



# Technical Change and Task Content of Jobs in India

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# Trade, Technology and Skill Premium



- Globalization
- ICT Revolution



# SBTC VS Task Models



- SBTC: Empirical success and issue of mechanism
- Labour market polarization
- Task models

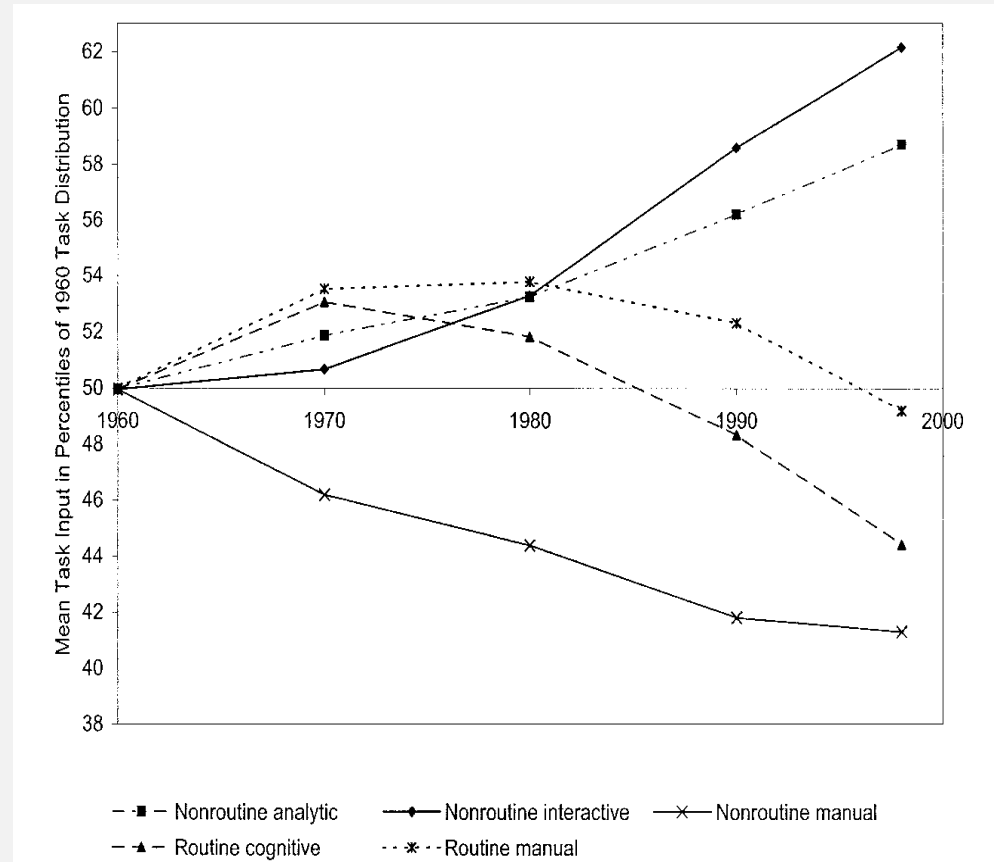


Figure reproduced from Autor, Levy and Murnane 2003

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# Changing task content and its drivers

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- Routine task content declined in the developed countries (Michaels et al. 2014)
- Transition economies following the same trend (Hardy et al. 2015)
- Technology (Autor et al 2003, Goos 2009)
- Up-scaling: Increase in supply graduates (Salvatori 2015; Hardy et al. 2015)
- Structural change (Barany and Siegel 2015)

