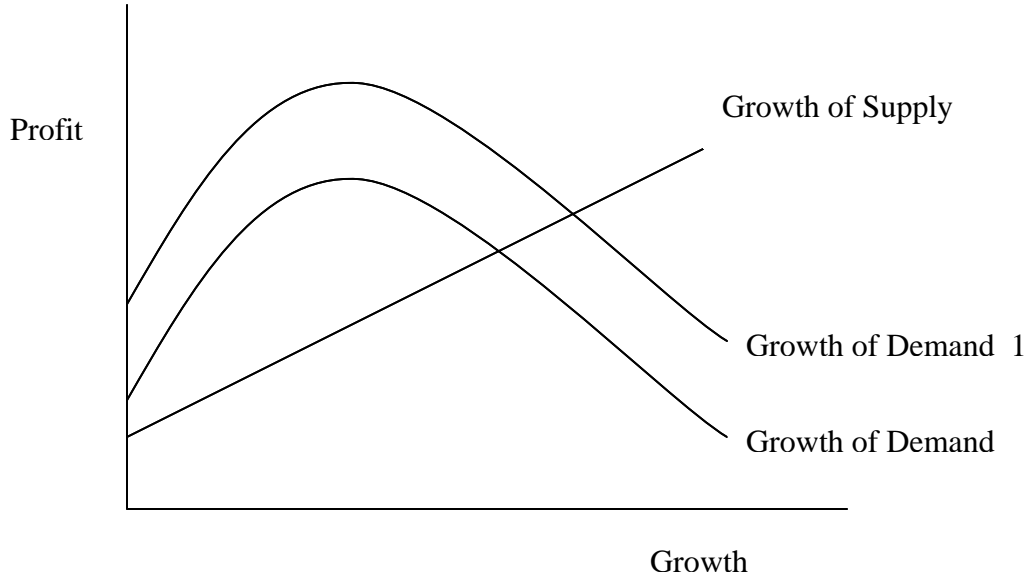
$$d = \gamma_2 \left( \frac{1}{\pi} v \right) \quad (3b)$$

The equilibrium point can be represented by Eq. 4

$$D_g = S_g \quad (4)$$

Substituting (3a) in (1)  $D_g = \gamma_3 \left( \frac{1}{\rho} \right)$  (5)

where  $D_g$  is the demand for growth,  $d^*$  is the rate of successful diversification,  $S_g$  supply of growth,  $I$  investment,  $K$  capital stock,  $\alpha$  the amount of new investment financed per unit of profit earned,  $\alpha^*$  the maximum value  $\alpha$  can take,  $\Pi$  Profits,  $\pi$  profit margin,  $v$  capital output ratio, and  $\rho$  is the profit rate.



- ◆ To achieve faster growth the firm must diversify into new products or new markets
- ◆ To do so requires innovation to create new products and marketing to promote them
- ◆ For international growth, it also requires linkages abroad.
- ◆ Firms can shift the growth – profit frontier
- ◆ The growth-profit frontier can also shift out because of factors in the business environment external to the firm, such as changes in government policies, national income growth, and shifts in technology.
- ◆ Firms can differ in the extent to which they take advantage of changes in the external business environment or become victims of the changes.

### **International Linkages: The Role of Alliances**

- ◆ The case for non-equity strategic alliances
- ◆ Alliances enable firms to gain access to complementary resources that are difficult to build organically
- ◆ Alliances enable firms to create value that cannot be achieved by either alliance partner acting alone
- ◆ Collaborations can result in technological innovation and the creation of new products and services via knowledge sharing
- ◆ For international growth, alliances allow firms to learn about foreign markets; they offer a shortcut for inexperienced firms to enter markets abroad
- ◆ They can be implemented quickly, which is especially important in a fast-growing and rapidly changing industry.
- ◆ Alliances facilitate exporting
- ◆ Avoid the need for outward foreign direct investment into markets abroad
- ◆ They do not require a large home market from which to launch growth abroad
- ◆ They are a mechanism by which the firm can acquire complementary resources

## **Data and Empirical Methods**

The data used in the empirical analysis come from original survey research conducted by the Confederation of Indian Industry (CII) for the International Finance Corporation. The sample size is 119 firms.

