Structural Risk Modelling- Indian Mergers Acquisitions

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Mergers & Acquisitions with A Risk Scoring Model of Probability of Successes or Failures

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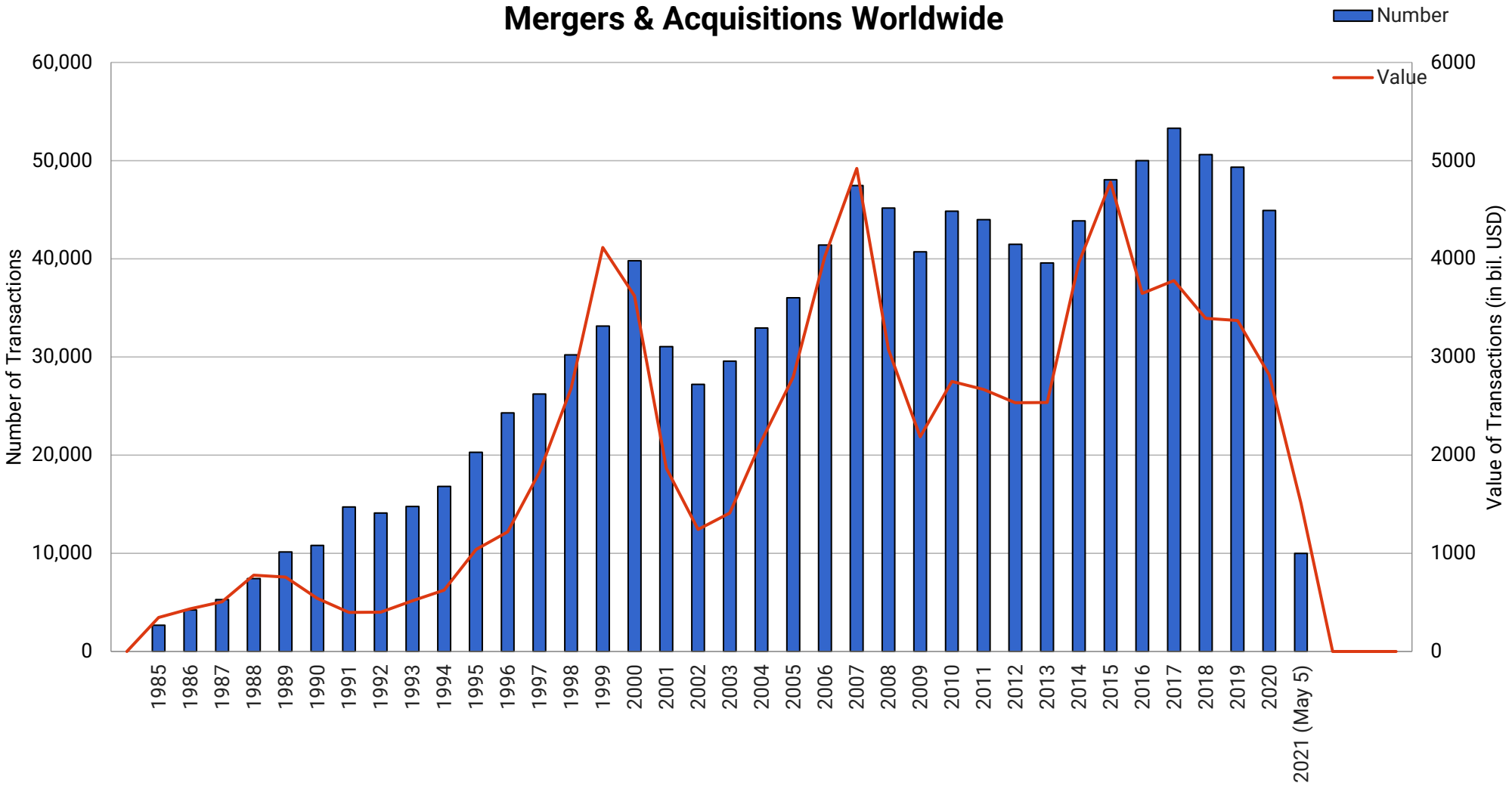


Fig 1: Worldwide Mergers and Acquisitions -Number of transactions and Value
Source: https://imaa-institute.org/mergers-and-acquisitions-statistics/

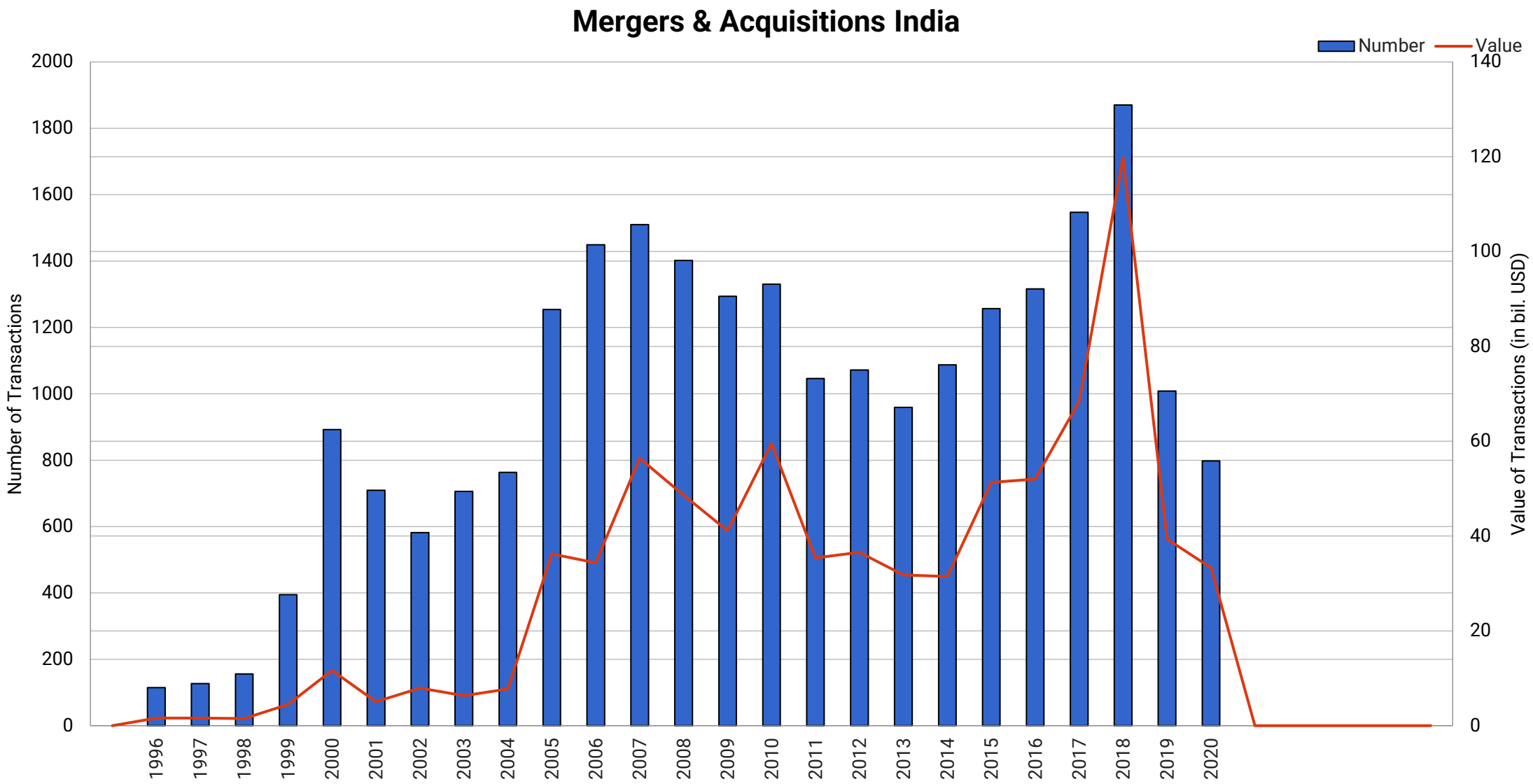


Fig 2- Trend in M&A transactions and Value
Source:https://imaa-institute.org/mergers-and-acquisitions-statistics/

