

Productivity Growth in the Philippines: Exploratory Study

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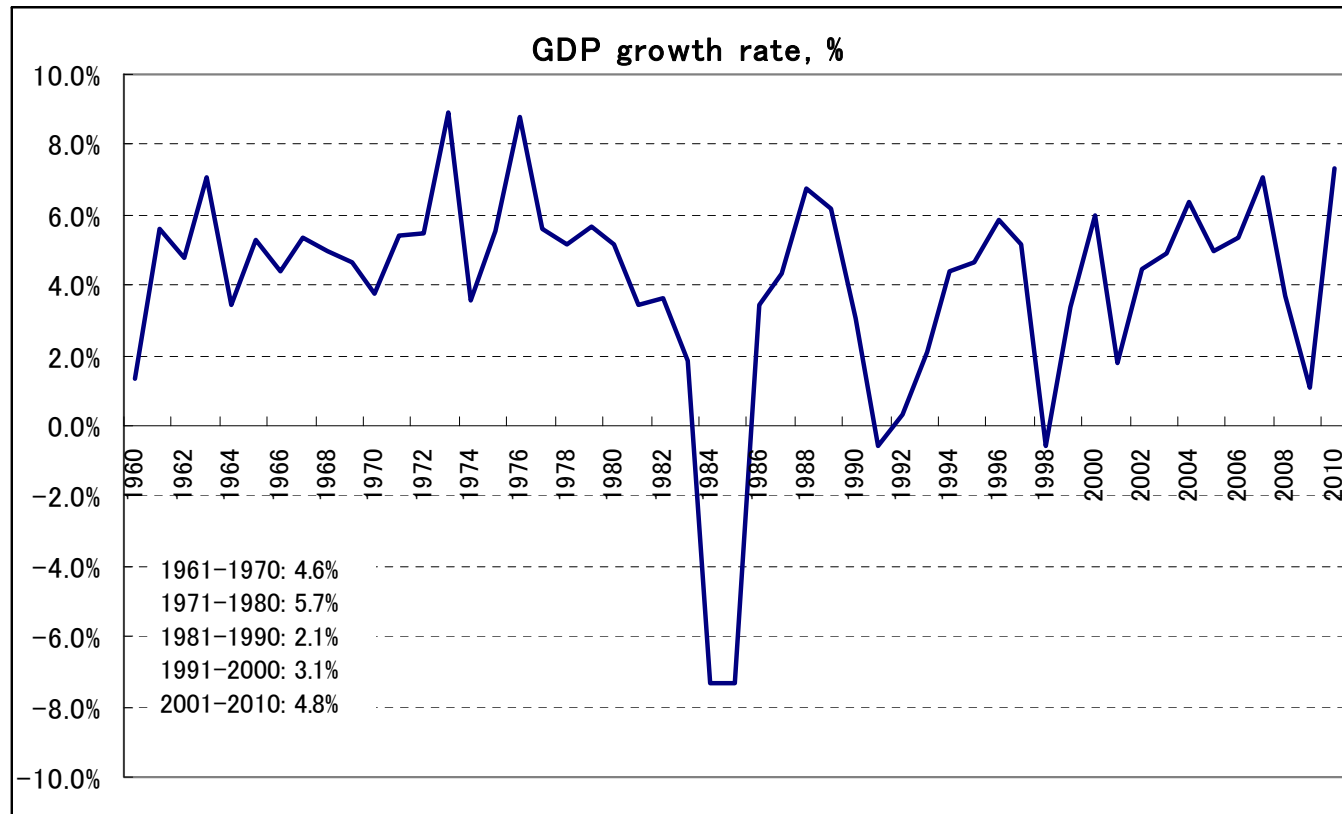
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Outline

1. Introduction
2. Industrial classification
3. Estimation of sources of growth by industry
4. Further work

1.1 GDP growth rates, Philippines



Source: CEIC

1.2 Labor Productivity, Index (base = 1985)

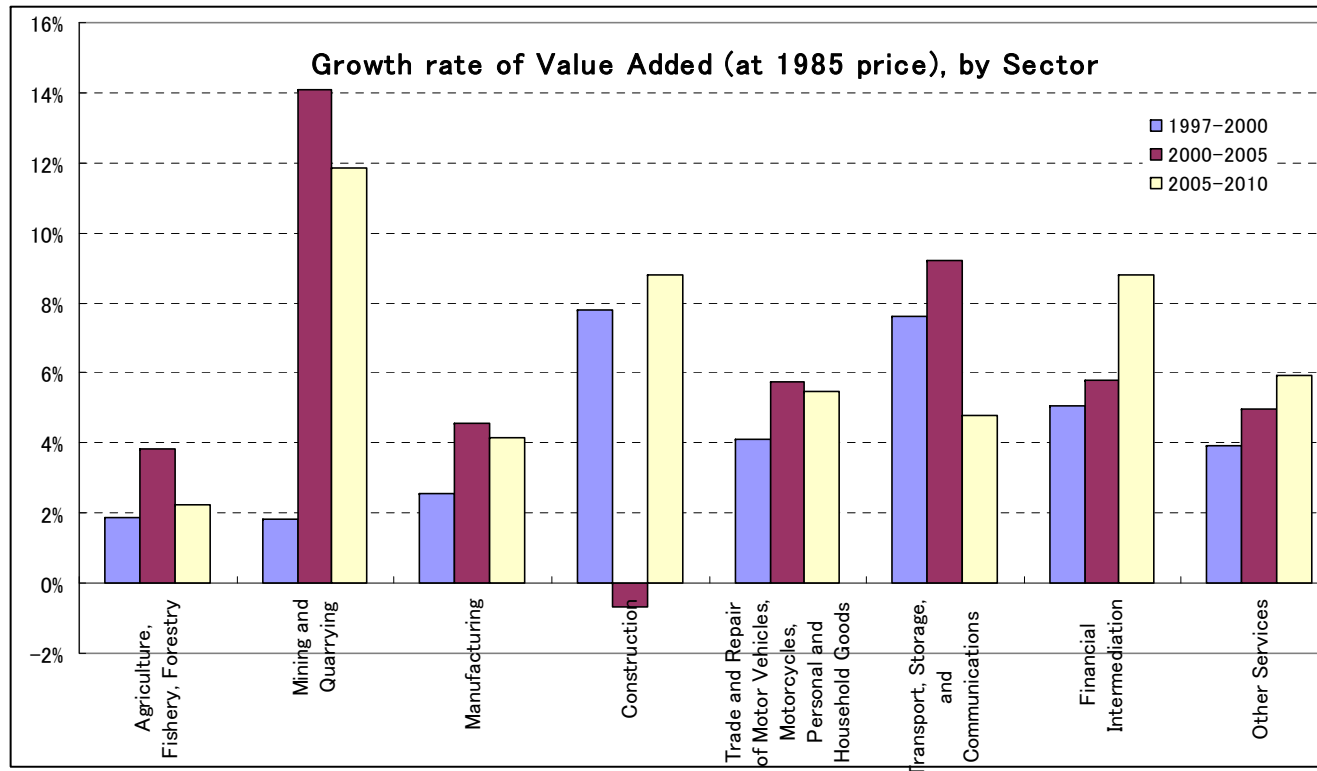


Source: Department of Labor and Employment

2.1 Industrial classification

Data from NSO and NSCB	Industry	# KLEMS	Available data for K	Available data for L
Agriculture, Fishery, Forestry	Agriculture, hunting, forestry and fishing	AtB	Yes	Yes
Mining and Quarrying	Mining and quarrying	C	Yes	Yes
Manufacturing	Total manufacturing	D	Yes	Yes
Electricity, Gas, and Water Supply	Electricity, gas, and water supply	E	Yes	No
Construction	Construction	F	Yes	Yes
Trade and Repair of Motor Vehicles, Motorcycles, Personal and Household Goods	Wholesale and retail trade	G	Yes	Yes
Transport, Storage, and Communications	Transport and storage	I	Yes	Yes
Financial Intermediation	Financial intermediation	J	Yes	Yes
Real Estate, Renting and Business Activities	Real Estate, Renting and Business Activities	K	Yes	No
Public Administration and Defense: Compulsory Social Security	Public Administration and Defense: Compulsory Social Security	L	Yes	No
Other Services	Community social and personal services	MtQ	Yes	Yes