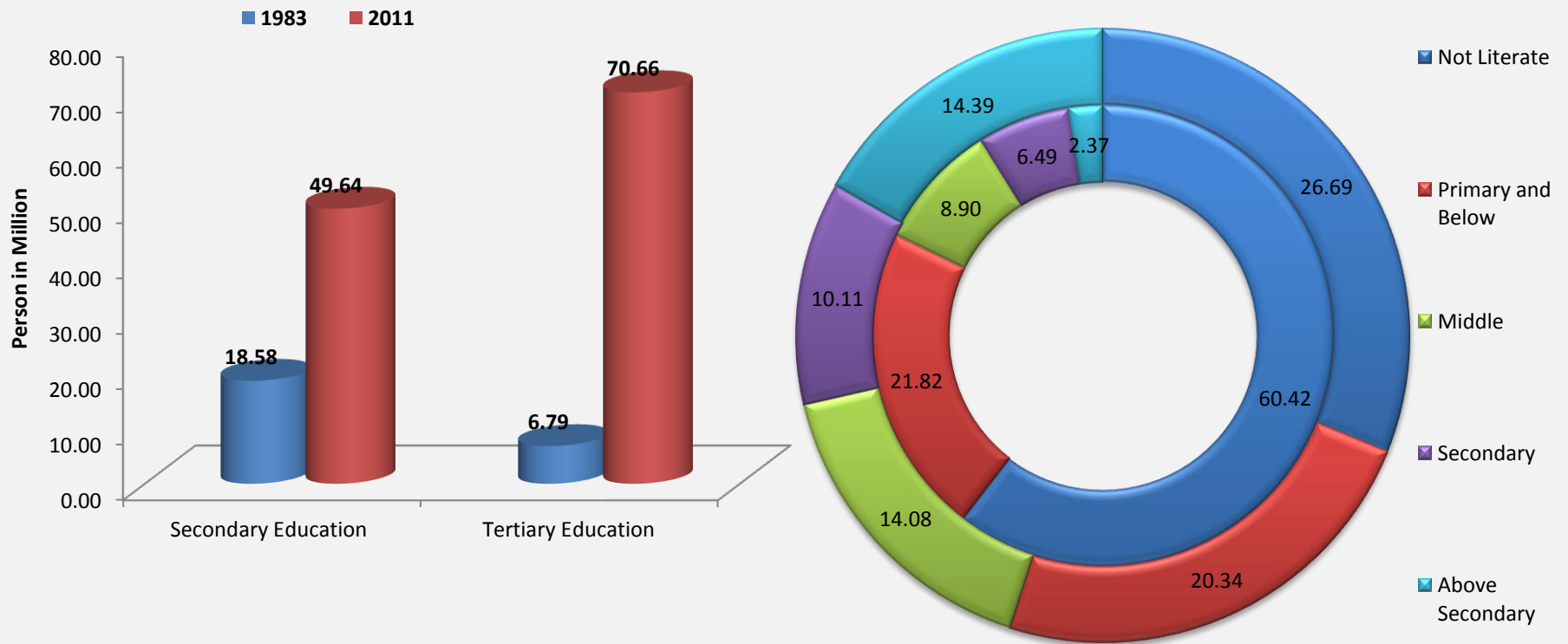
# Technology up-gradation



- Capital imports 
- R&D expenditure 
- Share of ICT capital 



# Supply of Labour



Source: Own calculation from NSSO data

# Changing Structure of Indian Economy



Sector	Share in GDP		Employment (PS+SS)	
	1983	2011	1983	2011
Agriculture	35.29	14.10	68.44	47.93
Mining and Quarrying	2.95	2.06	0.64	0.59
Manufacturing	14.79	15.70	10.63	12.19
Electricity, Gas and Water Supply	1.59	1.88	0.38	0.59
Construction	6.77	7.87	2.39	13.79
Services	38.61	58.39	17.52	24.91
Total	100.00	100.00	100.00	100.00

Source: Own calculation from National Account Statistics and NSSO data

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# Is India following the global trend?

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- Job polarization (Aedo et al. 2013)
- Change in task content (Aedo et al. 2013)



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# Methodology and data sources

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NSSO Round 38, 43,  
50, 55, 61, 66, 68