Table 1: List of recent M& A transactions in Indian Context

Acquiror Name	Acquiror Mid Industry	Acquiror Nation	Target Name	Target Mid Industry	Target Nation	Value of Transaction ($mil)
Petrol Complex Pte Ltd	Oil & Gas	Singapore	Essar Oil Ltd	Oil & Gas	India	12,907.25
Vodafone Grp Plc	Wireless	United Kingdom	Hutchison Essar Ltd	Telecommunications Service	India	12,748.00
Vodafone Grp PLC-Vodafone Asts	Wireless	India	Idea Cellular Ltd-Mobile Bus	Wireless	India	11,627.32
Bharti Airtel Ltd	Wireless	India	MTN Group Ltd	Wireless	South Africa	11,387.52
Bharti Airtel Ltd	Wireless	India	Zain Africa BV	Wireless	Nigeria	10,700.00
BP PLC	Oil & Gas	United Kingdom	Reliance Industries Ltd-21 Oil	Oil & Gas	India	9,000.00
MTN Group Ltd	Wireless	South Africa	Bharti Airtel Ltd	Wireless	India	8,775.09
Shareholders	Other Financials	India	Reliance Inds Ltd-Telecom Bus	Telecommunications Service	India	8,063.01
Oil & Natural Gas Corp Ltd	Oil & Gas	India	Hindustan Petro Corp Ltd	Petrochemicals	India	5,784.20
Reliance Commun Ventures Ltd	Telecommunications S	India	Reliance Infocomm Ltd	Telecommunications Service	India	5,577.18
ONGC Videsh Ltd	Oil & Gas	India	NCOC BV	Oil & Gas	Kazakhstan	5,000.00
Aircel Ltd	Telecommunications S	India	Reliance Commun-Wireless Bus	Wireless	India	4,866.55
Investor Group	Other Financials	India	Republic of Venezuela-Carabobo	Oil & Gas	Venezuela	4,848.00
Vedanta Resources PLC	Metals & Mining	United Kingdom	Cairn India Ltd	Oil & Gas	India	4,541.90
Sesa Goa Ltd	Metals & Mining	India	Sterlite Industries(India)Ltd	Metals & Mining	India	3,910.81
Abbott Laboratories	Pharmaceuticals	United States	Piramal Healthcare Ltd-	Pharmaceuticals	India	3,712.86
Unilever PLC	Food and Beverage	United Kingdom	Hindustan Unilever Ltd	Household & Personal Prod	India	3,573.41
Daiichi Sankyo Co Ltd	Pharmaceuticals	Japan	Ranbaxy Laboratories Ltd	Pharmaceuticals	India	3,441.66
Vodafone Grp Plc	Wireless	United Kingdom	Hutchison Essar Ltd	Telecommunications Service	India	3,320.00
Sun Pharmaceutical Inds Ltd	Pharmaceuticals	India	Ranbaxy Laboratories Ltd	Pharmaceuticals	India	3,225.51
HDFC Standard Life Insurance	Insurance	India	Max Finl Svcs Ltd-Life Ins Bus	Insurance	India	3,193.59
Adani Transmission Ltd	Power	India	Reliance Infrastructure Ltd-Mu	Power	India	2,932.42
Grasim Industries Ltd	Paper & Forest Produ	India	Aditya Birla Nuvo Ltd	Other Financials	India	2,895.73
Investor Group	Other Financials	India	Sabiha Gokcen International	Transportation & Infrastructu	Turkey	2,656.40
NTT DOCOMO Inc	Telecommunications S	Japan	Tata Teleservices Ltd	Wireless	India	2,654.78
ONGC Videsh Ltd	Oil & Gas	India	Rovuma Offshore Area 1	Oil & Gas	Mozambique	2,640.00
Sterlite Industries(India)Ltd	Metals & Mining	India	ASARCO LLC	Metals & Mining	United State	2,565.00
Undisclosed SPV	Other Financials	India	Videocon Mozambique Rovuma 1	Oil & Gas	Mozambique	2,475.00
UltraTech Cement Ltd	Construction Materials	India	Jaiprakash Assoc Ltd-Cement	Construction Materials	India	2,409.73
Kotak Mahindra Bank Ltd	Banks	India	ING Vysya Bank Ltd	Banks	India	2,400.87
IndusInd Bank Ltd	Banks	India	Bharat Financial Inclusion Ltd	Credit Institutions	India	2,394.28
HDFC Bank Ltd	Banks	India	Centurion Bank of Punjab Ltd	Banks	India	2,386.62
Tata Motors Ltd	Automobiles & Compo	India	Jaguar Cars Ltd	Automobiles & Components	United Kingd	2,300.00
Apollo Tyres Ltd	Automobiles & Compo	India	Cooper Tire & Rubber Co	Automobiles & Components	United State	2,242.80
Vedanta Ltd	Metals & Mining	India	Cairn India Ltd	Oil & Gas	India	2,156.08
Reliance Industries Ltd	Oil & Gas	India	Reliance Industries Ltd	Oil & Gas	India	2,078.81
Infosys Ltd	IT Consulting & Servic	India	Infosys Ltd	IT Consulting & Services	India	2,027.61
ONGC Videsh Ltd	Oil & Gas	India	Akpo	Oil & Gas	Nigeria	2,000.00
AAA Project Ventures Pvt Ltd	Other Financials	India	Reliance Energy Ltd	Power	India	1,997.91
American Tower Corp	Wireless	United States	Viom Networks Ltd	Telecommunications Service	India	1,953.90
Mundra Port & Special Eco Zone	Transportation & Infra	India	Abbot Point Coal Terminal	Transportation & Infrastructu	Australia	1,950.84
Ratnagiri Gas & Power Pvt Ltd	Other Financials	India	Dabhol Power Co	Power	India	1,938.84
Ambuja Cements Ltd	Construction Materials	India	Holcim(India)Pvt Ltd	Construction Materials	India	1,921.93
Relay BV	Food and Beverage	Netherlands	United Spirits Ltd	Food and Beverage	India	1,900.86
Mylan Inc	Pharmaceuticals	United States	Agila Specialties Pvt Ltd	Pharmaceuticals	India	1,850.00
Investor Group	Other Financials	India	Housing Development Finance	Other Financials	India	1,745.83
Reliance Capital Ventures Ltd	Asset Management	India	Reliance Capital Ltd	Credit Institutions	India	1,743.80
The Indian Hotels Co Ltd	Hotels and Lodging	India	Orient-Express Hotels Ltd	Hotels and Lodging	Bermuda	1,740.69
Investor Group	Other Financials	Mauritius	Axis Bank Ltd	Banks	India	1,730.44
Wipro Ltd	IT Consulting & Servic	India	Wipro Ltd	IT Consulting & Services	India	1,712.04

https://imaa-institute.org/mergers-and-acquisitions-statistics/

M &A Risk Scoring Model

1. Financial X_1
2. Geographical – X_2
3. Technology – X_3
4. Leadership and management X_4
5. Macroeconomic X_5

1. Financial Synergy Factors

i) Nature of deal
ii) EV/EBITDA
iii) Valuation parameter used
iv) Current profit/Loss
v) Deal Value USD mln
vi) Share Price
vii) Revenue

3. Technology Synergy Factors

i. Current technology
ii. New Technology
iii. Adaptability
iv. Patents
v. R&D expenses required
vi. Replacement Cost
vii. Sustainability of technology
viii. Environment factors/risks
ix. Lifespan of technology

2. Geography synergy factors

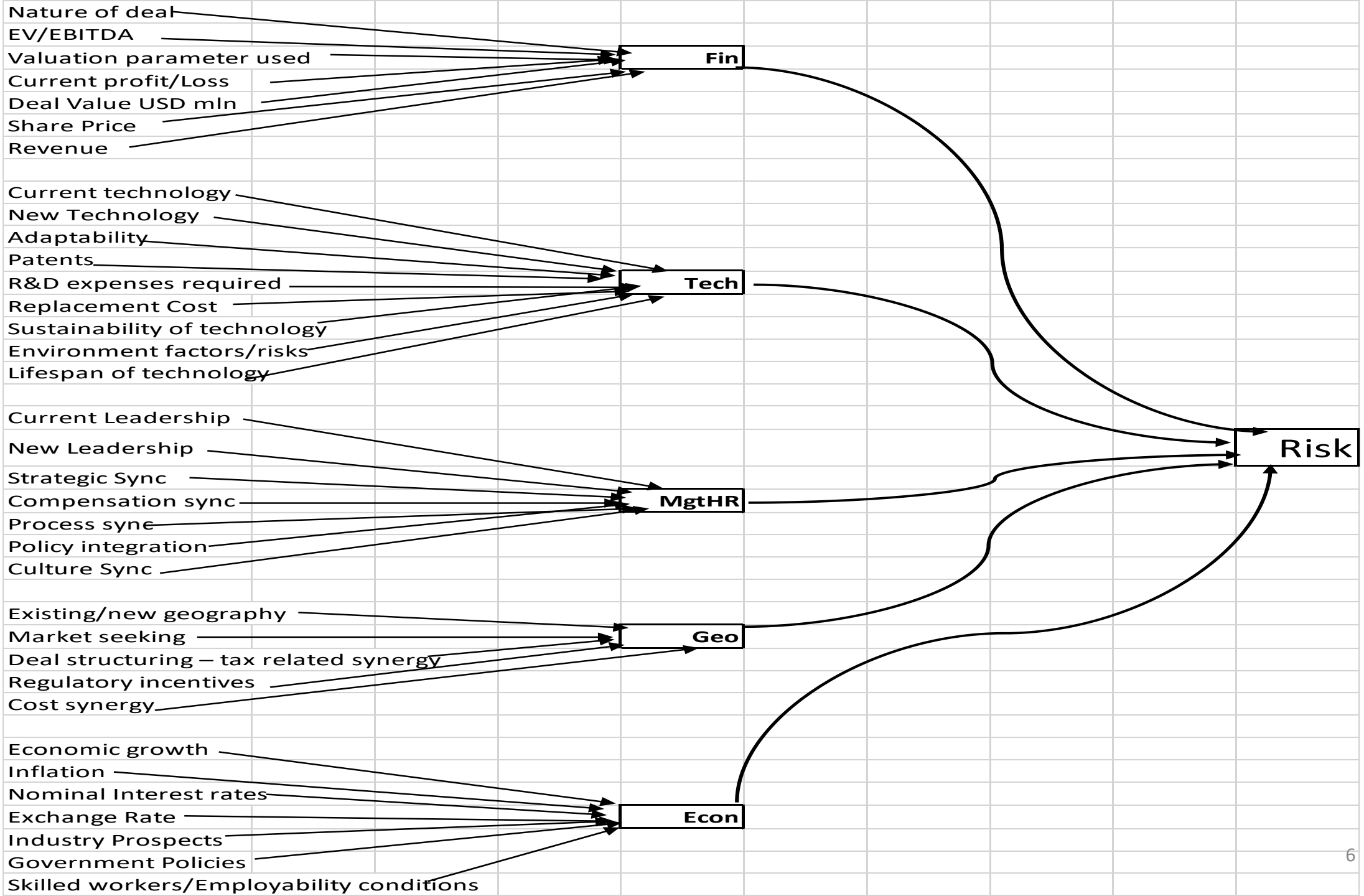
i. Existing/new geography
ii. Market seeking
iii. Deal structuring – tax related synergy
iv. Regulatory incentives
v. Cost synergy

