

Growth Opportunities, Technology Shocks and Asset Prices: Evidence from China

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JULY 15 2010

Structure

- **Overview**
- **Theoretical Framework**
- **Analysis**
- **Conclusions**
- **Extensions**

Overview

- **Motivation**
 - We investigate the empirical relationship between **Stock Market Prices, Growth opportunities and Investments in China**
 - The relationship is an open question in finance, especially in emerging market economies
- **Goal**
 - Research relevant for the understanding of the issue
 - Policy implications for **China and other Emerging Economies**

Overview

- **Related work**

- **Market prices & Investments**

Wang, Wu and Yang (JBF 2009): Investments do not significantly respond to the stock market valuation since prices contain little extra information about the future performance

- **Investments & Growth**

Firth, Lin and Wong (JCF 2008): banks in China impose fewer restrictions on the capital investment of low growth firms

- **Market prices – Growth & Investments**

Kogan and Papanikolaou (AER 2010): firms with high growth opportunities show higher covariance of their stock returns with the investment specific productivity shock

Overview

- **Difference with related work and contributions of the paper**
 - **OPEN QUESTIONS:**
 - **The relationship between Investment & Stock Price in Emerging Market**
 - **The Efficiency of the Chinese Stock Market**
 - **Investment decisions in SOEs**
 - **Impact of fiscal stimulus package in China**
 - **METHODOLOGY:**
 - **Productivity shock mimic portfolio in Emerging economies**

Overview

- **Conclusions**
 - **Growth opportunities** in China can be measured as correlation to the Technology shock mimic portfolio
 - Some of the speculative activity in the Chinese Stock Market may be motivated by **fundamentals**
 - Efficient investments allocation at least for **no-strategic sectors**



Theoretical Framework

Stock prices & Investments

- Open question
- If the stock market is **EFFICIENT**: **POSITIVE**
- If the stock market is **INEFFICIENT**: **????**
- Different in different countries
 - **The Chinese stock market is really controversial**
 - Non tradable shares
[Beltratti, Bortolotti & Caccavaio]
 - Poor quality of listed firms
 - Policy risk associated with the market
[Allen et al. (2005); Chen and Zhou (2002)]
- **Wang et al. (2009) JBF**
 - The Chinese Stock Market does not play a significant information role for firm investment since prices contain very little information about firms' future performance (1995-2004)

Growth & Investments

- **Negative relation between Leverage & Investments**
- **In China this relation is controversial due to a State-Owned bank lending environment**
- **Distortion in the investment allocation**

- **Firth et al. (2008) JCF**
 - **The negative relation is weaker** because State owned bank in China impose fewer restrictions on the capital expenditure
 - **low growth firms**
 - **poorly performing firms**
 - **firms with greater state ownership**
 - **Analysis 1991-2004**

Stock Prices & Growth & Investments

- **Market value = Value of asset + GROWTH OPPORTUNITIES**



- **Determinants of Economic Growth: TECHN SHOCKS**
in the capital goods sector
[Greenwood et al. (1997); Fisher (2006)]



- **Shocks identified with the PRICE OF INVEST GOOD**



- **Historically investment prices and AGGREGATE INVESTMENT**
are negatively correlated both
at business cycle and lower frequency



- **If high growth firms STOCK RETURNS**
respond more to the investment specific productivity shocks
(z-shocks) [Kogan and Papanikolaou 2010]

IMC portfolio

- Z-shocks \Rightarrow \downarrow Price of inv goods \Rightarrow \uparrow Stock returns of inv goods
- Prices of investment goods only annual frequency
- Portfolio mimicking z-shocks: a zero-investment portfolio long the stocks of investment-good producers and short the stocks of consumption goods producers

$$\text{IMC} = \text{Returns inv goods} - \text{Returns cons goods}$$

- IMC betas are able to identify heterogeneity in firms' investment responses to z-shocks
- Only for **CONSUMPTION** goods producers, more **MARKET ORIENTED**

IMC betas

- **IMC betas** are able to identify heterogeneity in firms' investment responses to z-shocks (f=firms, t=year, w=week)

$$r_{ftw} = \alpha_{ft} + \beta_{ft}^{IMC} R_{tw}^{IMC} + \varepsilon_{ftw} \quad w = 1 \dots 52$$