2.2 GDP growth rates, by sector



- Growth rates vary across the sectors
- Upward trend for Finance, Service and volatile for Agriculture, Construction, Mining, and Transport,
- Relatively stable for Trade and Manufacturing

Source: NSO

3. Estimation of sources of growth by industry (1)

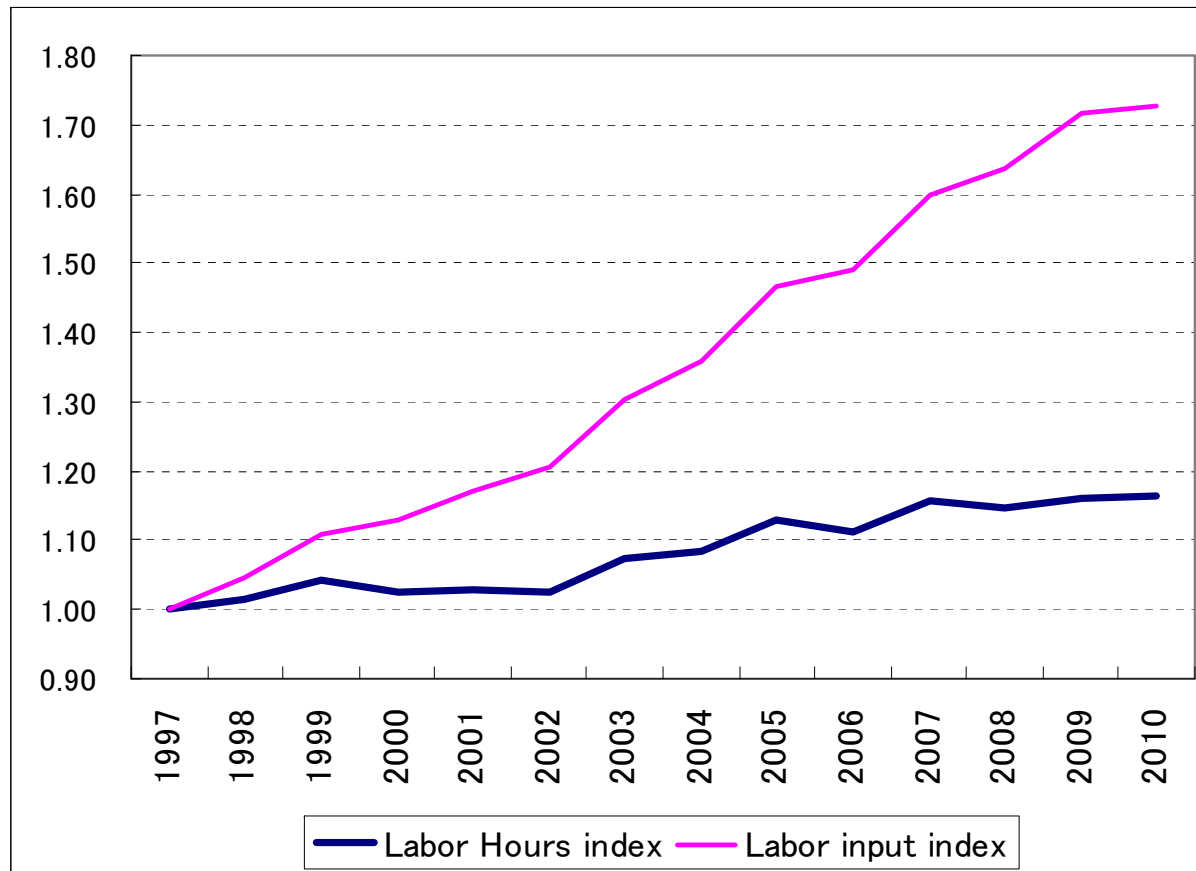
- Construction of Time Series on Labor input
 - Data (1997-2010)
 - (A) Time Series data for number of workers and working hours per week for major categories: Agriculture, Mining, Construction, Transport, Trade, Finance, Services, and Manufacturing
 - Source of data: NSO
 - (B) Time Series data for a Labor Quality Index by number of years of schooling
 - Source of data: NSO

3. Estimation of sources of growth by industry (2)

- Construction of Time Series on Labor input
 - Labor Quality Index
 - Use the number of years of schooling to measure quality of labor
 - Data
 - # of employed persons in each education level (Source: NSO)
 - Assumptions

Type of workers	Education level
Low-skilled	No education, primary
Medium-skilled	Secondary, undergraduate
High-skilled	College graduate

Labor input index, Philippines (base=1997)



3. Estimation of sources of growth by industry (3)

- Construction of Time Series on Capital Input
 - Formula for calculating growth rate of capital

$$\Delta \ln K_t = \sum_k \bar{v}_{k,t}^K \Delta \ln K_{k,t}$$
$$v_{k,t}^K = \frac{p_{k,t}^K K_{k,t}}{p_t^K K_t} \quad \bar{v}_{k,t}^K = \frac{(v_{k,t}^K + v_{k,t-1}^K)}{2}$$

- Where $p_{k,t}^K$ is the investment price of asset k.
- We calculated the stock of capital and rental price as follows.

- Stock of capital: $S_{k,T} = S_{k,T-1}(1 - \delta_k) + I_{k,T}$
- Rental price: $p_{k,t}^K = p_{k,t-1}^I i_t^* + \delta_k p_{k,t}^I$

3. Estimation of sources of growth by industry (4)

- Construction of Time Series on Capital Input
 - Depreciation rate follows Ernst and Young in the Philippines

	EY rate	Weights *	Assumed depreciation rate
Building	3.8%	20%	0.75%
Machinery and equipment	20.0%	80%	16.00%
			16.75%

* Weight calculated by information from annual reports of companies listed at the PSE