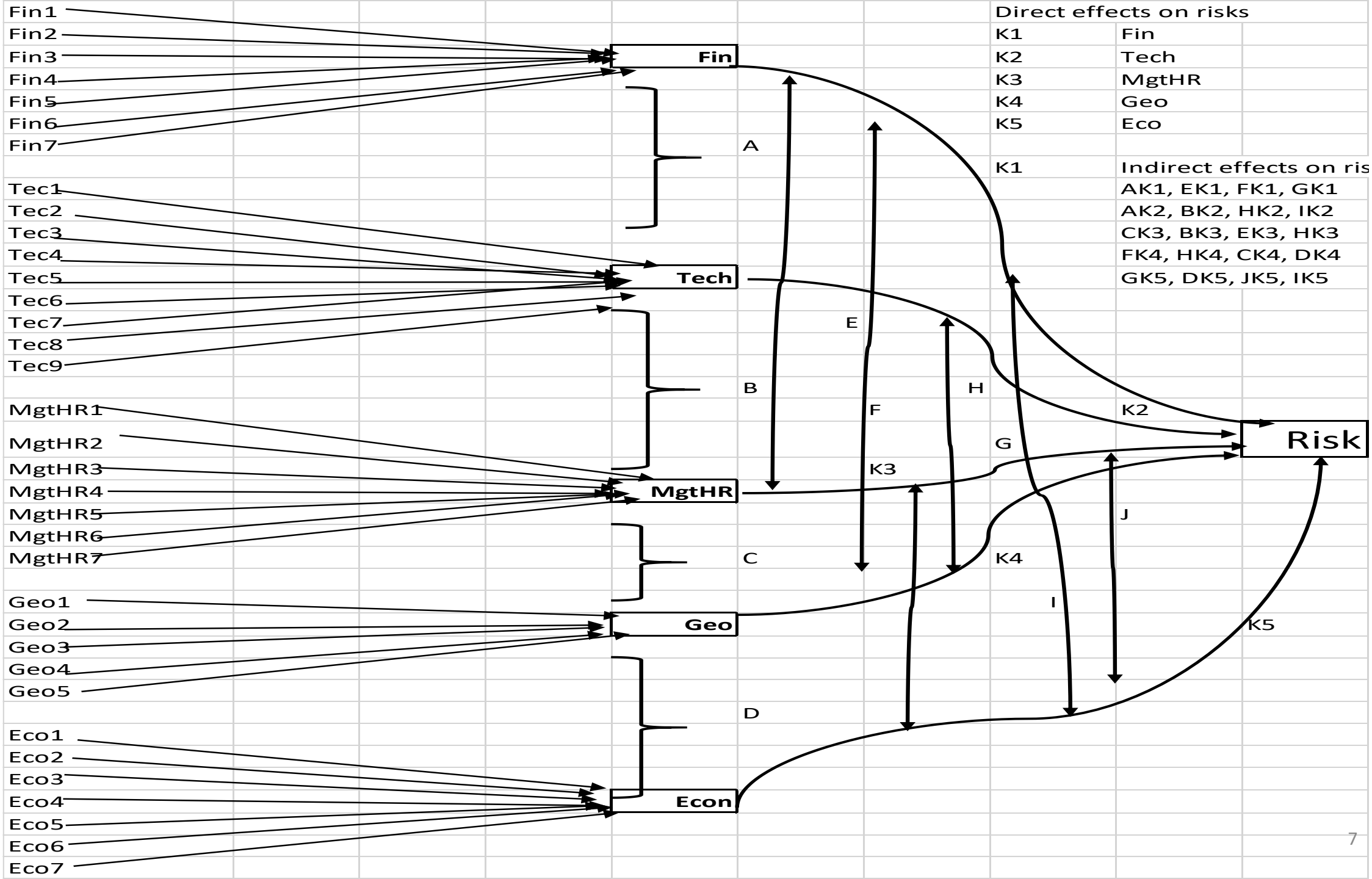
5. Management / Leadership synergy Factors

i. Current Leadership
ii. New Leadership
iii. Strategic Sync
iv. Compensation sync
v. Process sync
vi. Policy integration
vii. Culture Sync

1. Macroeconomic synergy factors

i. Economic growth
ii. Inflation
iii. Nominal Interest rates
iv. Exchange Rate
v. Industry Prospects
vi. Government Policies
vii. Skilled workers/Employability conditions


Nature of deal
EV/EBITDA
Valuation parameter used
Current profit/Loss
Deal Value USD mln
Share Price
Revenue
Fin
Current technology
New Technology
Adaptability
Patents
R&D expenses required
Replacement Cost
Sustainability of technology
Environment factors/risks
Lifespan of technology
Tech
Current Leadership
New Leadership
Strategic Sync
Compensation sync
Process syne
Policy integration
Culture Sync
MgtHR
Existing/new geography
Market seeking
Deal structuring – tax related synergy
Regulatory incentives
Cost synergy
Geo
Economic growth
Inflation
Nominal Interest rates
Exchange Rate
Industry Prospects
Government Policies
Skilled workers/Employability conditions
Econ
Risk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MgtHR4
MgtHR5
MgtHR6
MgtHR7
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K1 Fin
K2 Tech
K3 MgtHR
K4 Geo
K5 Eco
K1 Indirect effects on ris
AK1, EK1, FK1, GK1
AK2, BK2, HK2, IK2
CK3, BK3, EK3, HK3
FK4, HK4, CK4, DK4
GK5, DK5, JK5, IK5

Review of the Literature on M&A

- Leibenstein, H. (1966) on allocative efficiency vs. "X-Efficiency" in explaining advantages of merger
- Farrell, J., & Shapiro, C. (1990)
- Jensen, M. (1986)
- Shleifer, A. and Vishny, R.W., (2003)
- Harford, 2005
- Hazelkorn, T., Zenner, M. and Shivdasani, A., 2004
- Tirole and Jean,1988.
- Orefice, G., Sly, N. and Toubal, F., 2021
- Carril Caccia, F. and Pavlova, E., 2020
- Leepsa, N.M. and Mishra, C.S., 2013
- Eaton, G.W., Liu, T. and Officer, M.S., 2019
- Kim, D.H., 2010
- Roll (1986)
- Cirjevskis, A., 2015
- Ghosh,S. Leverage (2008)
- King, D., Dalton, D. R., Daily, C. M. & Covin, J. G. (2004)
- Xia, J., Tan, J. and Tan, D., 2008
- John H. Dunning (1980)
- Devra L. Golbe and Lawrence J. White (1988)
- Mark L. Mitchell and J. Harold Mulherin (1996)
- Mark J. Epstein (2005)
- Scott Moeller, *et al* (2012)
- Ellis, S., Sharma, S. and Brzeszczyński, J., 2022.

- Vincenzo Aliberti (1998)
- David Floyd (2003)
- Julian di Giovanni (2005)
- Travlos (1987)
- Beitel, P., Schiereck, D., &Wahrenburg, M (2004)
- Hirshleifer, D., 1995
- Kyriazis (2010)
- , Ouyang, W., & Hilsenrath, P (2017)
- Delistingee, S., & Deisting, F. (2012)
- Vazirani (2012)
- Weaver, S., Harris, R., Bielinski, D., &MacKenzie, K. (1991)
- Kim, D.H., 2010
- Roll (1986)
- Cirjevskis, A., 201
- . Ghosh,S. Leverage (2008)
- King, D., Dalton, D. R., Daily, C. M. &Covin, J. G. (2004)
- Xia, J., Tan, J. and Tan, D., 200
- John H. Dunning (1980)
- Marina Martynova, SjoerdOosting and Luc Renneboog (2006)
- John O. Nigh and Marco Boschetti (2006)
- Agyenim Boateng, Xiuping Hua, Moshfique Uddin and Min Du (2014)
- Bhargavi J *et al* (2016)

Composite financial index is constructed from 7 financial factors such as Nature of deal, EV/EBITDA

Valuation parameter used, Current profit/Loss , Deal Value USD mln, Share Price and Revenue as:

$$Fin = \sum_{i=1}^{7} \varphi_i Fin_i \qquad (1)$$

Composite Tech index is constructed from 9 technical factors such as Current technology, New Technology, Adaptability, Patents, R&D expenses required, Replacement Cost, Sustainability of technology, Environment factors/risks, Lifespan of technology such as:

$$Tech = \sum_{i=1}^{9} \tau_i Tec_i \qquad (2)$$

Composite management and leadership index is constructed from 7 management and leadership factors such as Current Leadership, New Leadership, Strategic Sync, Compensation sync, Process sync, Policy integration, Culture Sync:

$$MgtHR = \sum_{i=1}^{7} \mu_i MgtHR_i \quad (3)$$

Composite geographical index is constructed from 5 geographical factors Existing/new geography,
Market seeking, Deal structuring – tax related synergy, Regulatory incentives, Cost synergy

$$Geo = \sum_{i=1}^{5} \gamma_i Geo_i \quad (4)$$

Composite economic index is constructed from 7 macroeconomics factors such as Economic growth
Inflation, Nominal Interest rates , Exchange Rate, Industry Prospects, Government Policies, Skilled workers/Employability conditions

$$Eco = \sum_{i=1}^{7} \epsilon_i Eco_i \quad (5)$$

Then risk is modeled as a latent factor from above five composite factors representing micro and macro-economic factors that firms face in the economy.

The SEM model equations to derive the direct effect can be explained as follows:

$$K_1 + A.K_1 + E.K_1 + F.K_1 + G.K_1 = Fin.R \quad (6)$$

$$AK_2 + K_2 + B.K_2 + H.K_2 + I.K_2 = Tech.R \quad (7)$$

$$CK_3 + B.K_3 + K_3 + E.K_3 + H.K_3 = MgtHR.R \quad (8)$$

$$F.K_4 + H.K_4 + C.K_4 + K_4 + D.K_4 = Geo.R \quad (9)$$

$$G.K_5 + D.K_5 + J.K_5 + I.K_5 + K_5 = Eco.R \quad (10)$$

$$\begin{bmatrix} 1 & A & E & F & G \\ A & 1 & B & H & I \\ C & B & I & E & H \\ F & H & C & I & D \\ G & D & J & I & 1 \end{bmatrix} \begin{bmatrix} K_1 \\ K_2 \\ K_3 \\ K_4 \\ K_5 \end{bmatrix} = \begin{bmatrix} Fin.R \\ Tech.R \\ MgtHR.R \\ Geo.R \\ Eco.R \end{bmatrix} \quad (11)$$

Solution

$$\begin{bmatrix} K_1 \\ K_2 \\ K_3 \\ K_4 \\ K_5 \end{bmatrix} = \begin{bmatrix} 1 & A & E & F & G \\ A & 1 & B & H & I \\ C & B & I & E & H \\ F & H & C & I & D \\ G & D & J & I & 1 \end{bmatrix}^{-1} \begin{bmatrix} Fin.R \\ Tech.R \\ MgtHR.R \\ Geo.R \\ Eco.R \end{bmatrix} \quad (12)$$