- **High IMC betas** invest more on average
- **High IMC betas** response more to a positive investment shock
- **High IMC betas** tend to have
 - ↑ cash
 - ↑ sales growth
 - ↑ Tobin Q

$$i_{ft} = a_1 + \sum_{d=1}^3 a_d D(\beta_{f,t-1}^{IMC})_d + b_1 \tilde{R}_t^{IMC} - \sum_{d=1}^3 b_d D(\beta_{f,t-1}^{IMC}) * b_1 \tilde{R}_t^{IMC} + cX_{f,t-1} + y_t + u_t$$

Asset Prices

- **Cross sectional differences in the relative value of growth opportunities of firms lead to cross-sectional differences in their risk premia.**

$$R_{pt} - r_f = \alpha_p + \beta_{m,p} (R_{Mt} - r_f) + \varepsilon_{pt} \quad p = 1 \dots 10$$

$$R_{pt} - r_f = \alpha_p + \beta_{m,p} (R_{Mt} - r_f) + \beta_p^{IMC} (R_{It} - R_{Ct}) + \varepsilon_{pt} \quad p = 1 \dots 10$$

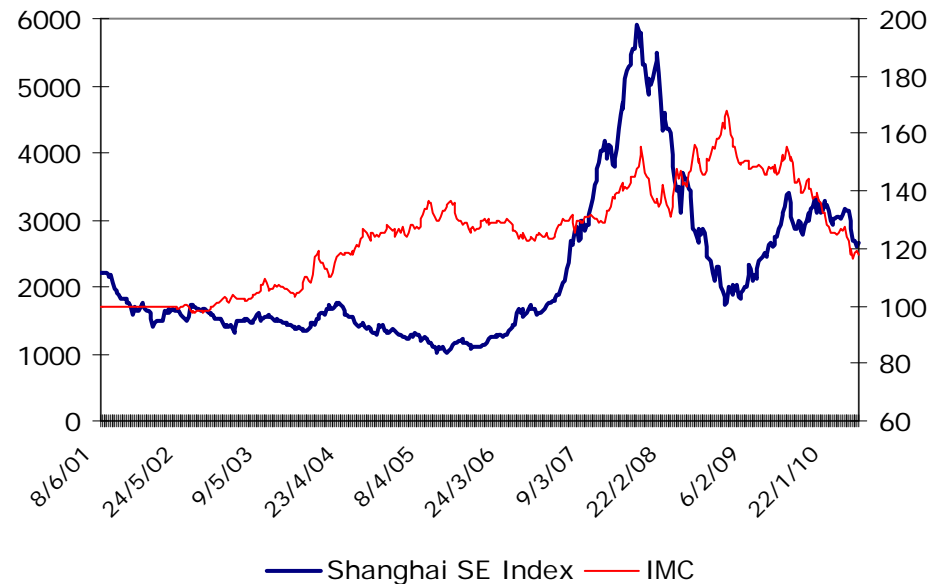
Analysis

IMC: Sectors

- **Summary statistics for the period: 2002-2009**
- **Investment sectors: Strategic Sectors and SOEs**

	CONSUMPTION				INVESTMENT			
	mean		10%	90%	mean		10%	90%
	ev	vw			ev	vw		
Total Asset	4,675		0.530	5.991	8,568	0	0.633	12.818
Leverage	0.312	0.269	0.062	0.513	0.318	0.292	0.076	0.534
Investment	0.059	0.063	0.006	0.136	0.068	0.085	0.003	0.169
Cash Flow	0.050	0.071	-0.040	0.148	0.050	0.084	-0.053	0.152
TobinQ	2.010	2.489	0.786	3.520	1.766	1.932	0.748	2.965
FL	0.592	0.613	0.310	1.000	0.572	0.574	0.300	1.000
SOS	0.388	0.400	0.088	0.650	0.440	0.470	0.138	0.680
Number	938				792			
Sectors	Automobiles & Parts Beverages Electronic & Electrical Equipm Food & Drug Retailers Food Producers General Industrials General Retailers Health Care Equipment & Servic Leisure Goods Personal Goods Pharmaceuticals & Biotechnolog Software & Computer Services Support Services Technology Hardware & Equipmen Travel & Leisure				Aerospace & Defense Alternative Energy Chemicals Construction & Materials Electricity Forestry & Paper Household Goods & Home Constru Industrial Engineering Industrial Transportation Media Mining Mobile Telecommunications Oil Equipment & Services Real Estate Investment & Servi			