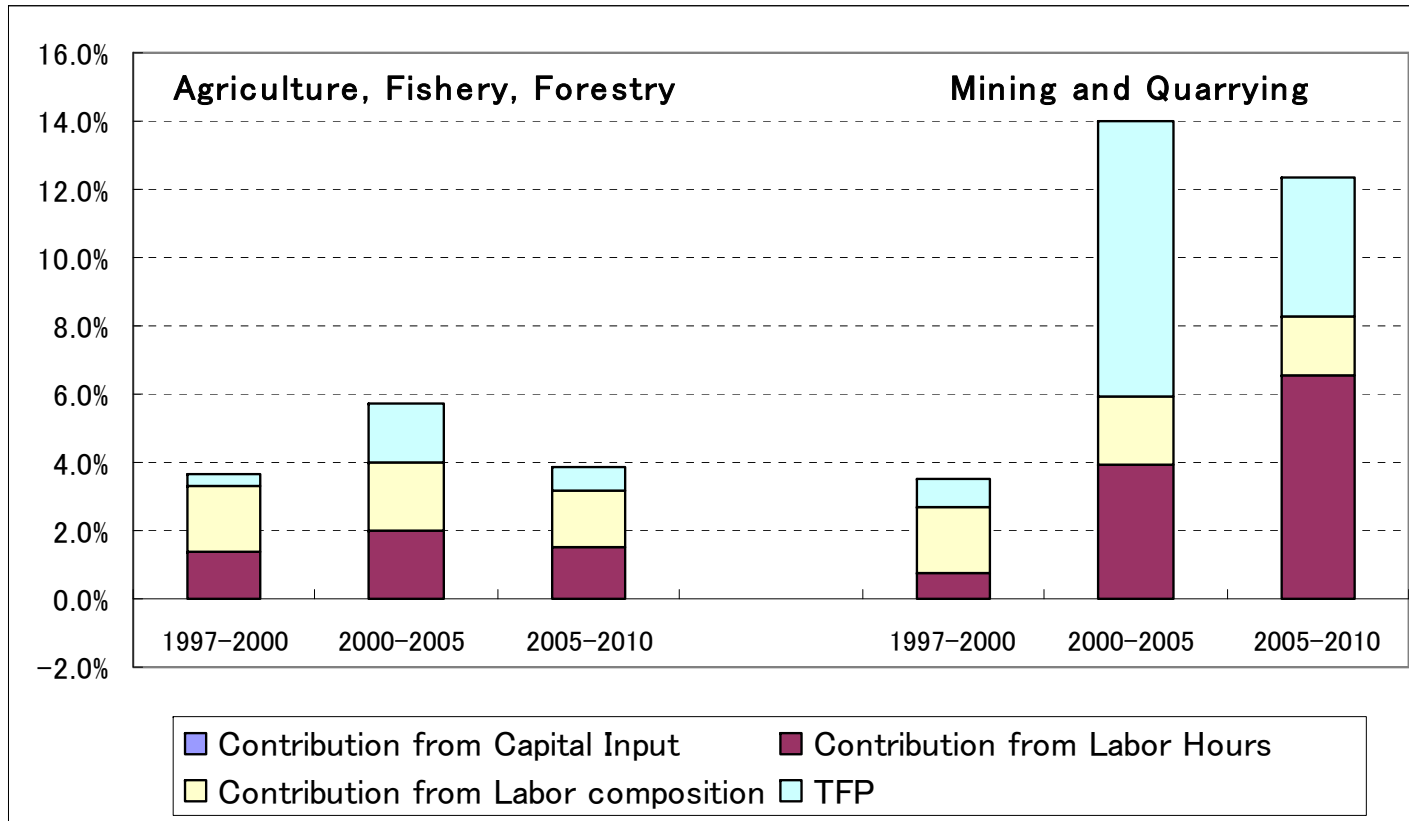
3. Estimation of sources of growth by industry (5)

- Construction of Time Series on Capital Input
 - Data (1997-2010)
 - Gross fixed capital formation in each sector (NSO)
 - Government Securities-1Yr (BSP), dividend yield by sector (PSE)
 - Depreciation method (as presented above)

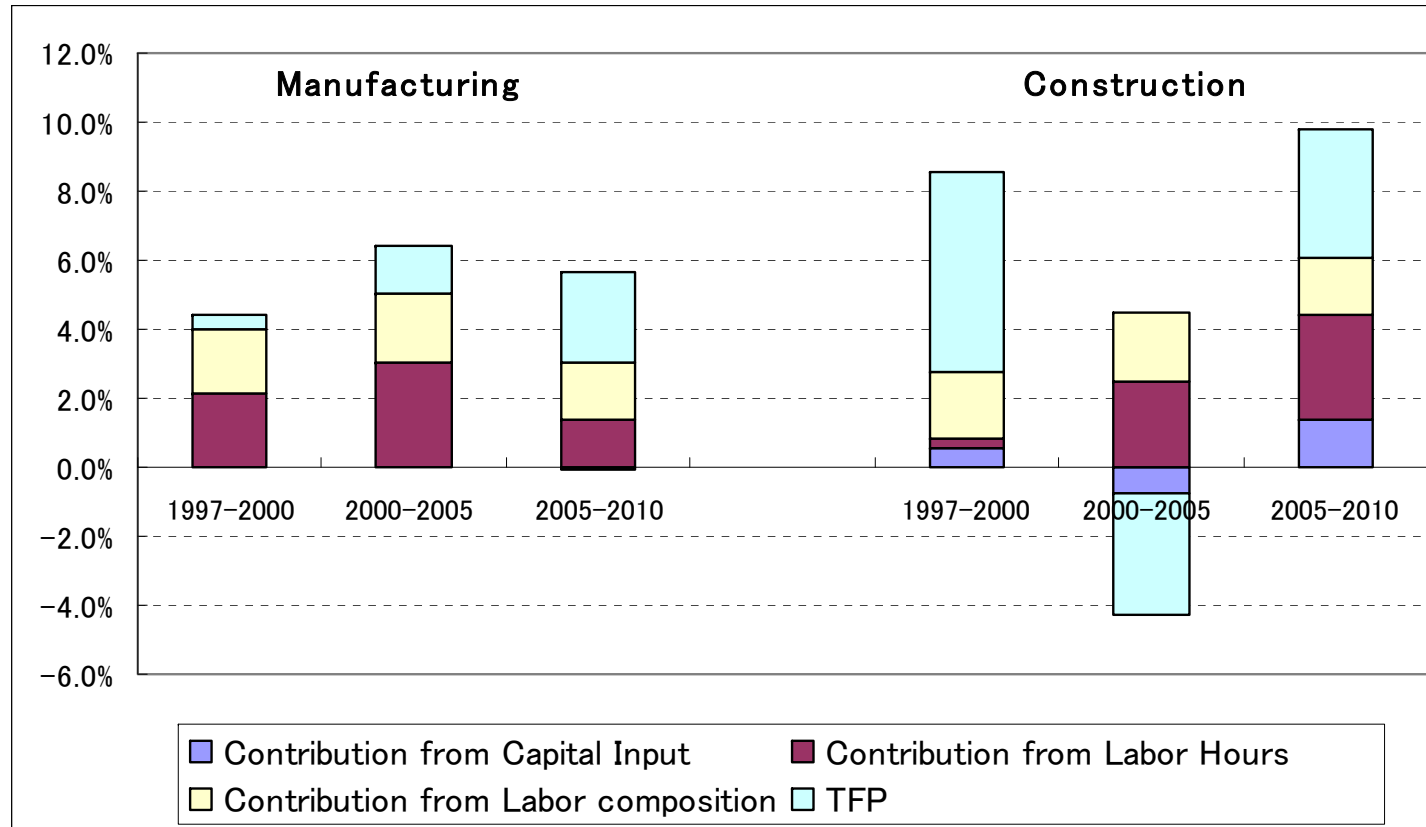
3. Estimation of sources of growth by industry (6)

- Calculating TFP by Value Added
 - Using the Cobb-Douglas production function to calculate TFP
 - $\Delta \ln(\text{TFP}) = \Delta \ln Y - (W_K^* \Delta \ln K) - (W_L^* \Delta \ln L)$
 - Weights for $K=0.4$; $L=0.6$ (Park, 2010:4)

