



The model of innovative activity in US companies of IT sector

Speaker

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- Цель
- Что мы знаем об инновациях?
- Обзор
- Основные источники вдохновения
 - Innovation capital as factor in PF
 - Knowledge creation as gradual process
 - Неопределённость инноваций, запас знаний как «пул идей» для генерации прорывных новинок
 - Ненаблюдаемые цены + FDS
 - Absorptive capacity concept



Firms' optimization problem

Firm problem

$$\max V_t = E_t \left\{ \begin{aligned} &((1 - \tau_t)\pi_t(X) + \tau_t \hat{\delta}_t \hat{K}_{t-1} - p_t^I [I_t + i_1(K_t - K_{t-1})^2 + i_2 I_t \mathbb{I}_{I_t < 0}] + \\ &+(B_t - B_{t-1}) - (o_0 + o_1 O_t + o_2 O_t^2) \mathbb{I}_{O_t > 0} + \beta_t V_{t+1}) \end{aligned} \right\}$$

s.t. (liquidity condition)

$$CS_t = CS_{t-1} + (1 - \tau_t)\pi_t(X) + \tau_t \hat{\delta}_t \hat{K}_{t-1} - p_t^I [I_t + i_1(K_t - K_{t-1})^2 + i_2 I_t \mathbb{I}_{I_t < 0}] + (B_t - B_{t-1}) + O_t \geq 0$$

$$M_t, L_t, R_t, K_t, Y_t, P_t, B_t, O_t, A_t, CS_t \geq 0, \omega_t \in [0; 1]$$

$(1 - \tau_t)\pi_t(X)$ – book profit after taxes

$\tau_t \hat{\delta}_t \hat{K}_{t-1}$ – depreciation allowance

$p_t^I [I_t + i_1(K_t - K_{t-1})^2 + i_2 I_t \mathbb{I}_{I_t < 0}]$ – cash flow from investing activity (CFI)

$(B_t - B_{t-1})$ – increase in corporate debt

$(o_0 + o_1 O_t + o_2 O_t^2) \mathbb{I}_{O_t > 0}$ – private quadratic costs of equity holders connected with external equity financing O_t .



Firms' optimization problem

$$\pi_t(X) = P_t(X)Y_t(X) - p_t^M M_t - p_t^L L_t - p_t^R R_t - \hat{\delta}_t \hat{K}_{t-1} - r_t(X)B_{t-1} - A_t$$

$P_t(X)Y_t(X)$ – total firm sales

$P_t(X)$ – price level of goods sold

$Y_t(X)$ – quantity index of goods sold. IT companies produce a variety of heterogeneous products and we don't know the structure of their turnover.

$p_t^M M_t$ – nominal material costs

$p_t^L L_t$ – nominal labour costs

$p_t^R R_t$ – nominal investment in R&D

A_t – advertising costs.

Price indices p_t^M , p_t^L , p_t^R , p_t^I are assumed to be exogenous.

We distinguish between nominal \hat{K}_t and real K_t capital.

$$\hat{K}_t = (1 - \hat{\delta}_t)\hat{K}_{t-1} + p_t^I I_t$$

The interest rate r_t may vary reacting on firm-specific liquidity risk.

$$E(r_{t+1}(X)) = r_0 + r_1 \frac{B_t}{V_t} + r_2 \frac{\pi_t}{Y_t} + FE \text{ (time, sector)}$$



Solution

- Решение оптимизационной задачи для фирмы – по факторам (FOC)
 - Насколько разрешима задача
- SMM – численное решение, какие моменты брать?
 - Производственная функция
 - Уравнение спроса на рынке
 - Спрос на факторы (factor demand system)
 - Основные показатели (V , B/K , I/K)
- Как выбирать начальные параметры и разброс сетки (или метод градиентов?)



Labor & Related Expense Note	40	0,29%
Labor & Related Expense	350	2,52%
Employees Note	1237	8,92%
Total Foreign Sales	3415	24,62%
Goodwill	4087	29,47%
Advertising Expense	6248	45,05%
PP&E-Total Gross	11563	83,37%
R&D Expense	11574	83,45%
Debt - Current Portion	11750	84,72%
Employees	12799	92,28%
Total Current Assets	13639	98,34%
Total Current Liabilities	13684	98,67%
EBITDA	13777	99,34%
Interest Expense	13805	99,54%
Sales	13845	99,83%
Cost of Sales	13845	99,83%
SG&&A	13845	99,83%
Depreciation	13845	99,83%
PP&E	13864	99,96%
PP&E-Total Net	13864	99,96%
Intangibles	13866	99,98%
Total Assets	13868	99,99%
Total Long Term Debt	13868	99,99%
Total Stockholders' Equity	13869	100,00%

Internet Software & Services	174	15,9%
Application Software	146	13,3%
Telecommunications Equipment	133	12,1%
Electronic Equipment & Instruments	125	11,4%
Semiconductors	109	10,0%
IT Consulting & Services	67	6,1%
Data Processing & Outsourced Services	56	5,1%
Systems Software	56	5,1%
Computer Storage & Peripherals	55	5,0%
Semiconductor Equipment	50	4,6%
Electronic Manufacturing Services	46	4,2%
Technology Distributors	29	2,6%
Computer Hardware	20	1,8%
Home Entertainment Software	16	1,5%
Computers Software/Services	10	0,9%
Office Electronics	2	0,2%
Electronics (Instrument.)	1	0,1%