IMC: Portfolio



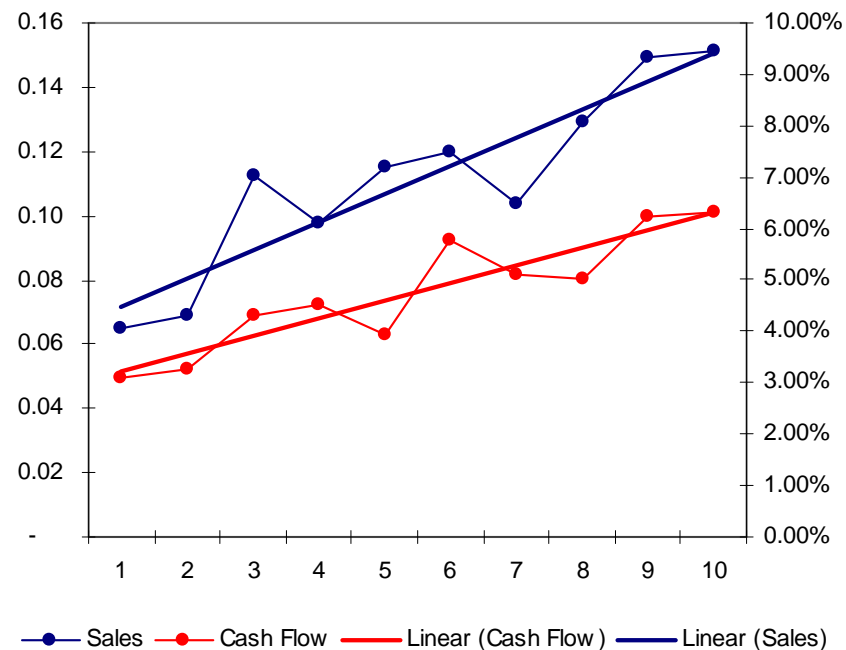
- **IMC = Returns investment goods – Returns consumption goods**
- **On 9 November 2008: stimulus package for 2009-2010 amounting to RMB 4 trn (USD 586 bn)**
 - **The real size of the package was far bigger (OECD estimates)**
 - **Main focus: infrastructure investment.**

IMC: betas (1/2)

- **IMC betas are able to identify heterogeneity in firms' investment responses to z-shocks (f=firms, t=year, w=week)**

$$r_{ftw} = \alpha_{ft} + \beta_{ft}^{IMC} R_{tw}^{IMC} + \varepsilon_{ftw} \quad w = 1 \dots 52$$