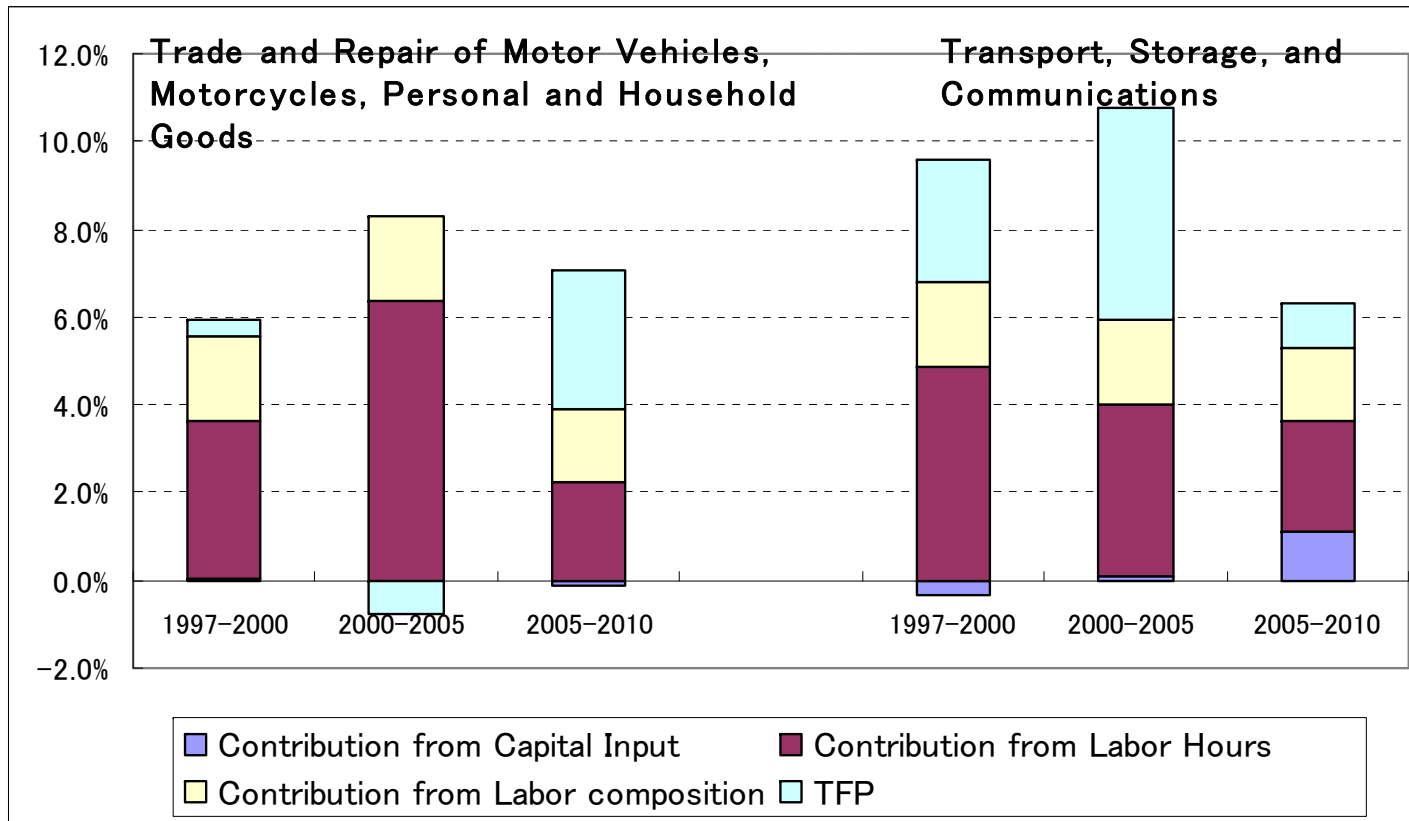
3.1 Sources of Value Added Growth (1)



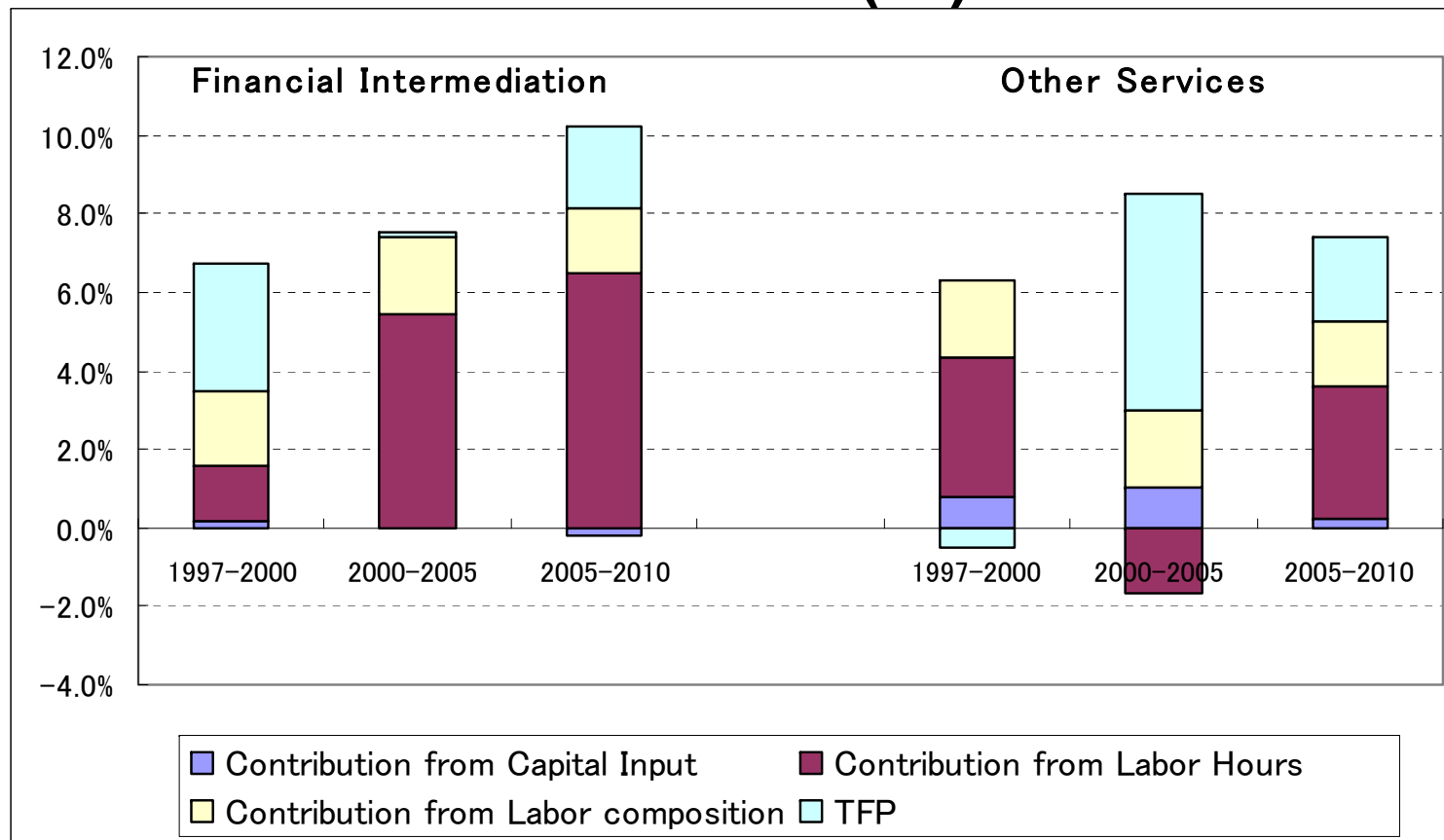
3.1 Sources of Value Added Growth(2)