O-Net 2003, 2014

NCO 1960  
NCO 2004

O-Net SOC  
SOC 2000  
SOC 2010

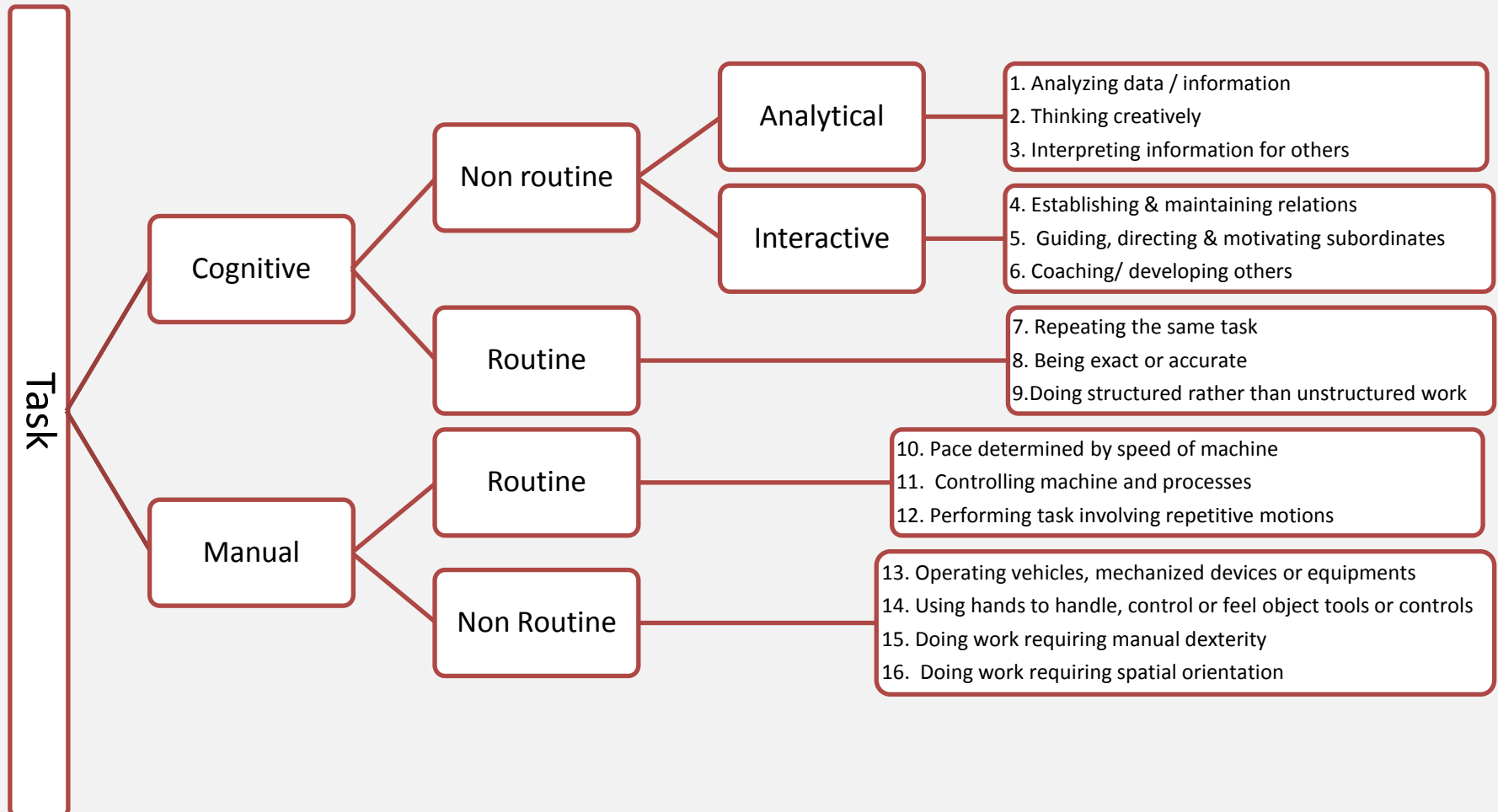
113 occupations  
at 3 digit level

# NSS data: some issues



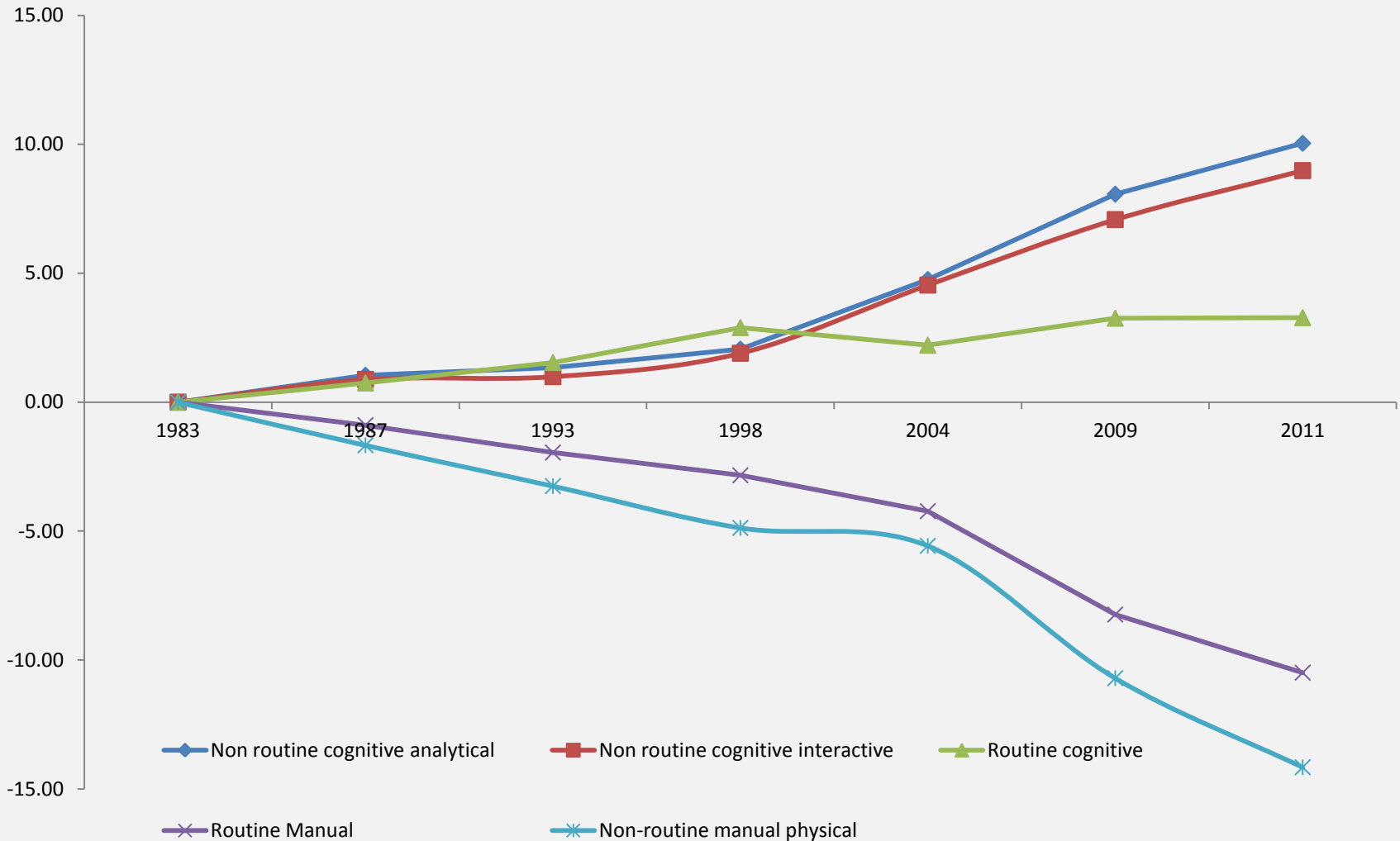
	Missing NCO Code		Wrong NCO	
	No. of Observations	Share in Employment	No. of Observations	Share in Employment
NSS Round 38	985	0.34	918	0.31
NSS Round 43	9110	3.22	850	0.30
NSS Round 50	1246	0.42	697	0.26
NSS Round 55	3006	0.33	694	0.20
NSS Round 61	1190	0.32	0	--
NSS Round 66	817	0.36	0	--
NSS Round 68	203	0.10	0	--