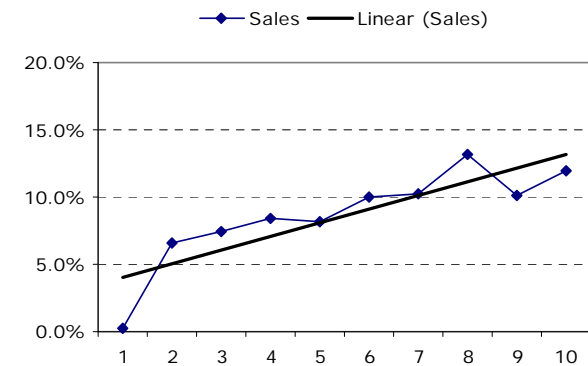
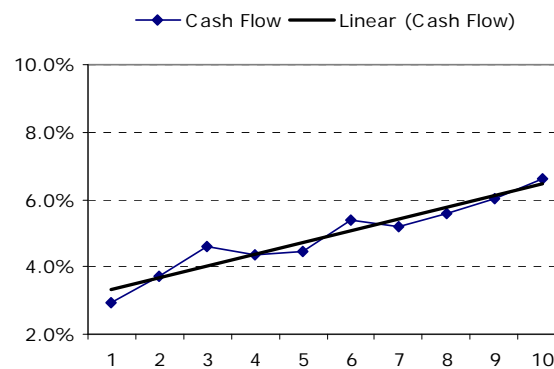
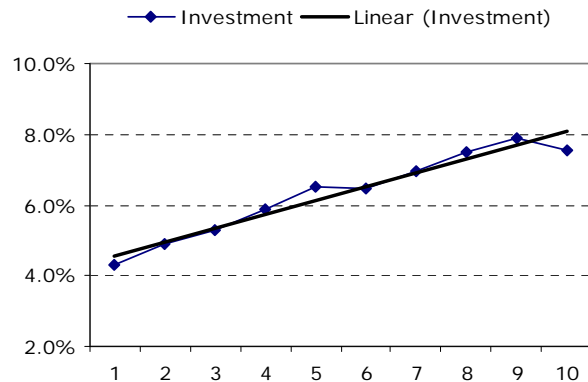
- **Comparing betas with standard measures of growth opportunities (Sales growth and Cash flow)**



IMC: betas (2/2)

- Summary statistics for firms in different betas deciles (Predicted)

PREDICTIVE	Total Asset	Leverage	Investment	Cash Flow	TobinQ	Sales	SOS	FLOAT	Beta_mkt
Beta_imc_low	1,951,546	41.46%	4.30%	2.92%	2.390	0%	37.1%	58.6%	0.97
2	1,754,872	35.88%	4.90%	3.72%	1.883	7%	39.7%	57.5%	0.96
3	2,154,323	34.59%	5.30%	4.58%	1.884	7%	35.9%	57.2%	0.94
4	2,489,014	31.75%	5.89%	4.33%	1.766	8%	39.7%	58.7%	0.95
5	2,628,908	28.87%	6.52%	4.48%	1.689	8%	38.5%	59.3%	0.93
6	2,291,736	31.81%	6.49%	5.40%	1.886	10%	37.7%	62.2%	0.92
7	2,645,653	32.54%	6.94%	5.18%	1.897	10%	38.1%	60.0%	0.91
8	3,373,888	28.88%	7.52%	5.59%	1.961	13%	37.6%	62.7%	0.86
9	3,268,307	32.85%	7.90%	6.01%	2.509	10%	37.0%	62.3%	0.86
Beta_imc_high	4,988,208	47.30%	7.55%	6.63%	2.550	12%	38.8%	63.9%	0.76

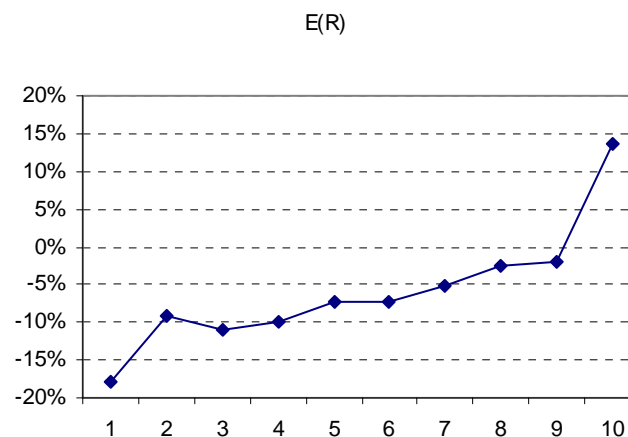


IMC: Asset Prices (1/2)

- **Cross sectional differences in the relative value of characteristic of firms lead to cross sectional differences in their risk premia**