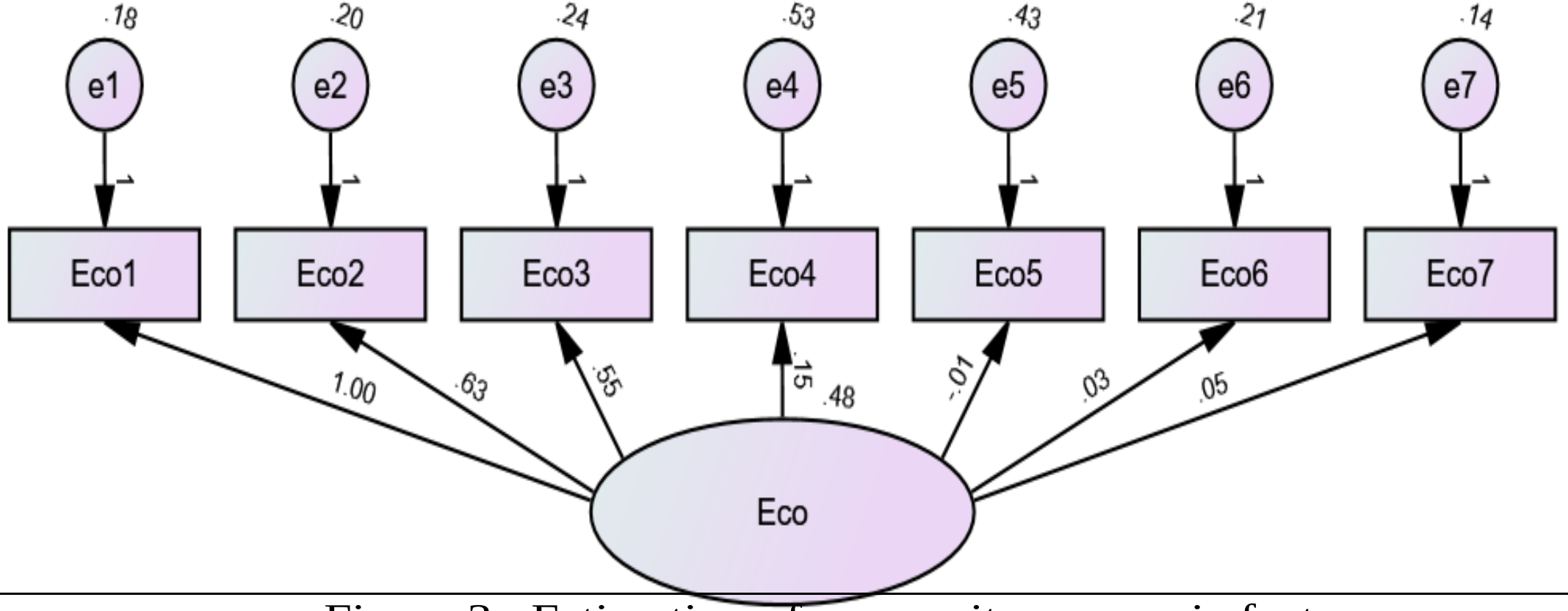


Figure 3: Estimation of composite economic factor

Macro-economy factors include Economic growth, Inflation, Nominal Interest rates, Exchange Rate, Industry Prospects, Government Policies, Skilled workers/Employability conditions. The estimated coefficient in the path diagram give relative importance of each these economic factors and external errors.

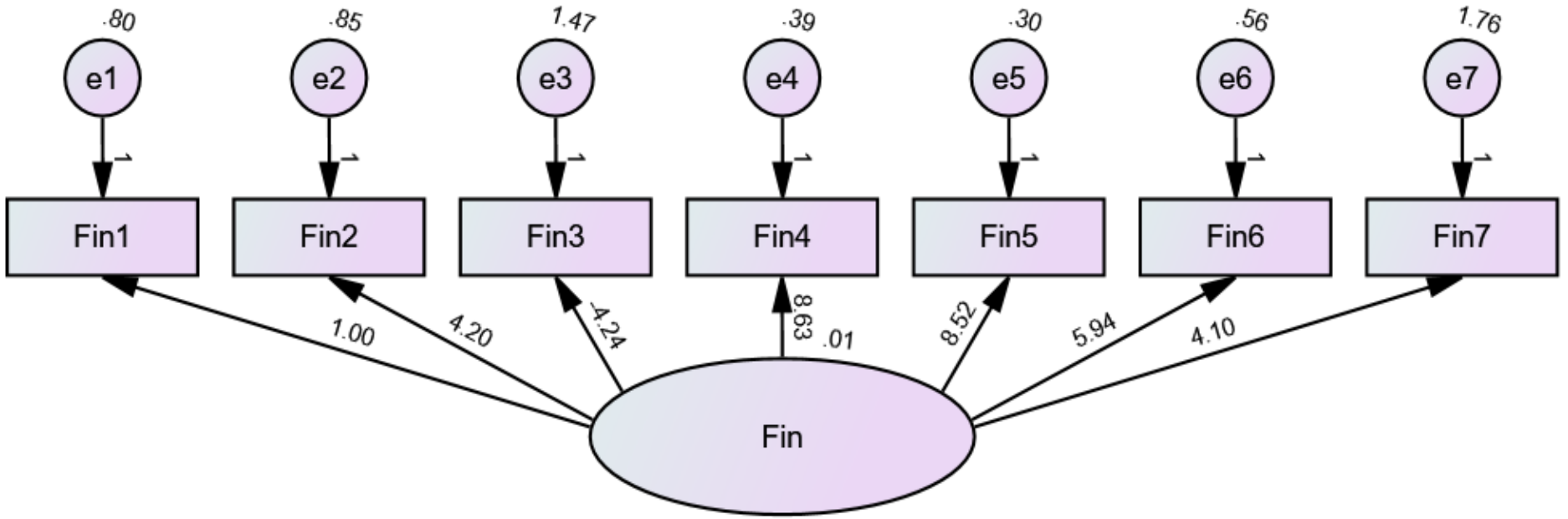


Figure 4: Estimation of composite financial factor

Finance include Nature of deal, EV/EBITDA, Valuation parameter used, Current profit/Loss, Deal Value USD mln, Share Price, Revenue. The estimated coefficient give relative importance of each these factor for finance.

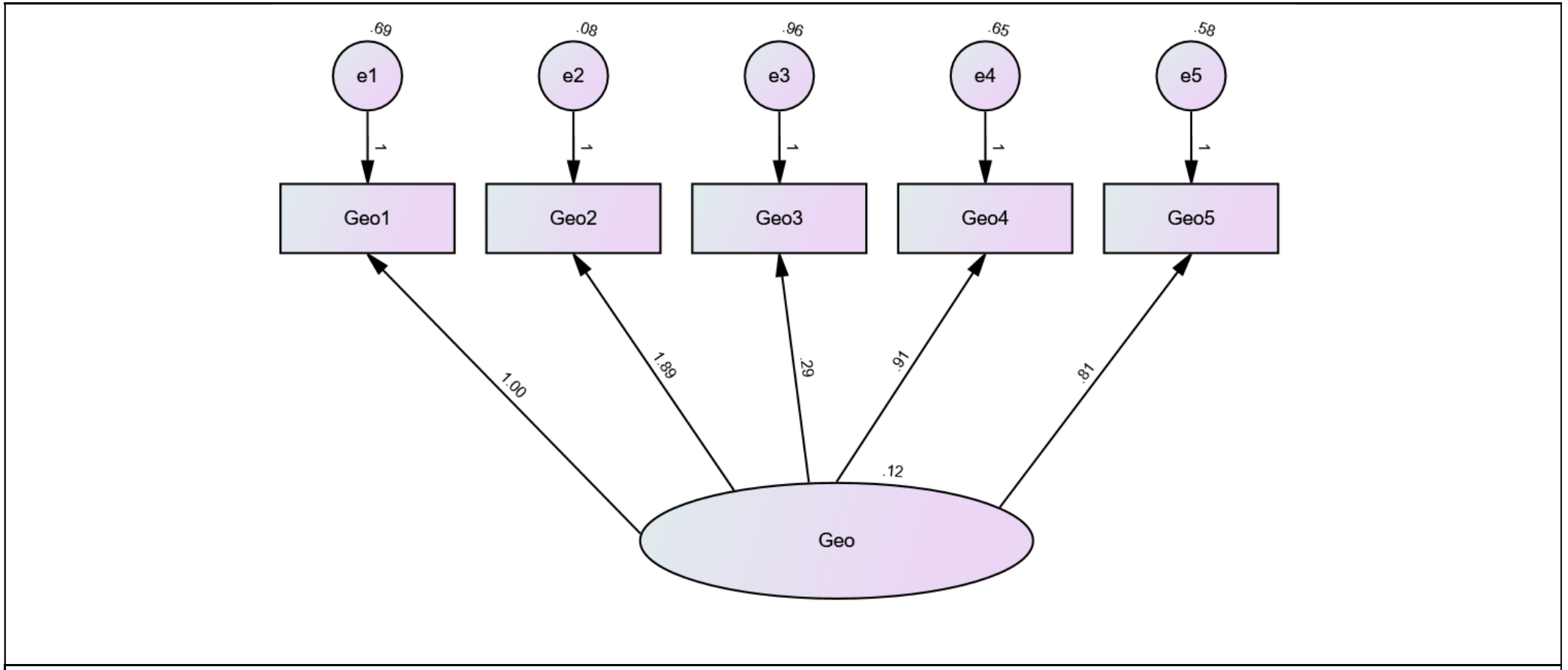


Figure 5: Estimation of composite geographic factor

Geographical factors include Existing/new geography, Market seeking Deal structuring – tax related synergy, Regulatory incentives and Cost synergy. The estimated coefficient in the path diagram give relative importance of each these geographic factors and external errors