# Task items

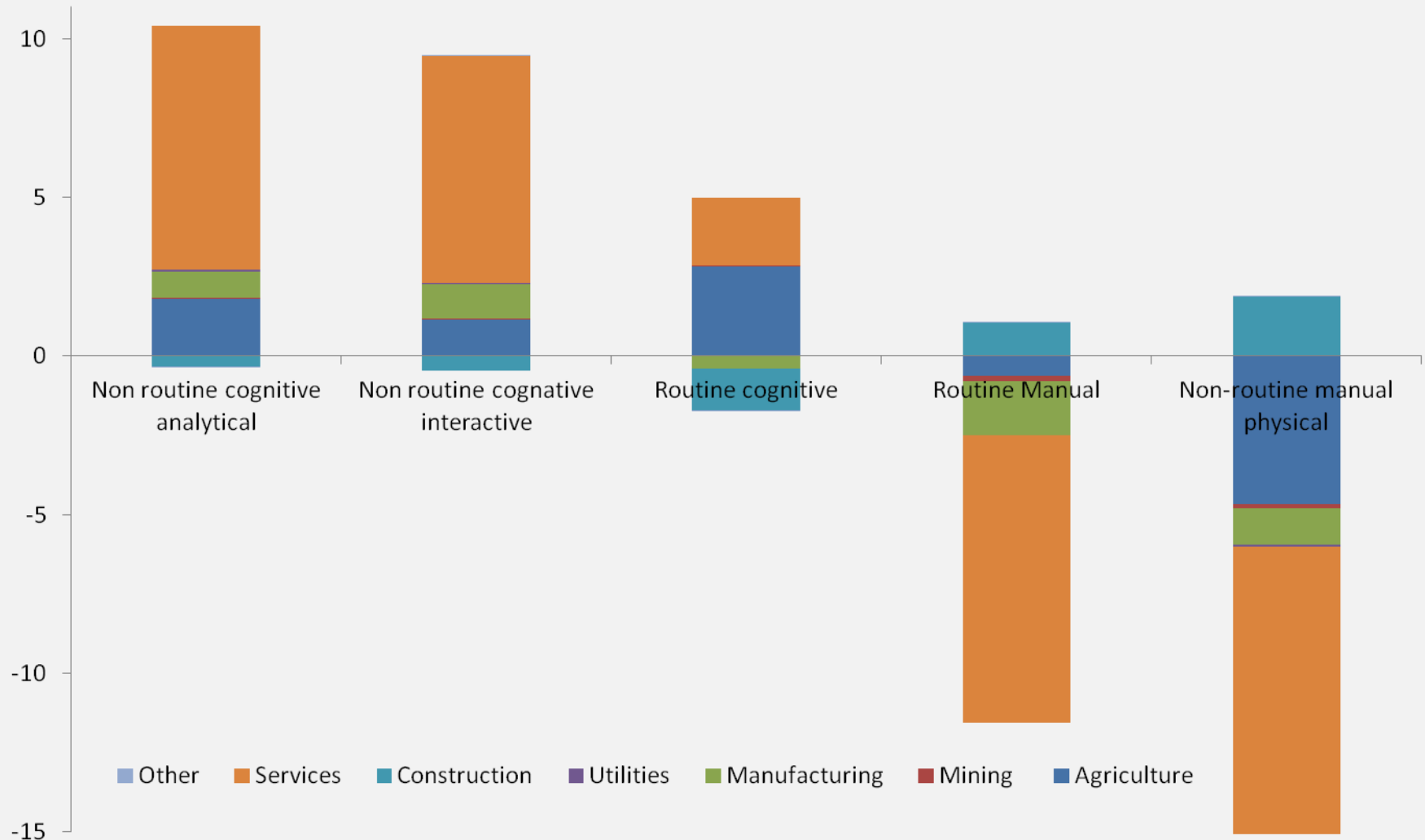


Source: Own compilation based on Autor, Levy and Murnane 2003

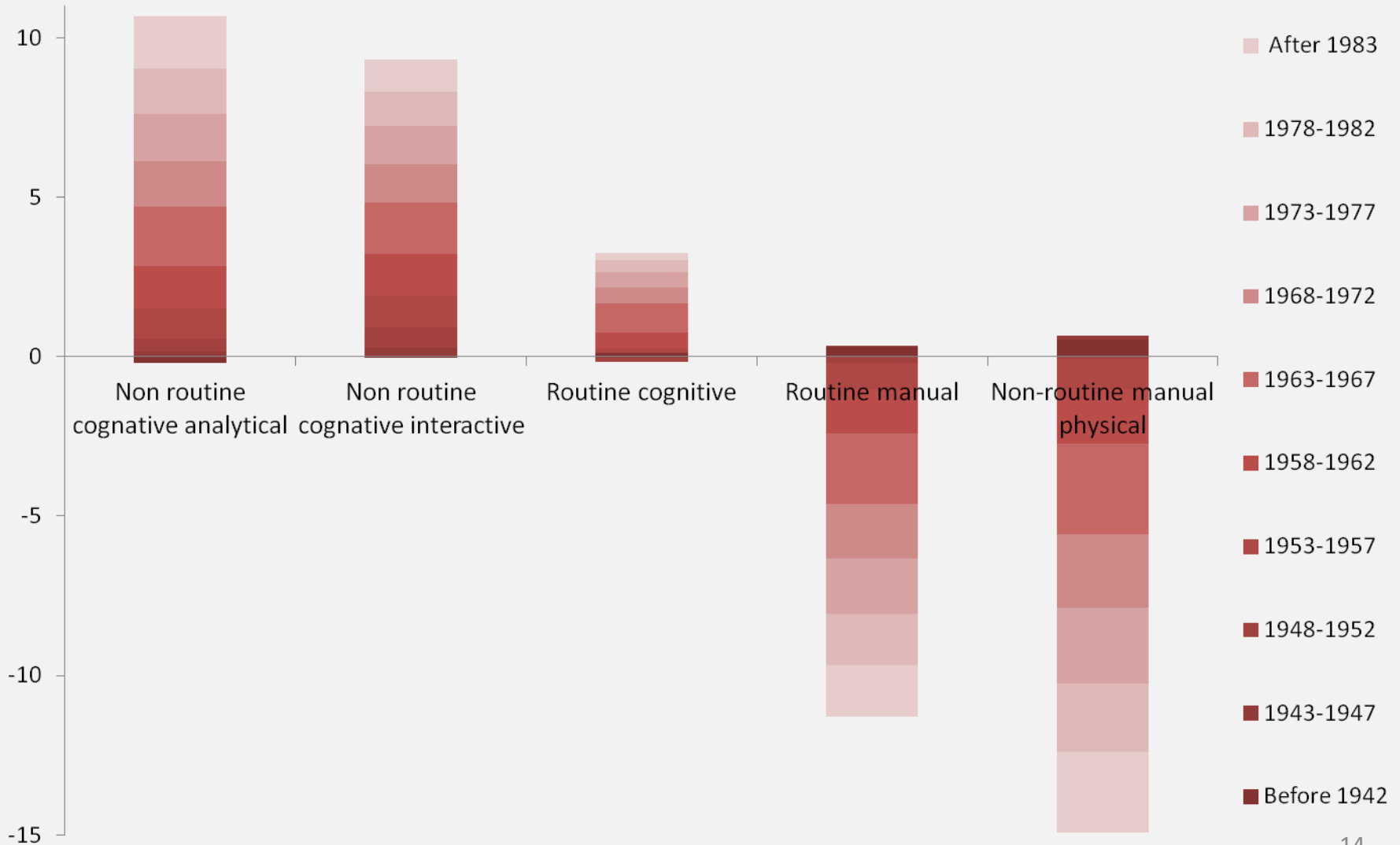