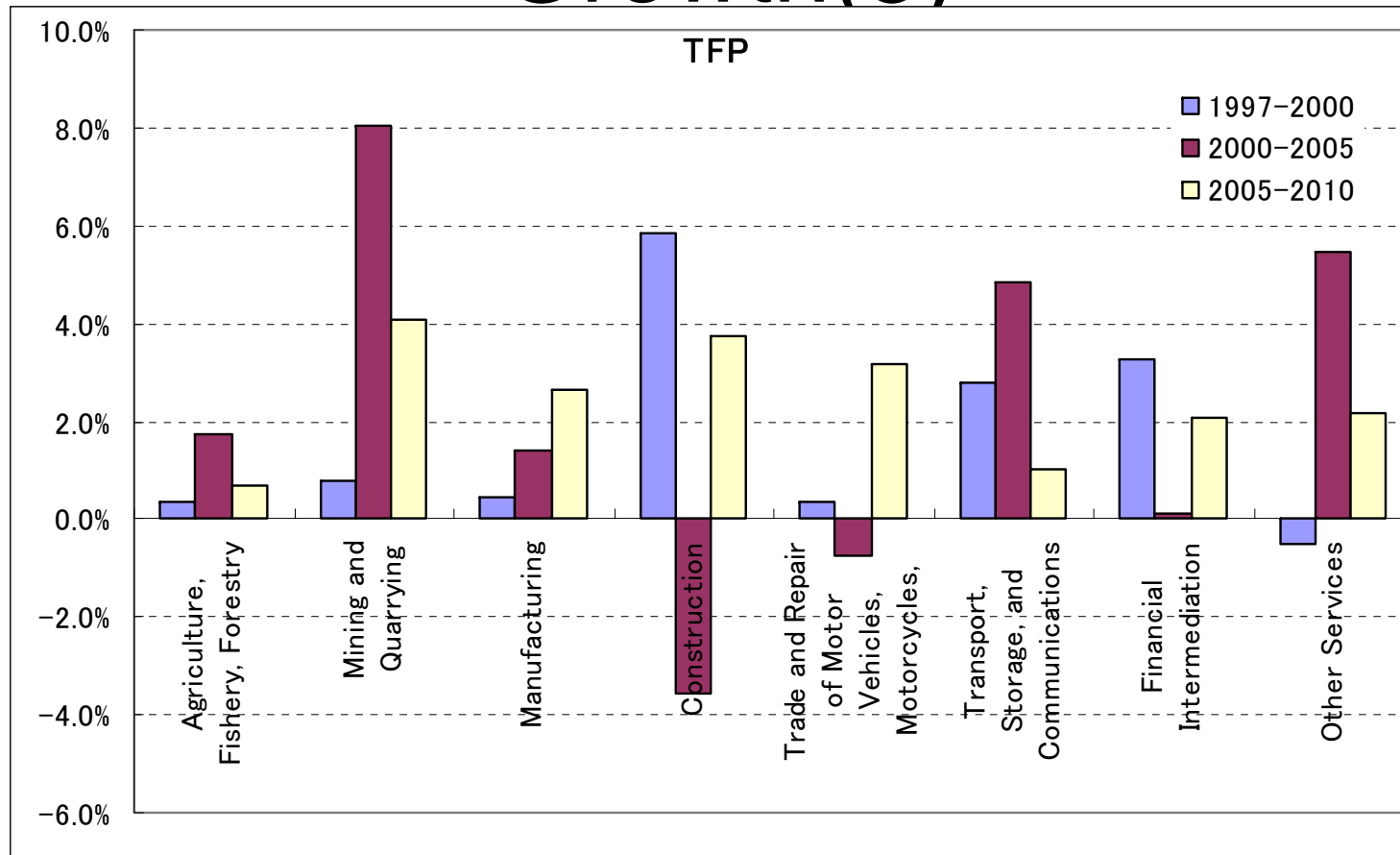
3.1 Sources of Value Added Growth(3)



3.1 Sources of Value Added Growth(4)



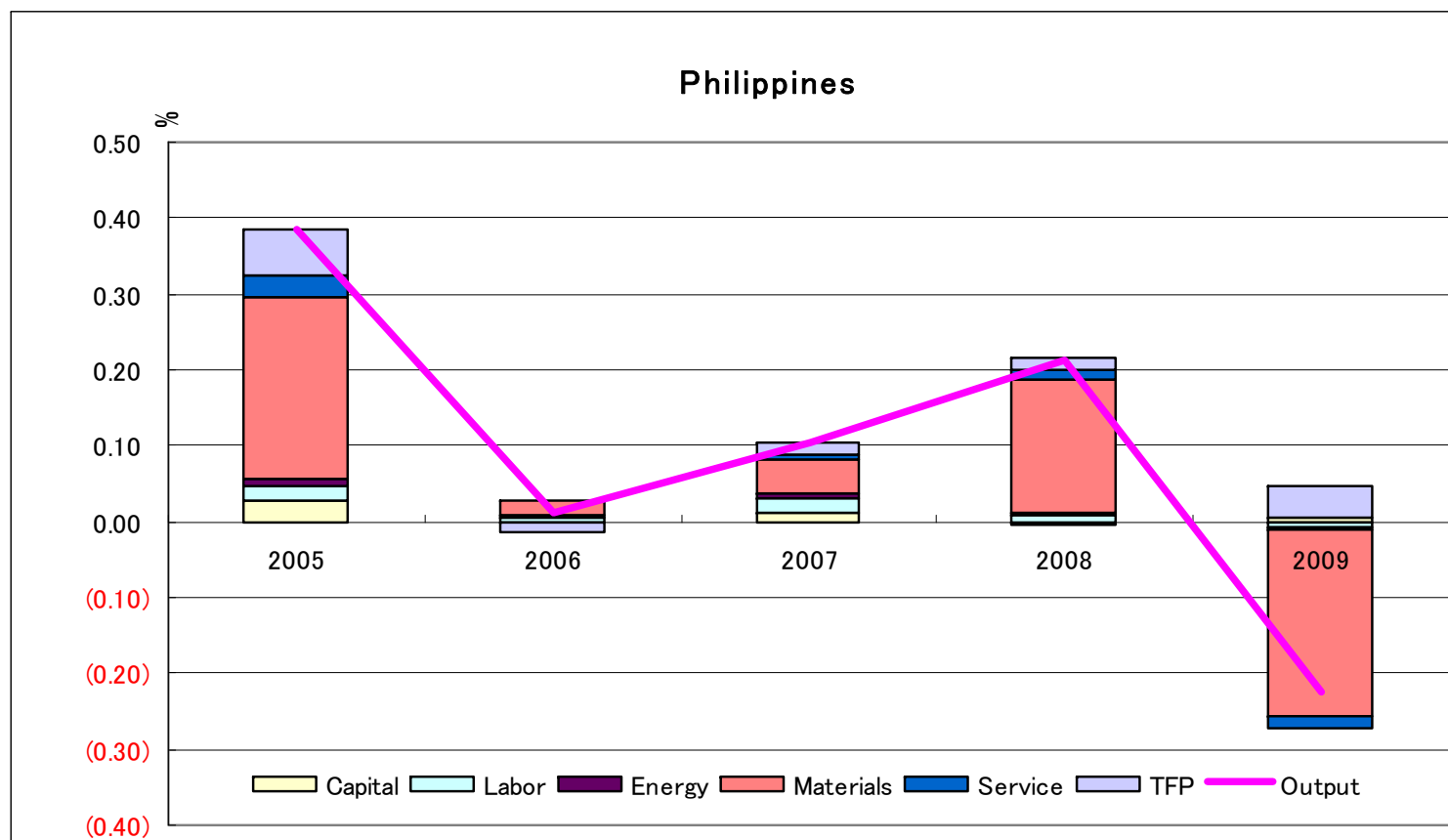
3.1 Sources of Value Added Growth(5)