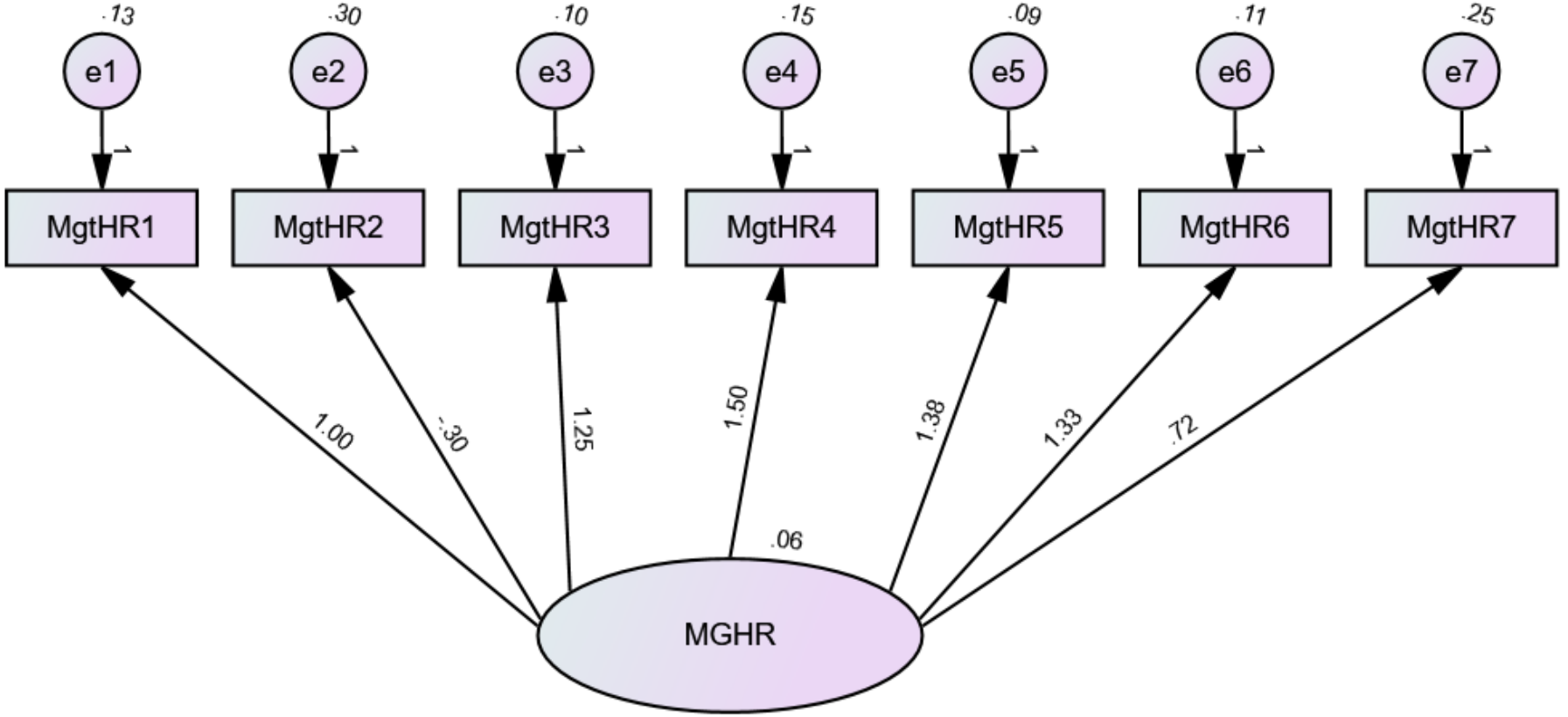


Figure 6 : Estimation of composite management and human resource factor

Management-Leadership factors include Current Leadership, New Leadership, Strategic Sync, Compensation sync, Process sync, Policy integration and Culture Sync. The estimated coefficient in the path diagram give relative importance of each these management and human resource factors and external errors

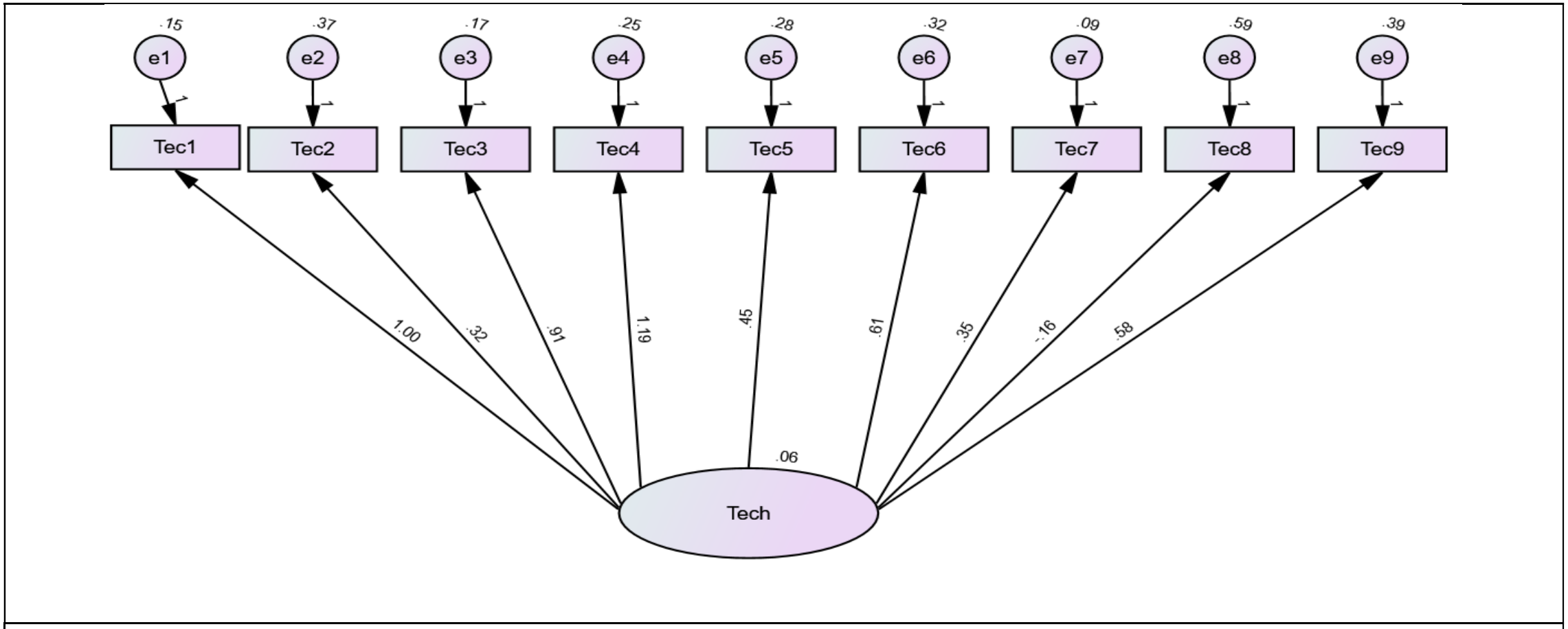


Figure 7: Estimation of composite technology factor

Technology factors include Current technology, New Technology Adaptability, Patents, R&D expenses required, Replacement Cost, Sustainability of technology, Environment factors/risks, Lifespan of technology. The estimated coefficient in the path diagram give relative importance of each these technology factors and external errors

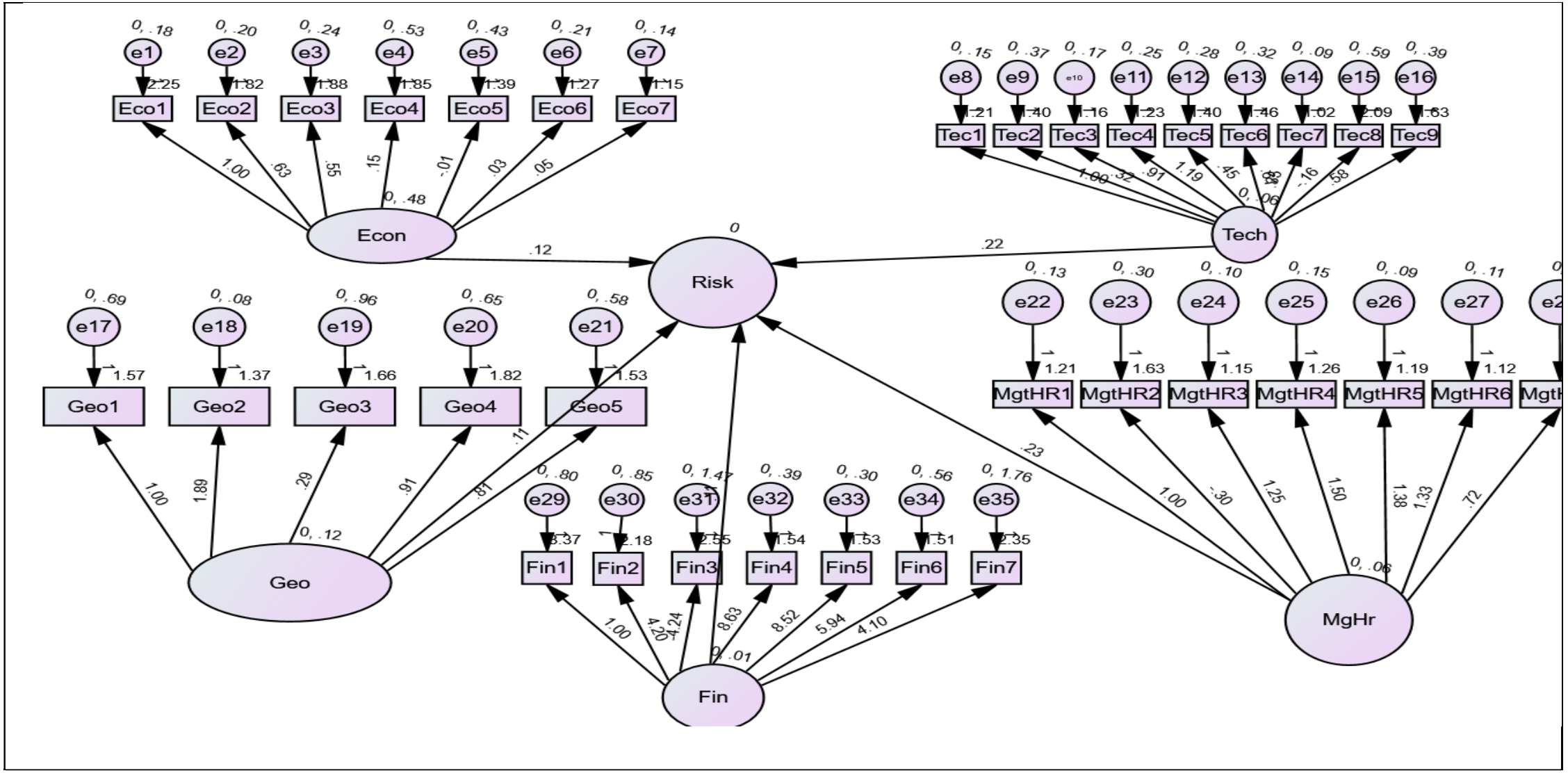


Figure 8 : Risk as composite of economics, financial, geographic, technological, management and human resources in integrated structural equation model