# Task content of jobs in India



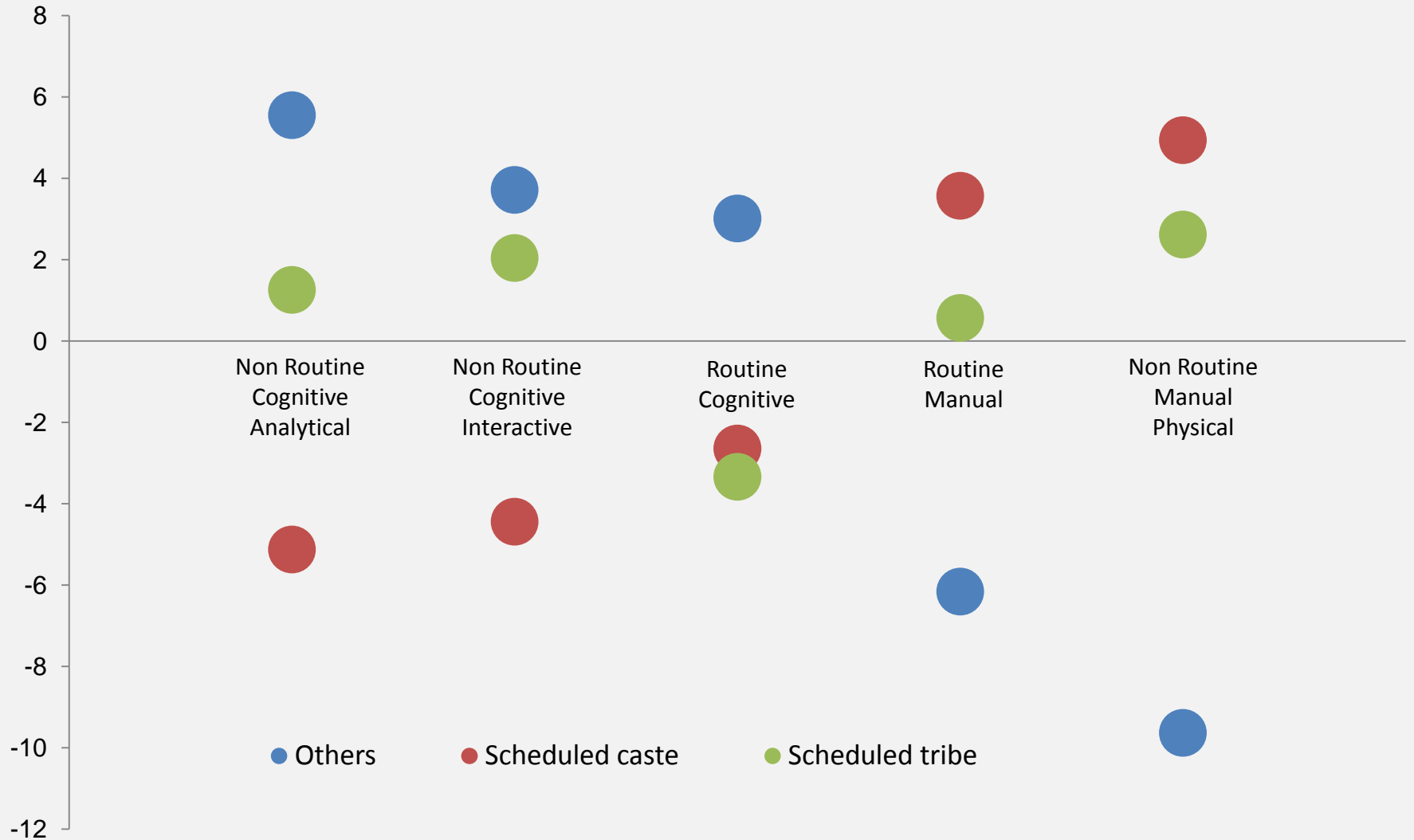
# Services biggest contributor to change in task content