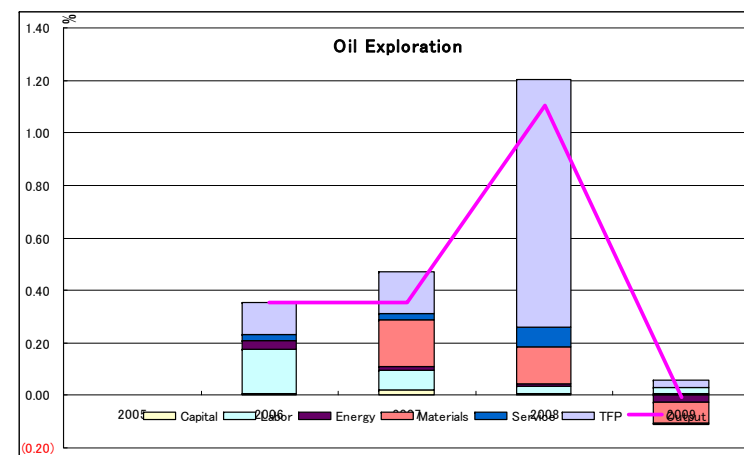
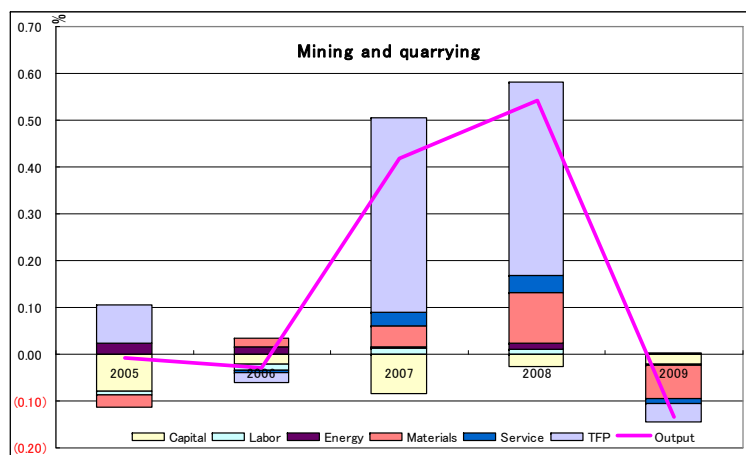
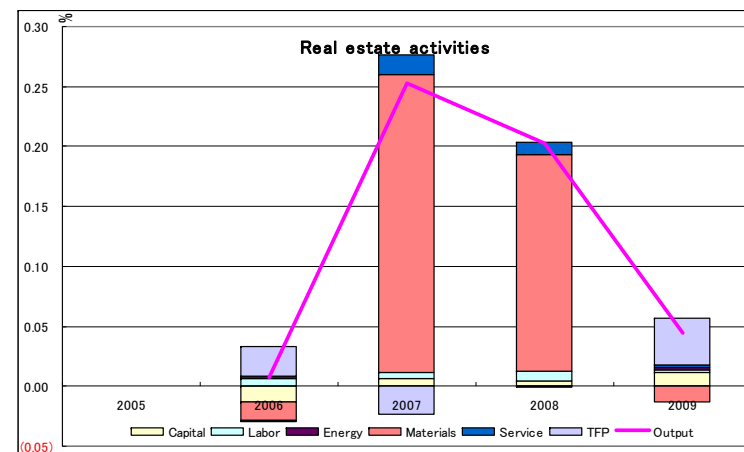
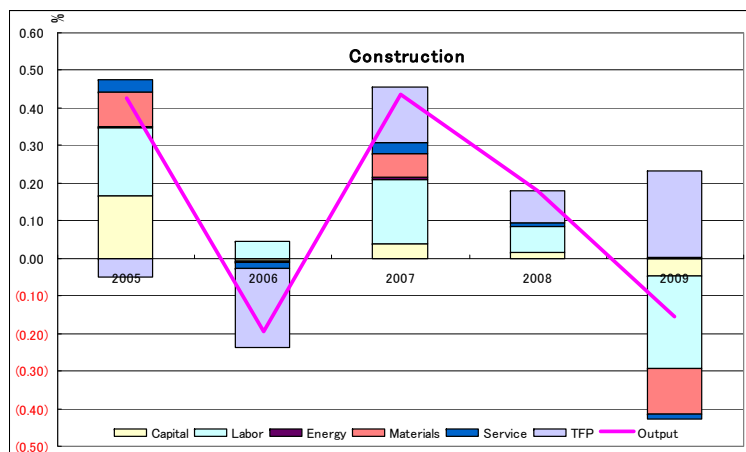
3.2 Sources of Gross output growth (1)

Industry	KLEMS	#	Sources of Data (from Annual Reports)
Post and Communications	64	3	Digital Telecom- Network (2005-9); ISM (2006-9); PLDT (2005-9)
Food products, beverages and tobacco	15t16	6	Alaska Milk (2004-9); Ginebra San Miguel (2005-9); CADP (2004-9); Universal Robina (2004-9); Pepsi (2007-9); Liberty Flour Mills (2006-8)
Coke, refined petroleum products and nuclear fuel	23	4	PNOC (2004-9); Petron (2004-9); Phoenix (2005-9); First Philippine (2005-9)
Intermediate manufacturing	24-35	11	Alliance Global- Goods (2005-9); Cosmos Bottling Corp (2004-6); KPMI- Ship building (2005-7); KPMI- Ship repair (2005-7); Ionic (2005-9); JG Summit Holding (2005-9); RHI (2005-9); Mabuhay Vinyl Corp (2005-9); MVC (2004-9); Manchester International (2004-8); TKC (2005-9)
Mining and quarrying	C	7	Lepanto (2004-9); Manila Mining (2004-9); Philex (2004-9); Semirara (2004-9); United Paragon (2006-9); Nihao (2005-9); DMCi Holding- Mining (2005-9)
Electricity, gas, and water supply	E	1	Manila Water (2005-9)
Construction	F	3	EEI (2004-9); House of Investment- Construction contract (2005-9); DMCi Holding- Construction (2005-9)
Retail Trade, except of motor vehicles and motorcycles; repair of household goods	52	5	Filinvest development Corp.- Surgar Sale (2007-9); Global (2005-9); House of Investment- Merchandise Sale (2005-9); Empire East Land Holding (2005-9); Cebu property venture (2006-9)
Transport and storage	60t63	3	ATI (2004-9); ICTSI (2004-9); Macro (2004-9)
Hotels and restaurants	H	4	Ayalaland- Hotel (2005-9); Grand Plaza hotel (2006-8); Leisure and Resort World Corp (2006-9); Robinson land- Hotel operation (2005-9)
Financial intermediation	J	4	Anscor (2006-9); Basic Energy Corp (2005-9); Mega world (2006-9); MUSX (2004-8)
Education	M	1	Far Eastern University (2007-9)
Real estate activities	70	8	Shang Properties (2005-9); Vista land (2005-9); Belle Corp (2006-9); Cebu holding (2005-9); Filinvest development Corp.- Real Estate Sale (2005-9); Ayalaland- Real Estate (2005-9); Robinson land- Real Estate (2005-9); Highland Prime (2005-9)
Services	LtQ	6	Paxys Inc (2005-9); Bacnotan (2004-9); Alliance Global- Services (2004-9); Jolliville holding (2005-9); House of Investment- Services (2005-9); Metro (2008-9)
Oil Exploration		3	South China Resources (2005-9); Petro Energy (2005-9); PNOC- Explore (2006-9)
IT and Media		3	ICTV (2006-9); Benpres Holding Corp (2005-9); Premiere entertainment (2006-9)