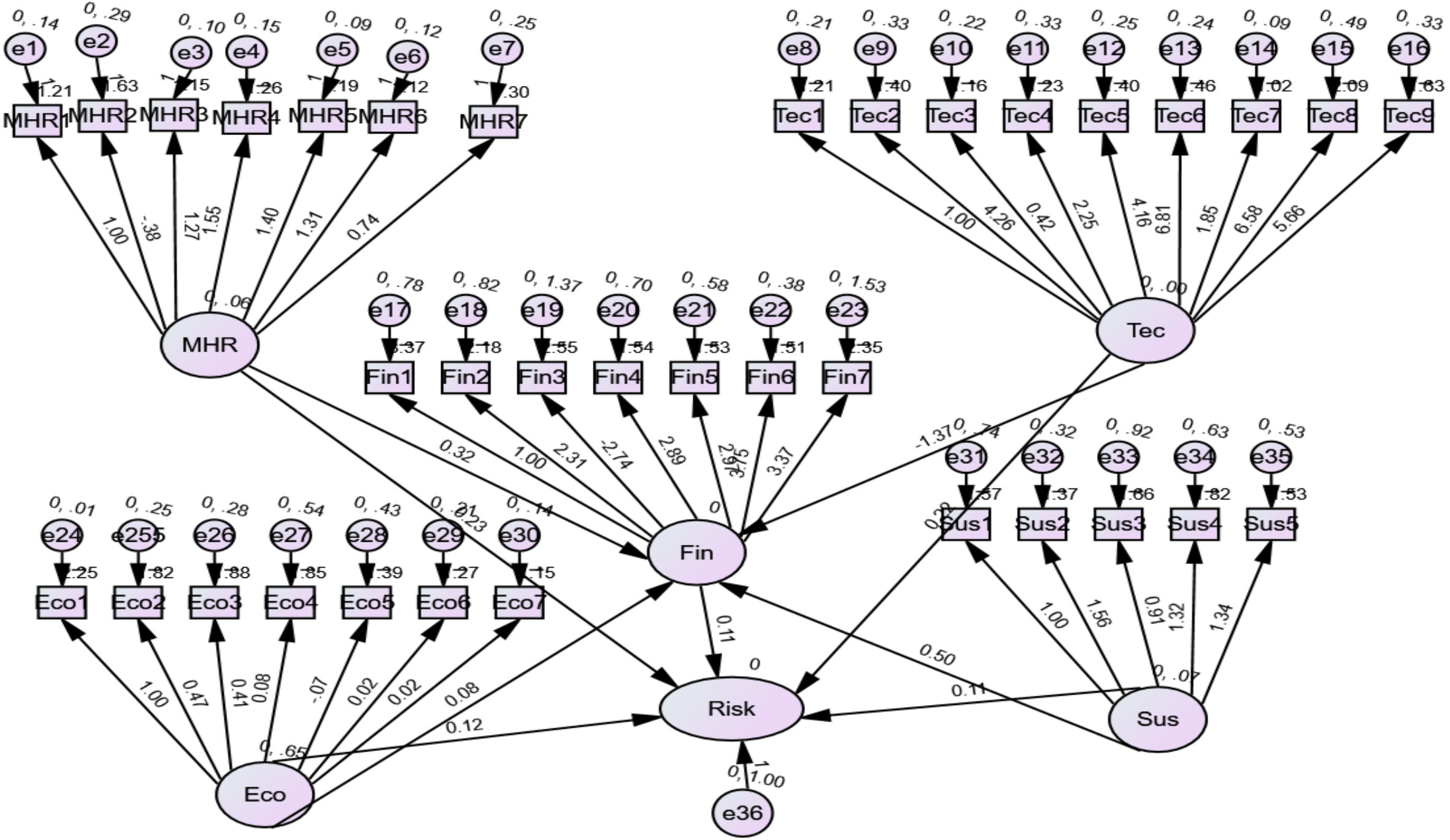
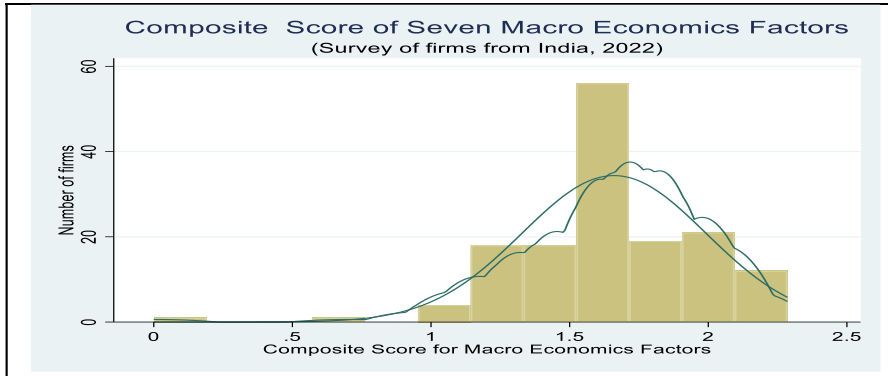
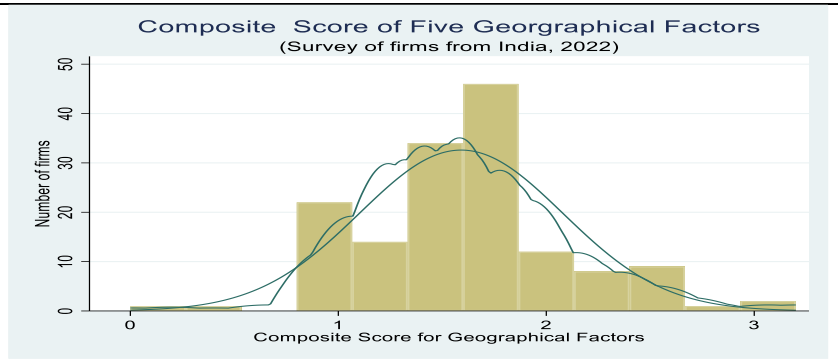
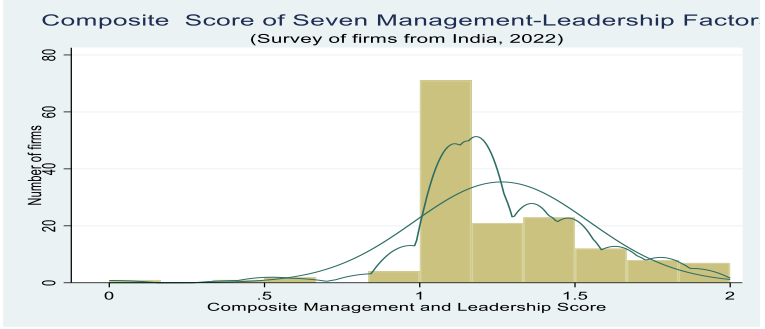
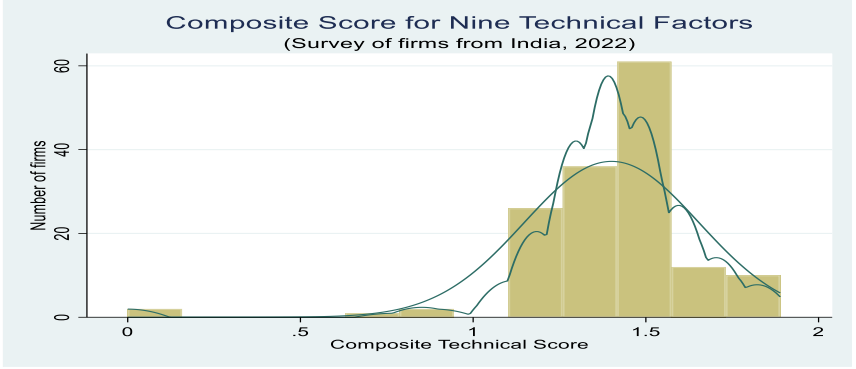


Figure 9 : Risk as composite of economics, financial, sustainability, technological, management and human resources in integrated structural equation model