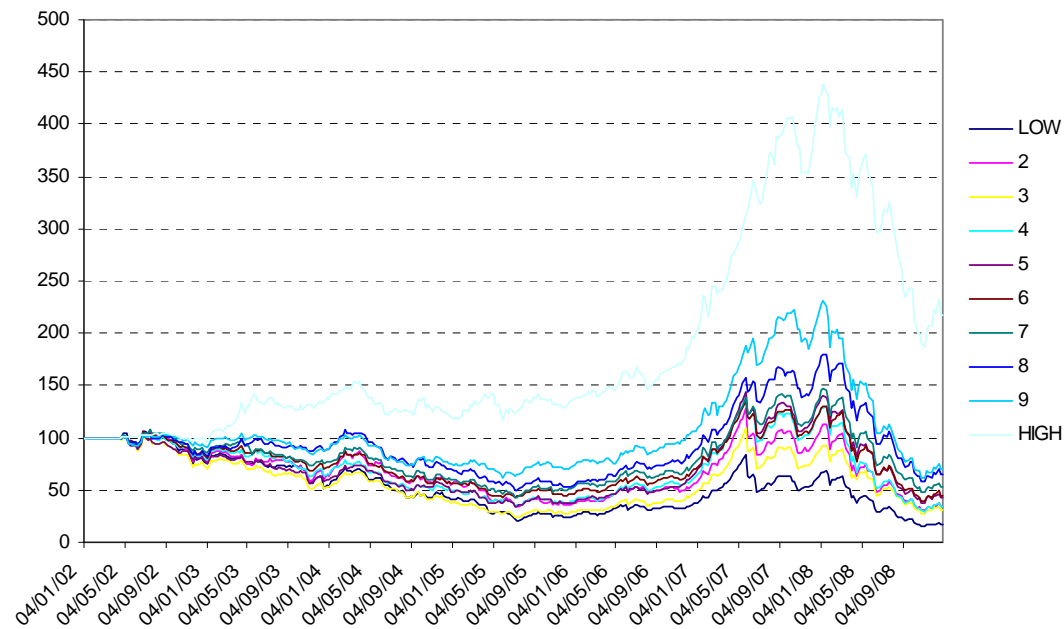
$$R_{pt} - r_f = \alpha_p + \beta_{m,p} (R_{Mt} - r_f) + \beta_p^{IMC} (R_{It} - R_{Ct}) + \varepsilon_{pt} \quad p = 1 \dots 10$$

	LOW	2	3	4	5	6	7	8	9	HIGH
E (R)	-17.87%	-9.06%	-10.97%	-9.89%	-7.16%	-7.22%	-5.25%	-2.55%	-1.90%	13.57%
Sigma	5.21%	4.91%	4.64%	4.49%	4.32%	4.04%	3.86%	3.76%	3.52%	3.16%
Sharpe	-3.43	-1.85	-2.36	-2.20	-1.66	-1.79	-1.36	-0.68	-0.54	4.30
B_mkt	1.35	1.33	1.28	1.26	1.23	1.17	1.11	1.13	1.05	0.88
alfa	0.06	0.05	0.05	0.04	0.04	0.04	0.04	0.03	0.03	0.03
R_2	59.72	65.82	67.52	70.17	72.16	74.77	74.40	80.50	79.68	69.97
B_mkt	1.12	1.15	1.11	1.10	1.09	1.05	1.01	1.05	0.99	0.88
B_IMC	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.03
alfa	-2.16	-1.81	-1.66	-1.52	-1.35	-1.21	-1.06	-0.81	-0.62	-0.05
R_2	0.08	0.08	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.08
alfa	-0.17	-0.04	-0.09	-0.09	-0.05	-0.07	-0.04	-0.02	-0.03	0.22
R_2	0.11	0.10	0.09	0.09	0.08	0.07	0.08	0.07	0.08	0.09
R_2	85.99	86.67	87.00	87.59	87.14	88.40	85.90	87.54	84.37	70.00



IMC: Asset Prices (2/2)

- **Cross sectional differences in the relative value of characteristic of firms lead to cross sectional differences in their risk premia**



	Beta_imc_low	2	3	4	Beta_imc_high
t-1					
Beta_imc_low	31.6%	22.3%	19.2%	16.2%	12.4%
2	21.3%	22.3%	21.3%	19.4%	14.1%
3	19.1%	23.6%	21.5%	19.7%	17.3%
4	17.0%	18.5%	21.1%	22.6%	20.5%
Beta_imc_high	11.0%	13.1%	16.9%	22.2%	35.7%