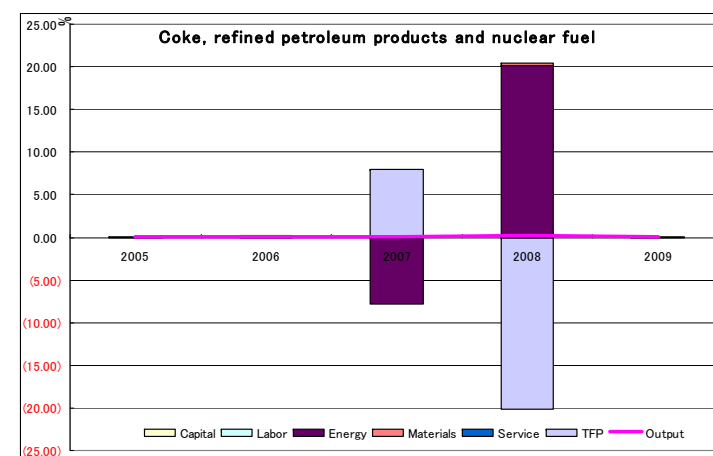
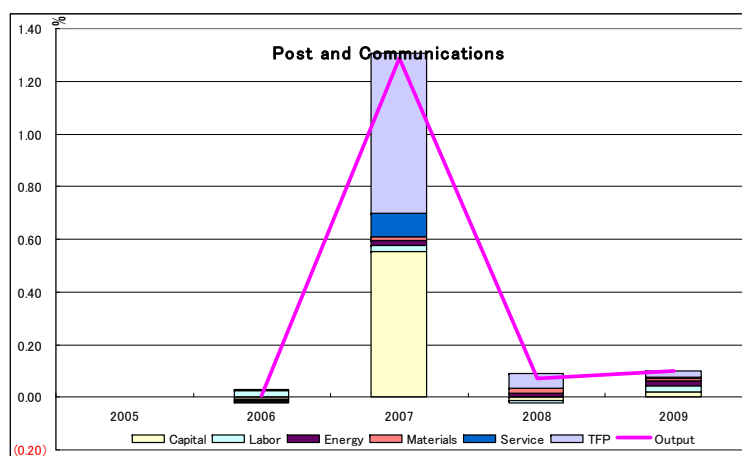
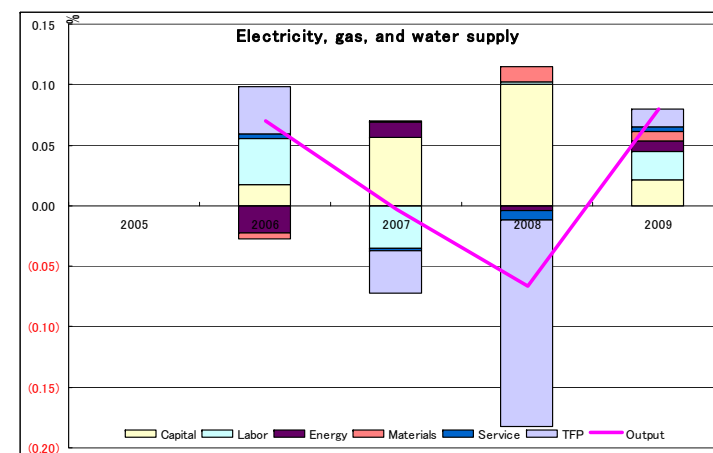
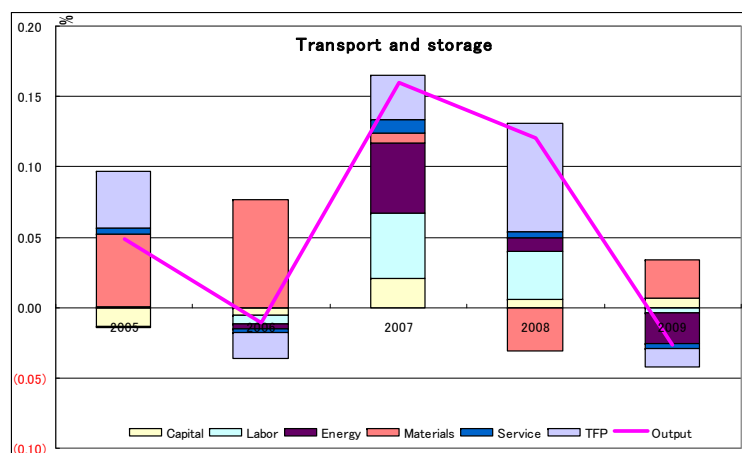
3.2 Sources of Gross output growth (2)