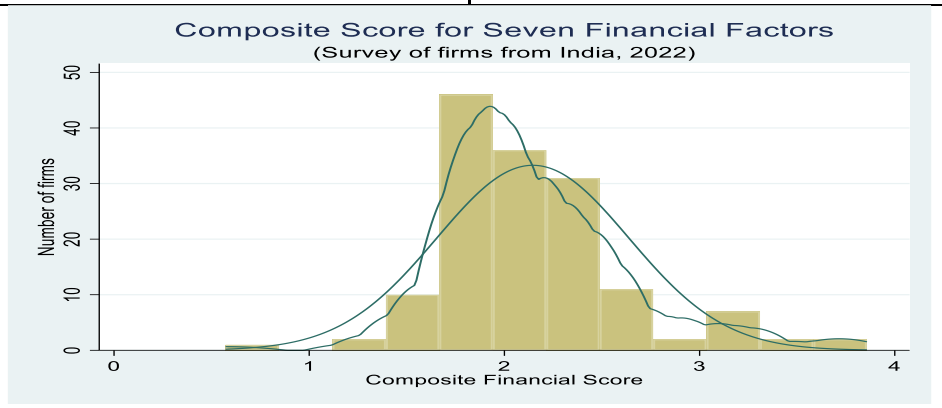


Figure 9: Distribution of composite indices constructed from the survey

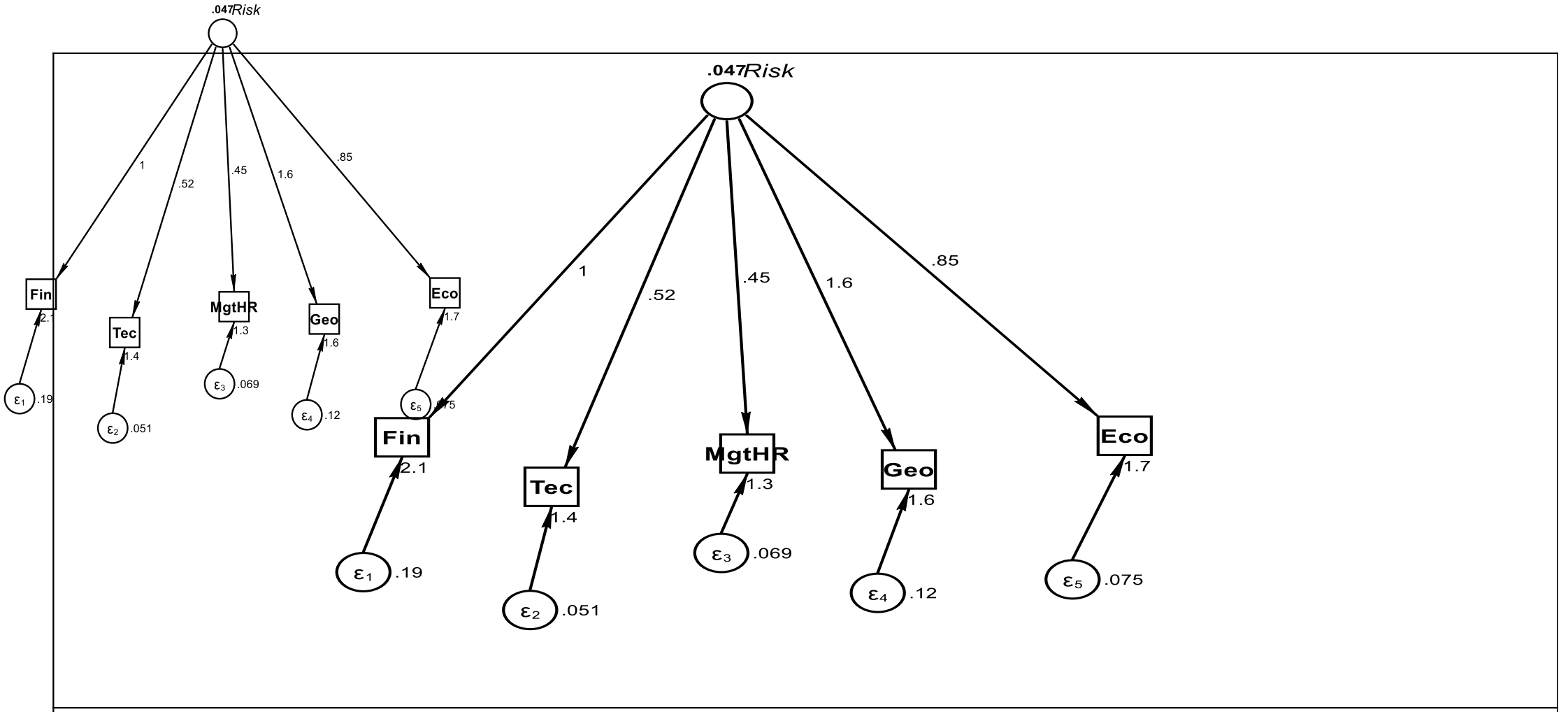


Figure 10: Risk scoring from the composite factors

Estimated risk equation for a multinational corporation considering M&A deal is estimated to be

$$Risk_i = 0.44\,Fin_i + 0.45Tech_i + 0.35MgtHR_i + 0.69Geo_i + 0.56Eco_i$$

Allocation of Grades

- AAA – Score 71 and above - Probability of success is high
- AA – Score 65-70 - Probability of success is moderate
- BBB – Score 60-64 - Probability of success is Low
- BB – Score 55-59 – Above average
- CCC – Score 50-54 – Below average
- CC - Score 45-49
- Score of 44 and below
- UR – kept on review
- UR+ – scope for improvement
- UR- - scope for improvement is low

Panel data regression model of number of mergers

- Number of mergers (N_{it}) for country *i* at time *t* depends on economic variables including the growth rate (GR), inflation (infl) FDI inflows (FDI) and outflows (FDO) and corporate tax (CT) and institutional variables including government effectiveness (GE), control of corruption (CC), political stability (PS), Rule of Law (RL), regulatory quality (RQ), and voice accountability (VA).

$$N_{it} = \alpha_i + \beta^X X^F_{i,t} + \beta^I INS^I_{i,t} + \mu_i(X_{it} \times INS_{it}) + \lambda_t + e_{it} \quad (1)$$

- In greater details this means

$$N_{it} = \beta_0 + \beta_1 GR_{it} + \beta_2 Inf_{it} + \beta_3 FDI_{it} + \beta_4 FDO_{it} + \beta_5 CT_{it} + \beta_6 GE_{it} + \beta_7 CC_{it} + \beta_8 PS_{it} + \beta_9 RL_{it} + \beta_{10} RQ_{it} + \beta_{11} VA_{it} + \mu_i(X_{it} \times INS_{it}) + \lambda_t + e_{it} \quad (2)$$

- Value of mergers (V_{it}) for country *i* at time *t* depends on economic variables including the growth rate (GR), inflation (infl) FDI inflows (FDI) and outflows (FDO) and corporate tax (CT) and institutional variables including government effectiveness (GE), control of corruption (CC), political stability (PS), Rule of Law (RL), regulatory quality (RQ), and voice accountability (VA).

$$V_{it} = \beta_0 + \beta_1 GR_{it} + \beta_2 Inf_{it} + \beta_3 FDI_{it} + \beta_4 FDO_{it} + \beta_5 CT_{it} + \beta_6 GE_{it} + \beta_7 CC_{it} + \beta_8 PS_{it} + \beta_9 RL_{it} + \beta_{10} RQ_{it} + \beta_{11} VA_{it} + \mu_i(X_{it} \times INS_{it}) + \lambda_t + e_{it} \quad (3)$$

- we expect $\beta_1 \beta_3$ to be positive and β_2 and β_4 to be negative. Then institutional variables are expected to have positive impacts, thus β_6 to β_{11} to be positive. The interaction variables can be positive or negative. The effect of time is measured by λ_t.

Motivations for Merger & Acquisitions

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- Motivations and modalities of merger vary across countries.
- Good economic environment at home and the strong institutions are important for prosperity of business.
- Healthy companies merge if that contributes to the profit or sales maximization or for strategic reasons.
- Mergers are quick if the qualities of institutions are good including effective law and order and transparency in business.
- Control of corruption and voice accountability also create favorable environment for merger and acquisitions.
- Mergers may raise the market or markup power of firms. M&A decision basically occurs at the firm level across industries.
- Macroeconomic factors and institutional factors influence on such decisions. For this reason our empirical analysis focuses on economic and institutional variables across time and for three groups namely BIRICS, G7 and G20 countries.
- In our knowledge this is first study on this issue for comparison across these three categories of advanced and emerging economies controlling over 80 percent of global GDP and M&A activities.

Data Sources and

- The data for BRICS, G7 and G20 countries were collected from OECD database for the period of 20 years from 2000 to 2020 for all the three Groups from the Institute of Merger and Acquisition (https://imaa-institute.org/mergers-and-acquisitions-statistics/) and UNCTAD cross-border M&A database (www.unctad.org/fdistatistics).
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- Panel data models of **fixed and random effects** by taking number of mergers and acquisitions deals and value as dependent variable for all three groups of countries were estimated and results are tabulated.

- Two **panel quintile regression models** for G20 countries were also estimated.

Table 1: Number of Purchase Mergers in BRICS Countries: Panel Data Model

	(1)	(2)	(3)	(4)
VARIABLES	Model FE1	Model RE1	Model FE2	Model RE2
GDP	3.192	2.365	2.030	14.14***
	(3.709)	(3.771)	(3.454)	(4.351)
Inflation	2.752	1.937	2.281	-8.349**
	(3.368)	(3.425)	(3.140)	(3.892)
FDIIN	0.00192***	0.00202***	0.00162***	0.00298***
	(0.000219)	(0.000221)	(0.000222)	(0.000193)
FDIOUT	2.56e-05	2.73e-05	1.75e-05	6.51e-05
	(3.74e-05)	(3.85e-05)	(3.37e-05)	(4.81e-05)
GE			7.369**	10.16***
			(3.086)	(2.424)
CC			3.730	0.411
			(2.282)	(2.387)
PS1			-0.152	-4.452***
			(1.366)	(1.376)
RL			-4.028	-0.502
			(2.834)	(3.448)
RQ			-3.428	-4.673*
			(2.435)	(2.804)
VA			-0.110	7.685***
			(2.417)	(0.944)
Constant	79.76***	80.17	-125.3	-572.4***
	(27.21)	(71.02)	(184.7)	(81.44)
Observations	112	112	111	111
R-squared	0.444		0.481	
Number of ID	7	7	7	7

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 2: Number of Sale Mergers in BRICS Countries: panel data model
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)
VARIABLES	Model FE1	Model RE1	Model FE2	Model RE2
GDP	3.973	3.308	2.526	9.741**
	(3.117)	(3.203)	(3.155)	(3.933)
Inflation	3.727	3.331	2.275	-4.809
	(2.830)	(2.909)	(2.868)	(3.518)
FDIIN	0.00178***	0.00189***	0.00176***	0.00307***
	(0.000184)	(0.000187)	(0.000203)	(0.000174)
FDIOUT	-1.24e-05	-1.14e-05	-1.09e-05	1.82e-05
	(3.15e-05)	(3.27e-05)	(3.08e-05)	(4.35e-05)
GE			-5.319*	0.404
			(2.819)	(2.192)
CC			-0.933	-4.088*
			(2.084)	(2.158)
PS1			0.126	-4.947***
			(1.248)	(1.244)
RL			-2.188	3.156
			(2.589)	(3.117)
RQ			5.971***	5.551**
			(2.224)	(2.535)
VA			-3.419	4.975***
			(2.208)	(0.853)
Constant	77.97***	75.31	425.2**	-345.7***
	(22.87)	(60.07)	(168.7)	(73.62)
Observations	112	112	111	111
R-squared	0.486		0.498	
Number of ID	7	7	7	7

Table 3: Number of Mergers in G7 Countries: panel data model
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)
VARIABLES	Model FE1	Model RE1	Model FE2	Model RE2
FDIIN	0.0103***	0.0302***	0.00883***	0.0251***
	(0.00148)	(0.00241)	(0.00151)	(0.00226)
FDIOUT	-0.00118	0.00762***	-0.000864	0.00444**
	(0.00110)	(0.00228)	(0.00107)	(0.00206)
GDPgr	75.66*	82.30	89.79**	96.95
	(42.51)	(90.70)	(41.40)	(83.81)
Inflation	92.84	107.8	30.66	172.3
	(89.53)	(167.3)	(90.84)	(162.6)
Ctax	-62.15***	7.428	-45.24**	33.24
	(15.85)	(28.47)	(17.67)	(30.78)
VA			-144.3***	-223.9***
			(32.53)	(37.47)
PS			-4.014	-50.07***
			(10.84)	(12.38)
GE			-6.978	14.84
			(38.30)	(71.03)
RQ			62.29*	136.7**
			(34.01)	(53.49)
RL			-40.51	166.9**
			(52.98)	(81.13)
CC			32.43	-99.64
			(35.78)	(64.22)
Constant	4,996***	578.4	13,362***	3,970
	(535.7)	(989.4)	(4,053)	(3,506)
Observations	147	147	147	147
R-squared	0.333		0.426	
Number of ID	7	7	7	7