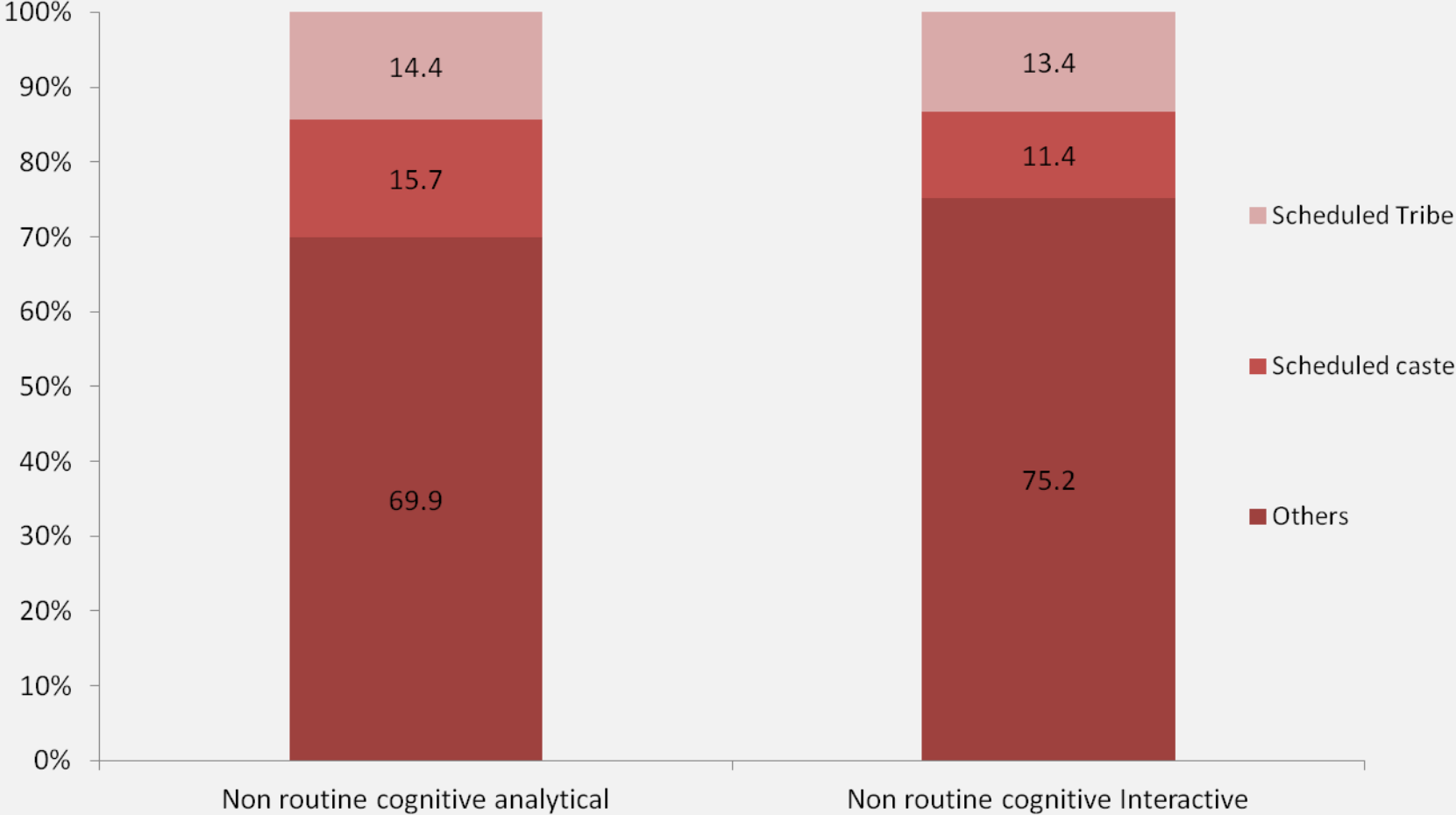
# Task content by age cohort



# Social dimension of task content

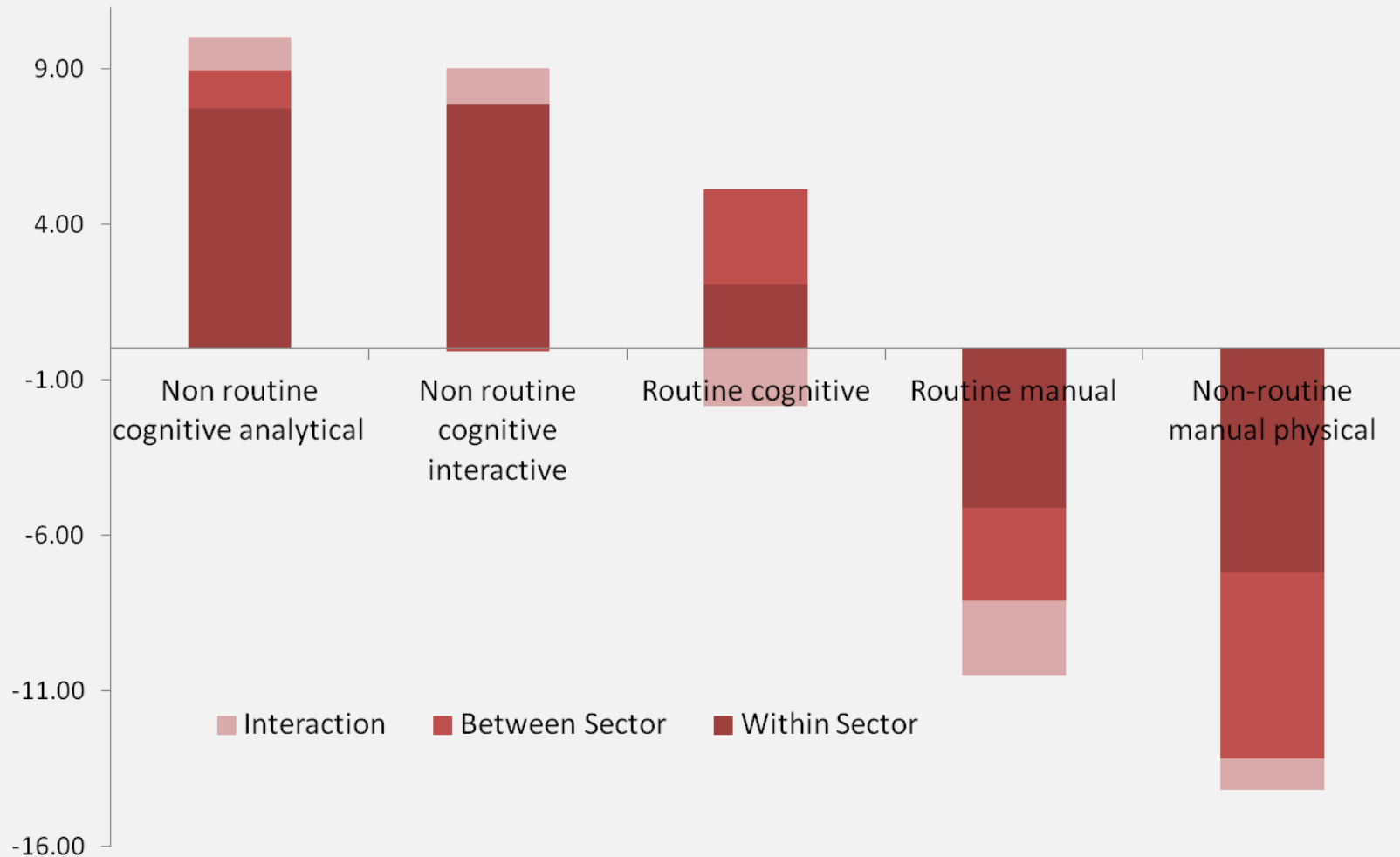


# Are weaker sections lagging behind?





# Within sector change driving the non routine cognitive task content



# Fixed effect regression of task content measures



	Non Routine Cognitive Analytical		Non Routine Cognitive Interactive	
	1	2	3	4
High Education Share	.029* (.003)	.004 (.005)	.029* (.004)	.005 (.006)
Medium Education Share	-.007 (.011)	.004 (.003)	-.007 (.012)	.003 (.002)
Total Factor Productivity		.013* (.002)		.012* (.003)
No. of Observations	42	42	42	42
Within R Square	.35	.62	.30	.55

\*, \*\*, \*\*\* significant at 1, 5 and 10 percent respectively. Estimation using Driscoll Kraay standard error.  
Standard error in parenthesis

# Fixed effect regression of task content measures



	Routine Cognitive		Routine Manual		Non-Routine Manual Physical	
	5	6	7	8	9	10
High Education	.002 (.003)	.001 (.004)	-.049* (.005)	-.053* (.006)	-.042* (.004)	-.041* (.006)
Medium Education	.009*** (.004)	.009** (.002)	-.053* (.002)	-.052* (.003)	-.037* (.005)	-.038* (.004)
Total Factor Productivity		.000 (.000)		-.001 (.003)		-.001 (.002)
No. of Observations	42	42	42	42	42	42
Within R Square	.02	.02	.57	.58	.56	.57

\*, \*\*, \*\*\* significant at 1, 5 and 10 percent respectively. Estimation using Driscoll Kraay standard error.  
Standard error in parenthesis

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# Conclusion and Implications

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- Significant change in task composition
- Technology driving the non-routine cognitive task components
- Routine cognitive task is holding in services and agriculture
- Risk of leaving weak behind
- Quality of education in public school
- Complete De-Routinization in Manufacturing: Role of labour regulation?