The sample design included all the medium-large firms and a random sample of the small firms. The response rate from software firms was 62%.

### **Dependent Variables**

- Sales revenue growth during the period 2001-2002
- Profit margin of firms in 2002 a gross profit/sales revenue

**Independent Variables** (all measured as of 2002 except where noted)

### **Management and Labour**

- Labour productivity – output/employment, \$/worker
- Managers' education – percent with post graduate degree – or experience – years of experience of top manager
- Entrepreneurial orientation – scale of three 5-point questions about top manager's perception of the company's emphasis on new processes, experimentation and alternative approaches to problem solving, and inclination to take on risky projects, obtained from factor analysis of five questions ( $\alpha = 0.781$ ).

### **Technology**

- Quality – binary variable with value = 1 if the firm has CMM certificate(s) and 0 if not
- Royalties or technology fees – binary variable with value = 2 if the company received royalties or technology fees from abroad in the last three years or value = 1 if not
- New products – number of new products introduced by the firm in the past year



### **International Linkages**

- Foreign non-equity strategic alliances – number of these alliances the company has
- Foreign ownership – share of foreign equity holding in total equity, percent
- Importance of non-residents' role – scale of the sum of four 5-point questions about the importance of benefits from access to capital, management practices, markets, and technology from non-residents (5 = very important to 1 = no benefit)

### **Control Variables**

- Firm size – sales revenue in 2001
- Age of the firm – number of years since founding
- Capital/labour ratio – fixed assets divided by employment in 2001
- Line of business – binary value with value = 1 if software services and value = 0 if products

When estimated using 2SLS, neither one of the endogenous variables was significant, so each was dropped, and the equations were re-estimated using ordinary least squares and SUR.

### Determinants of Revenue Growth and Profit Margin for Indian Software Firms

<i>Explanatory variable</i>	<i>Revenue Growth</i>		<i>Profit Margin</i>	
	OLS	SUR	OLS	SUR
<i>International linkages</i>				
Foreign alliances (number of non-equity strategic alliances)	1.925** 1.010	1.900** 0.957	0.960*** 0.360	0.983*** 0.341
Foreign ownership (% of equity)	0.279 0.187	0.274 0.178	0.071 0.069	0.070 0.065
Non-residents' role (access to markets, management, technology, capital)	-1.030 0.855	-0.952 0.810	0.819*** 0.309	0.828*** 0.293
<i>Technology</i>				
Royalties received (firm received royalties from abroad or not)			9.796* 5.295	9.344* 4.990
New products introduced (number of new products introduced)	2.252 2.475	2.135 2.334		
<i>Management and labor</i>				
Labor productivity (sales revenue per worker)	0.001*** <0.000	0.0007*** 0.0003	<0.000 <0.000	2.44E-05 9.67E-05
Managers' experience (for growth, yrs experience top manager) or education (for profits, % post-graduate degree)	2.130** 0.952	2.103** 0.898	0.022 0.064	0.014 0.060
Quality certification (firm has CMM or ISO certificates or not)	27.86* 16.58	29.86** 15.72		
<i>Controls</i>				
Size of firm (log of sales revenue in 2001)	-66.69*** 11.30	-66.69*** 10.68	-0.252 3.213	-0.295 3.038
Capital intensity (fixed assets/employment)	<0.000 <0.000	4.59E-07 2.08E-06	<0.000 <0.000	1.09E-06 2.54E-07
Age of firm (years since began operations)			-0.739** 0.359	-0.786*** 0.338
Constant	494.2*** 83.14	495.6*** 78.6	5.928 25.692	7.956 24.30
Adjusted R2	0.259	0.257	0.125	0.125
Sample size	104	104	97	97

Revenue growth is sales revenue in 2002 minus sales revenue in 2001 divided by sales revenue in 2001 Profit margin is gross profit divided by sales revenue in 2002