Table 4: Value of Merger Deals in G7 Countries: Panel Data Model
Standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)
VARIABLES	Model FE1	Model RE1	Model FE2	Model RE2
FDIIN	0.00254***	0.00446***	0.00227***	0.00395***
	(0.000297)	(0.000286)	(0.000316)	(0.000292)
FDIOUT	0.000102	0.000851***	0.000122	0.000609**
	(0.000221)	(0.000273)	(0.000223)	(0.000266)
GDPgr	17.20**	12.20	19.25**	19.37*
	(8.507)	(10.85)	(8.642)	(10.83)
Inflation	5.385	13.43	-4.405	18.57
	(17.92)	(19.93)	(18.96)	(21.02)
Ctax	-3.795	3.310	-2.500	4.593
	(3.172)	(3.382)	(3.688)	(3.979)
VA			-16.81**	-22.32***
			(6.790)	(4.843)
PS			2.428	-4.315***
			(2.262)	(1.600)
GE			-2.897	-4.082
			(7.995)	(9.182)
RQ			7.641	13.77**
			(7.100)	(6.915)
RL			-7.570	14.81
			(11.06)	(10.49)
CC			7.163	-7.207
			(7.469)	(8.302)
Constant	264.4**	-167.4	1,175	556.0
	(107.2)	(117.6)	(846.0)	(453.3)
Observations	147	147	147	147
R-squared	0.398		0.436	
Number of ID	7	7	7	7

Table 5: Number of Mergers in G20 Countries: Panel Data Model
Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)
VARIABLES	Model FE1	Model RE1	Model FE2	Model RE2
FDIIN	0.0106***	0.0162***	0.0101***	0.0149***
	(0.00110)	(0.00135)	(0.00110)	(0.00128)
FDIOUT	0.00201**	0.00501***	0.00171**	0.00348***
	(0.000833)	(0.00106)	(0.000826)	(0.00100)
GDPgr	-4.874	-17.58	3.374	-4.305
	(13.49)	(16.96)	(13.63)	(16.14)
Inflation	5.506	-10.96	11.10	3.890
	(7.278)	(8.870)	(7.411)	(8.707)
Ctax	-64.35***	-28.01**	-54.62***	-27.55**
	(10.10)	(11.62)	(10.47)	(12.00)
VA			-35.52***	-10.44
			(12.77)	(7.609)
PS			-4.867	-8.098
			(5.018)	(5.535)
GE			17.71*	35.75***
			(10.30)	(11.73)
RQ			3.141	2.211
			(8.895)	(9.828)
RL			29.46**	31.23***
			(12.07)	(11.78)
CC			-4.464	-13.81
			(8.797)	(9.616)
Constant	3,436***	2,080***	2,519***	-731.8
	(309.7)	(383.2)	(931.3)	(624.3)
Observations	400	400	398	398
R-squared	0.319		0.353	
Number of ID	20	20	20	20

Conclusions

- Location or geographic factors contribute most to aggregate risk, it transmits 69 percent of its impact on risk measures. So, corporations look at the location while deciding M & A.
- Then second important factors associated to the macro and micro economic risks transmitting 56 percent of its volatility factor to aggregate risk.
- Then technology transmits 45 percent,
- financial factors transmit 44 percent
- management, and human resources transmit 35 percent into the aggregate risk.
- Therefore, for each firm i, above estimation makes it possible to estimate unobserved risk. As in our survey each firm has its own structure of these four components and thus will have different measures of risk.
- In theory M & A deal occurs when the aggregate risk is lower than certain cut-off points determined by policy makers in the corporate world.

Conclusions

- We constructed a two-level nested model to measure the aggregate risk taking five important factors relating to finance, management and human resources, technology, geography, and macroeconomic risks.
- Risk level of each firm can be estimated using the contribution of volatility in each of these factors to the unobserved value of aggregate risks. Authors also explain how external shocks to such unobserved risk causes fluctuations in these components.
- These results are based on results from the structural equation model estimated from the survey data of 150 firms in India.
- The model aims to predict M & A possibility for a firm based on the aggregate measure of latent risk scores in the market.
- Model is very comprehensive, but these results are reasonable.

Conclusions –panel evidence in mergers

- Factors contributing toward increasing numbers of M&A among firms and volume of business and sales of these firms are assessed empirically in this investigation.
- Major findings of this study are that while the economic growth and FDI contribute positively to the occurrence of M&A activities, these effects are even more prominent with efficiency in government institution, qualities of regulation, voice accountability and control of corruption.
- In the meantime higher inflation and corporation tax reduce the M&A activities.
- Medium or large corporations merge to exploit scale economies, to benefit from larger markets and to retain market power by operating across the globe.
- These results are based on results of the static and dynamic panel data models for BRICS, G7 and G20 countries.

References

Banker, R. D., Charnes, A., & Cooper, W. W. (1984). Some models for estimating technical and scale inefficiencies in data envelopment analysis. Management science, 30(9), 1078-1092.
Caiazza, S., Galloppo, G., & Paimanova, V. (2021). The role of sustainability performance after merger and acquisition deals in short and long-term. Journal of Cleaner Production, 314, 127982.
Cartwright, S., & Schoenberg, R. (2006). Thirty years of mergers and acquisitions research: Recent advances and future opportunities. British journal of management, 17(S1), S1-S5.
Chang, Y. B., & Cho, W. (2017). The risk implications of mergers and acquisitions with information technology firms. Journal of Management Information Systems, 34(1), 232-267. DOI: 10.1080/07421222.2017.1297641.
Carapeto, M., Moeller, S., Faelten, A., & Smolikova, A. (2011). Assessing market attractiveness for mergers and acquisitions: The MARC M&A maturity index. Available at SSRN 1786552.

Dackert, I., Jackson, P. R., Brenner, S. O., & Johansson, C. R. (2003). Eliciting and analysing employees' expectations of a merger. Human Relations, 56(6), 705-725.

Dell'Anno, R. (2007). The shadow economy in Portugal: An analysis with the MIMIC approach. Journal of Applied Economics, 10(2), 253-277.
Di Giovanni, J. (2005). What drives capital flows? The case of cross-border M&A activity and financial deepening. Journal of international Economics, 65(1), 127-149.
Dunning, J. H. (1980). Toward an eclectic theory of international production: Some empirical tests. Journal of international business studies, 11(1), 9-31.
Ellis, S., Sharma, S. and Brzeszczyński, J., 2022. Systemic risk measures and regulatory challenges. *Journal of Financial Stability*, *61*, p.100960
EMIS. 2022. M&A data. [online] Available at: <https://www.emis.com/php/dealwatch> [Accessed 1 April 2021].
Finch, W.H. and French, B.F., 2011. Estimation of MIMIC model parameters with multilevel data. Structural Equation Modeling, 18(2), pp.229-252.
Giffin, A. F., & Schmidt, J. A. (2002). Why HR Can Make or Break Your M&A. Emphasis Magazine, 2, 6-9.
Golbe, D. L., & White, L. J. (1988). A time-series analysis of mergers and acquisitions in the US economy. Corporate takeovers: Causes and consequences, 265-302. University of Chicago Press.

Hagedoorn, J., & Sadowski, B. (1999). The transition from strategic technology alliances to mergers and acquisitions: an exploratory study. Journal of management Studies, 36(1), 87-107.

Jayanthi, B., Sivakumar, S. N. V., & Haldar, A. (2016). Cross-border acquisitions and host country determinants: Evidence from Indian pharmaceutical companies. Global Business Review, 17(3), 684
Johanson, J., & Vahlne, J. E. (1977). The Internationalization Process of the Firm-A Model of Knowledge Development and Increasing Foreign Market Commitments. Journal of International Busine
32.
Kavanagh, M. H., & Ashkanasy, N. M. (2006). The impact of leadership and change management strategy on organizational culture and individual acceptance of change during a merger. British jou
management, 17(S1), S81-S103.

Krishnakumar, J., & Nagar, A. L. (2008). On exact statistical properties of multidimensional indices based on principal components, factor analysis, MIMIC and structural equation models. Social Indicators Research, 86(3), 481-496.
Lewis, Y., & Bozos, K. (2019). Mitigating post-acquisition risk: The interplay of cross-border uncertainties. Journal of World Business, 54(5), 100996.
McNamara, G. M. Jerayer (John) Haleblain, and Bernadine Johnson Dykes. 2008."The Performance Implications of Participating in an Acquisition Wave: Early Mover Advantages, Bandwagon Effects, and the Moderating Influence of Industry Characteristics and Acquirer Tactics.". Academy of Management Journal, 51(1), 113-30.

McDonald, J., Coulthard, M., & De Lange, P. (2005). Planning for a successful merger or acquisition: lessons from an Australian study. Journal of Global Business and Technology, 1(2), 1-11.
Miles, L., & Rouse, T. (2011). Keeping customers first in merger integration. Bain & Company.

Mitchell, M. L., & Mulherin, J. H. (1996). The impact of industry shocks on takeover and restructuring activity. Journal of financial economics, 41(2), 193-229.
Mathews, J.A (2002) "Dragon Multinationals: A New model for Global growth", Oxford, UK: Oxford University Press
Mathews, J. A. (2002). Dragon multinational: A new model for global growth. Oxford University Press.
Mathews, J. A. (2006). Dragon multinationals: New players in 21st century globalization. Asia Pacific journal of management, 23(1), 5-27.
Mardani, A., Kannan, D., Hooker, R. E., Ozkul, S., Alrasheedi, M., & Tirkolaee, E. B. (2020). Evaluation of green and sustainable supply chain management using structural equation modelling: A systematic review of the state-of-the-art literature and recommendations for future research. Journal of cleaner production, 249, 119383.
Mike Johnson and Michael Kapoor (2003) "The role of Human Capital in M&A", Towers Perrin
Maung, M., Wilson, C., & Yu, W. (2020). Does reputation risk matter? Evidence from cross-border mergers and acquisitions. Journal of International Financial Markets, Institutions and Money, 66, 101204.
Phillips, G. M., & Zhdanov, A. (2013). R&D and the incentives from merger and acquisition activity. The Review of Financial Studies, 26(1), 34-78.

Rabe-Hesketh, S., Skrondal, A., & Pickles, A. (2004). Generalized multilevel structural equation modeling. Psychometrika, 69(2), 167-190.
Rath, S., & Durand, R. B. (2015). Decomposing the size, value and momentum premia of the Fama–French–Carhart four-factor model. Economics Letters, 132, 139-141.
Ren, F., & Li, H. (2017). Risk assessment and management in hospital merger and acquisition. Journal of Commercial Biotechnology, 23(2),31-36.
Waldron, Amy. .Managing Risk in a CPA Firm Merger or Acquisition. Journal of Accountancy. May2014, Vol. 217 Issue 5, p16-17. 2p.