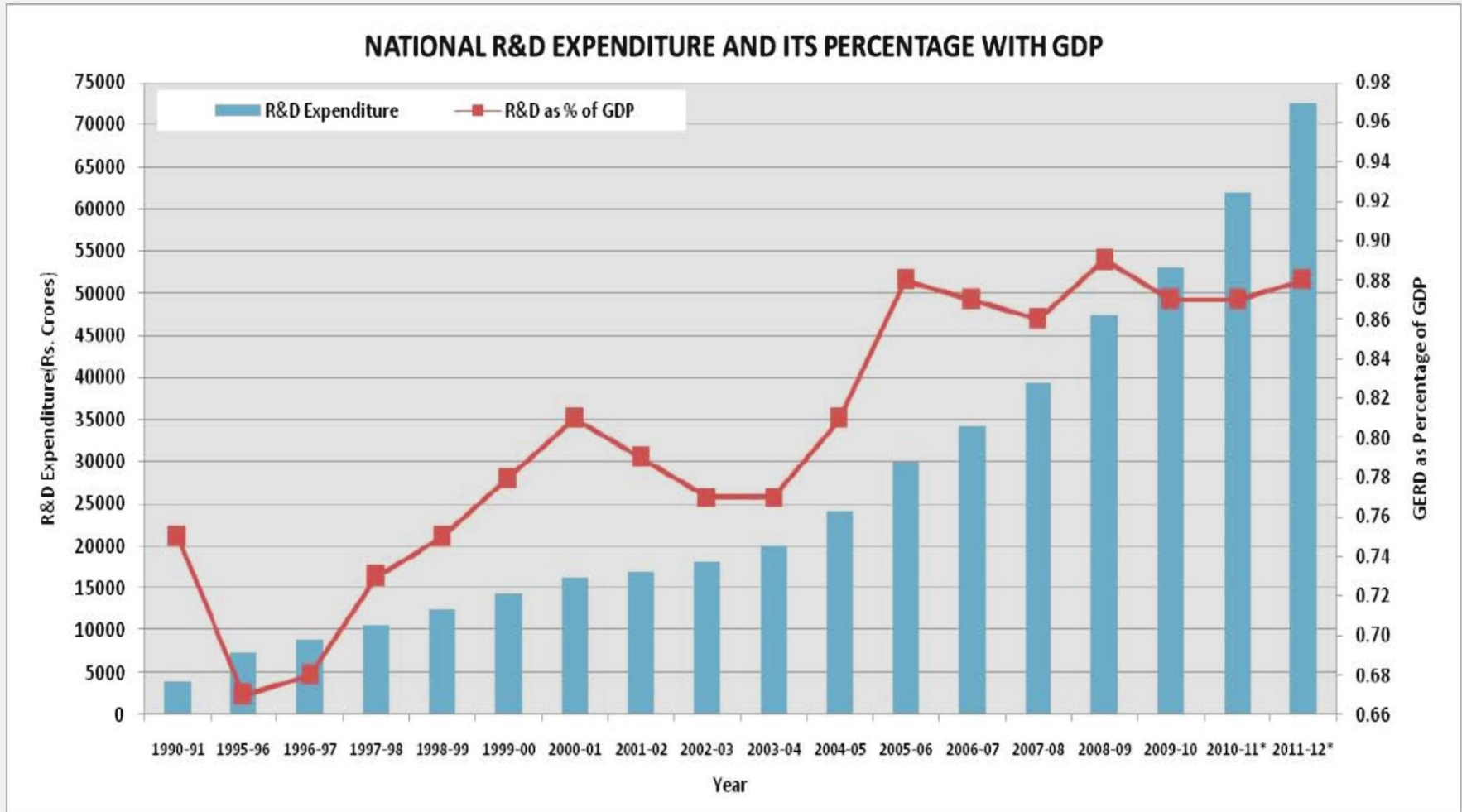


Thank you!

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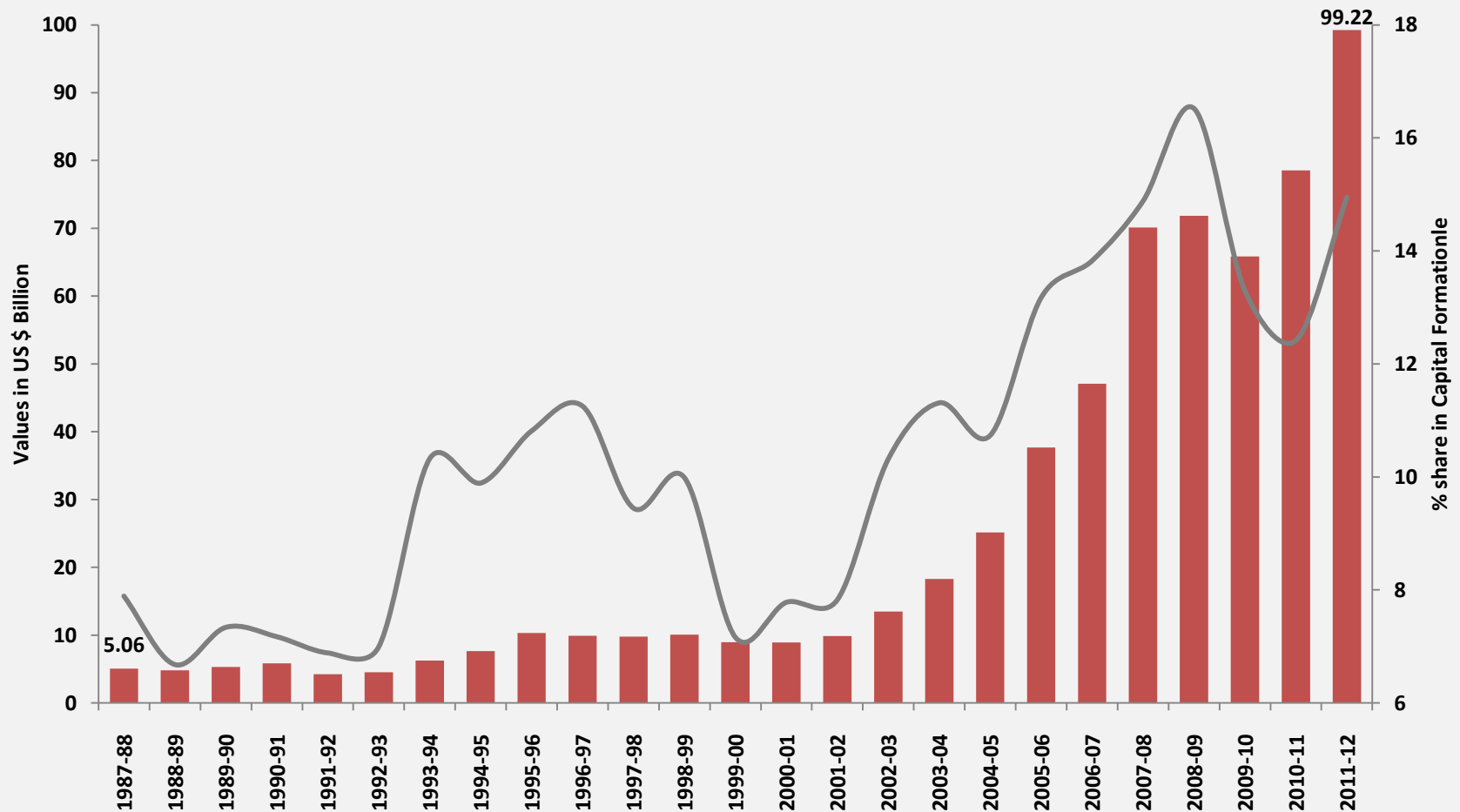
# Research and Development Expenditure in India