Dataset

Variable	Obs	Mean	Std. Dev.	Min	Max
Investment	3264	6.10%	0.08	0.00%	109.61%
Tertile1	3264	0.30	0.46	0	1
Tertile3	3264	0.30	0.46	0	1
Returns IMC	3264	8.36%	0.08	-3%	23%
Lagged Investment	3264	6.52%	0.08	0.00%	109.61%
Lagged Leverage	3264	30.36%	0.38	0.00%	1280.96%
Lagged Tobin Q	3264	1.91	1.58	0.05	31.15
Lagged Asset	3264	2.68	5.28	0.02	104.07
Lagged Cash	3264	4.9%	0.09	-62.69%	94.74%
Lagged Sale Growth	3264	1.08	0.33	-0.06	1.99

Correlations

	Investment	Tertile1	Tertile3	Returns IMC	Tertile1*Returns IMC	Tertile3*Returns IMC	Lagged Investment	Lagged Leverage	Lagged Tobin Q	Lagged Asset	Lagged Cash
Investment	1										
Tertile1	-0.12*	1									
Tertile3	0.12*	-0.43*	1								
Returns IMC	0.07*	-0.01	0.01	1							
Tertile1*Returns IMC	-0.09*	0.64*	-0.28*	0.41*	1						
Tertile3*Returns IMC	0.14*	-0.28*	0.65*	0.42*	-0.18*	1					
Lagged Investment	0.47*	-0.10*	0.12*	0.04	-0.07*	0.11*	1				
Lagged Leverage	-0.04	0.06*	-0.04	0.02	0.06*	-0.02	-0.02	1			
Lagged Tobin Q	0.07*	0.02	0.08*	0.05*	0.03	0.05*	-0.01	0.12*	1		
Lagged Asset	0.05*	-0.09*	0.13*	-0.06*	-0.09*	0.06*	0.06*	0.04	-0.14*	1	
Lagged Cash	0.19*	-0.09*	0.08*	-0.04	-0.11*	0.05*	0.17*	-0.04	0.09*	0.01	1
Lagged Sale Growth	0.05*	-0.06*	0.05*	-0.03	-0.05*	0.02	0.08*	-0.09*	-0.07*	0.04	0.06*

Cross section

$$i_{ft} = a_1 + \sum_{d=1}^3 a_d D(\beta_{f,t-1}^{IMC})_d + b_1 \tilde{R}_t^{IMC} - \sum_{d=1}^3 b_d D(\beta_{f,t-1}^{IMC}) * b_1 \tilde{R}_t^{IMC} + cX_{f,t-1} + y_t + u_t$$

	2003-2009 investment
Tertile1	-0.003 (0.004)
Tertile3	-0.002 (0.005)
Returns IMC	0.054** (0.021)
Tertile1*Returns IMC	-0.059** (0.030)
Tertile3*Returns IMC	0.073* (0.041)
Lagged Investment	0.438*** (0.031)
Lagged Leverage	-0.007*** (0.002)
Lagged Tobin Q	0.004*** (0.001)
Lagged Asset	0.000* (0.000)
Lagged Cash	0.088*** (0.020)
Lagged Sale Growth	0.003 (0.004)
Constant	0.016*** (0.005)
Observations	3264
R-squared	0.253

Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1
 Firms Fixed Effect
 Dummies Years Included

Conclusions

Conclusions

- **Growth opportunities** in China can be measured as correlation to the **IMC** portfolio
- some of the speculative activity in the shock market may be motivated by fundamentals
- Cross sectional differences in the relative value of **growth opportunities** of firms lead to cross-sectional differences in their risk premia and in their investment decisions
- **efficient allocation at least for the less strategic sectors**

Extensions

Extensions

- **Industry classification according to the NIPA Input-Output tables**
- **Fiscal Stimulus (Cross sectional prices reactions to the announcement of the stimulus package on November 2008)**
- **The role of State Owned Enterprises (SOEs) in Investment decisions**
- **The role of Corporate Governance in Investment decisions**
- **Can we build a measure of State Intervention?**
- **Robustness Analysis (Different estimation, only few sectors)**

Thank you for your attention!