Source: Department of Science and Technology, Government of India



# Surge in Capital Imports



Source: Reserve Bank of India



# Occupation structure



	1983-84	1993-94	1998-99	2009-10	20100-12
Legislator, senior officers and managers	1.13	1.95	2.90	5.17	6.76
Professionals	1.45	1.69	1.76	3.51	3.54
Technical and associate professionals	2.20	2.42	2.66	2.76	3.11
Clerks	1.66	1.72	1.75	1.77	1.88
Services, Shop and market sales workers	6.37	7.28	7.87	6.65	7.36
Skilled Agriculture and Fishery Workers	44.54	40.05	36.30	34.33	31.77
Craft Related Trade Workers	9.50	10.27	11.02	11.23	12.96
Plant and Machine Operator Workers	2.97	3.26	3.53	3.49	4.64
Elementary Occupations	29.82	30.92	31.27	30.60	27.78
Missing NCO Code	0.34	0.42	0.93	0.36	0.10

Source: Own calculation from NSSO data

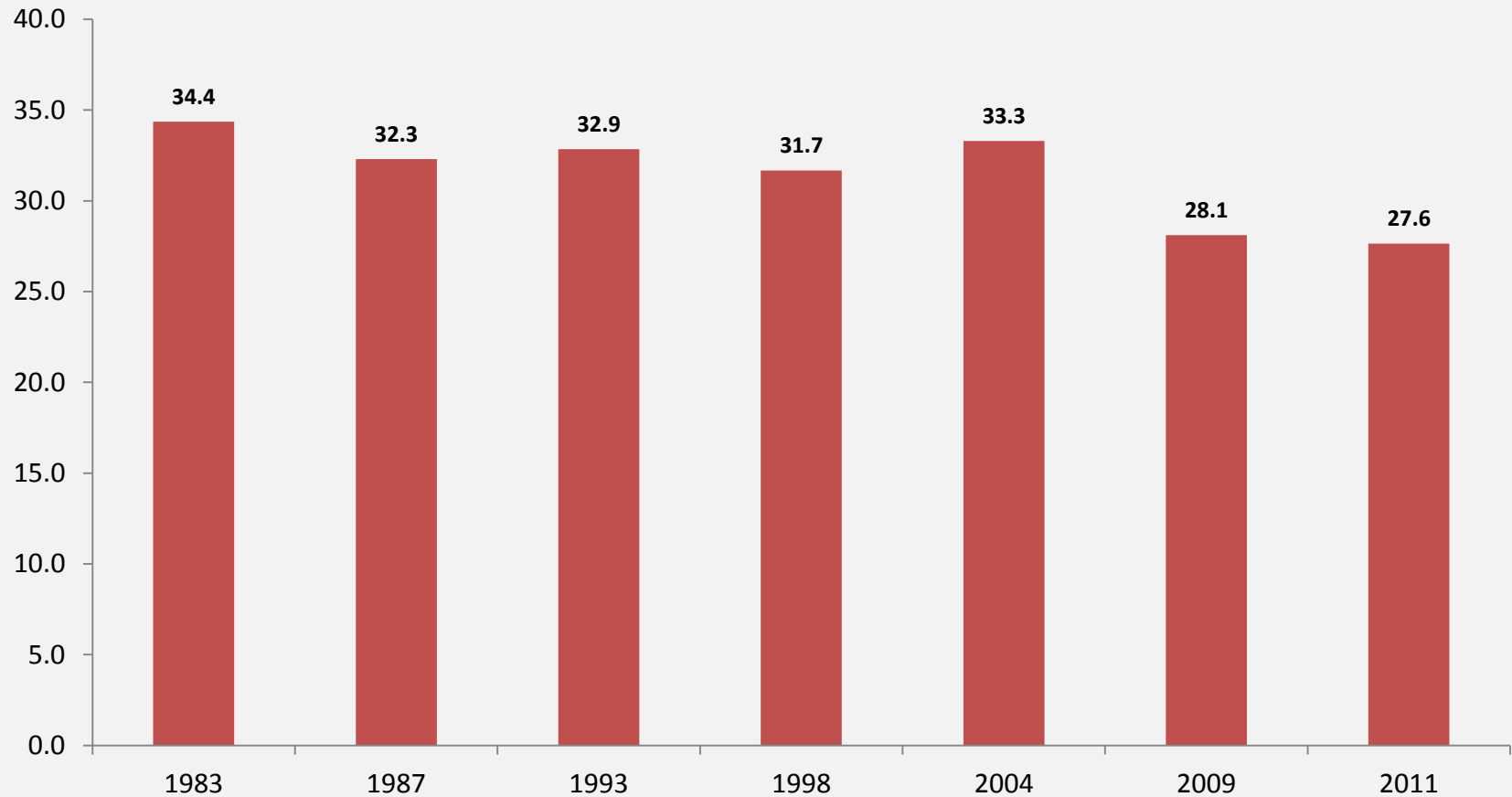


# Diagnostic test



		<b>NRGA</b>	<b>NRGI</b>	<b>RC</b>	<b>RM</b>	<b>NRMP</b>
Modified Wald Test Heteroskedasticity	Chi 2	22.33	11.34	129.46	75.86	455.99
	Prob. of Chi2.	0.0011	0.0485	0.0000	0.0000	0.0000
Breusch – Pagan LM Test for Cross Sectional Dependence	Chi 2	30.849	31.789	30.215	42.929	26.389
	Prob. of Chi2.	0.0092	0.0069	0.0112	0.0002	0.0341
Wooldridge Test for Serial Correlation	Chi 2	4.574	21.465	3.576	15.323	6.659
	Prob. of Chi2.	0.0855	0.0057	0.0872	0.0112	0.0494

# Female Share in Employment



Source: Own calculation from NSSO data