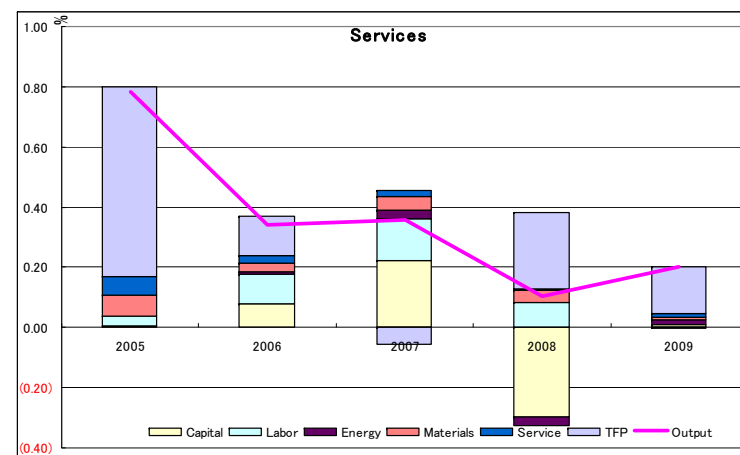
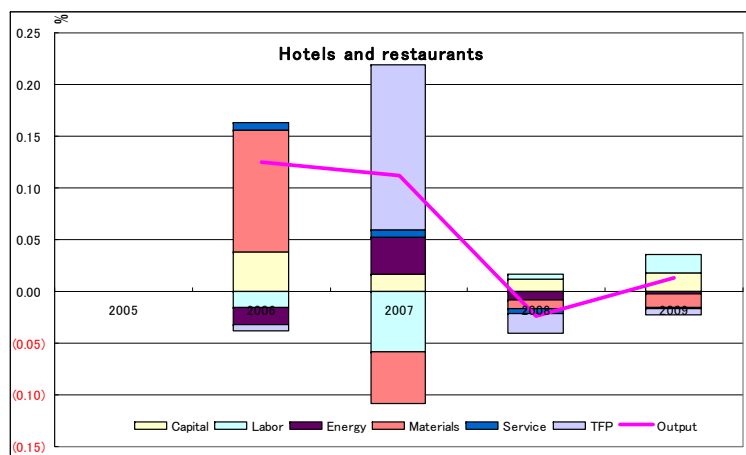
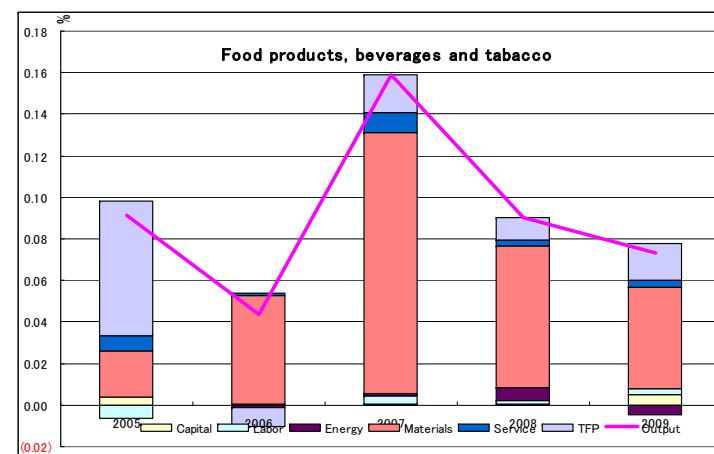
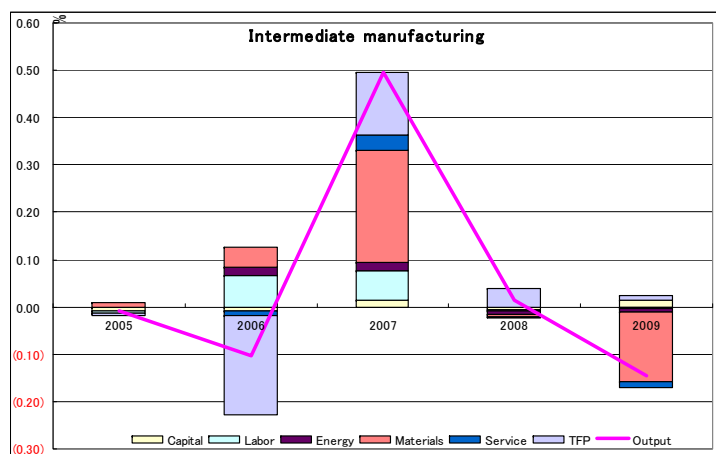
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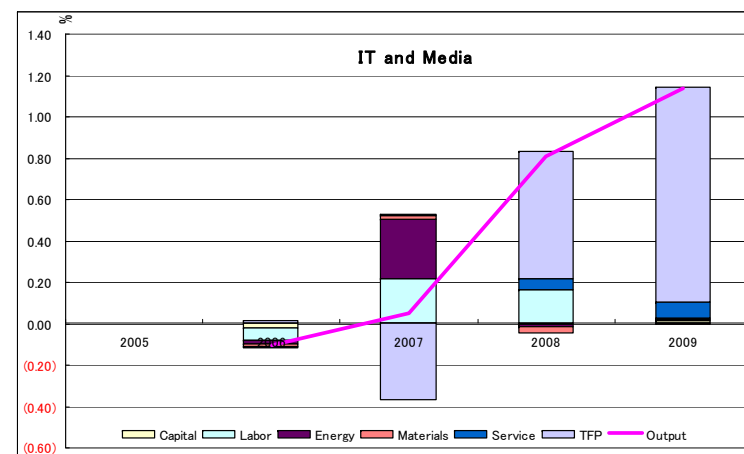
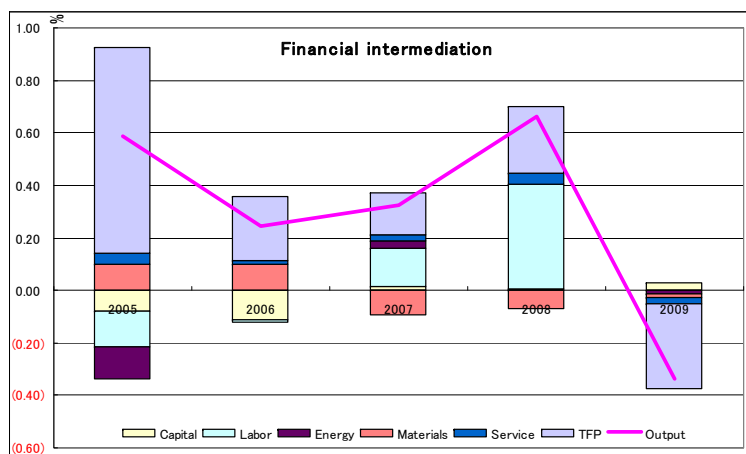
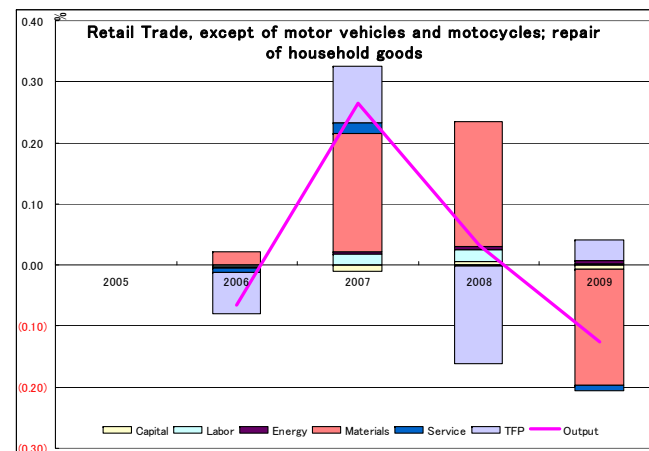
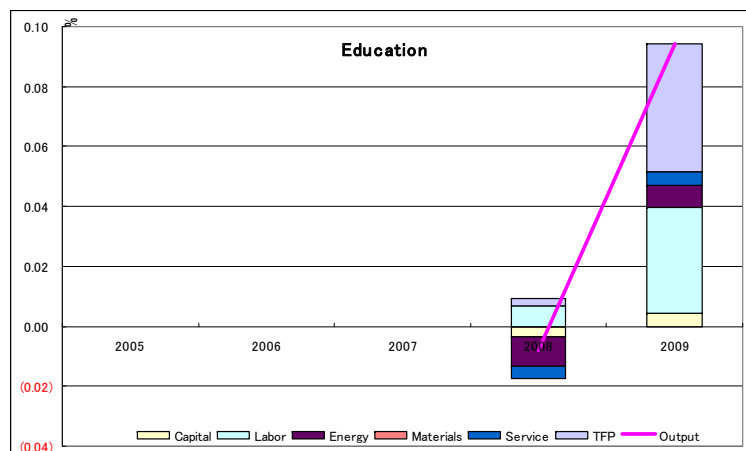
3.2 Sources of Gross output growth (4)



3.2 Sources of Gross output growth (5)



3.2 Sources of Gross output growth (6)



3.2 Sources of Gross output growth (7)

Industry	Output	K	L	E	M	S	TFP
IT and Media	0.47	(0.00)	0.08	0.07	(0.01)	0.03	0.33
Oil Exploration	0.45	0.01	0.07	0.01	0.08	0.03	0.31
Financial intermediation	0.30	(0.03)	0.08	(0.02)	0.00	0.02	0.22
Services	0.36	0.00	0.07	0.01	0.04	0.02	0.22
Mining and quarrying	0.16	(0.05)	(0.00)	0.01	0.01	0.01	0.17
Post and Communications	0.37	0.14	0.02	0.01	0.01	0.02	0.17
Construction	0.14	0.03	0.04	0.00	0.01	0.01	0.04
Hotels and restaurants	0.06	0.02	(0.01)	0.00	0.01	0.00	0.03
Transport and storage	0.06	0.00	0.01	0.01	0.03	0.00	0.02
Education	0.04	0.00	0.02	(0.00)	0.00	0.00	0.02
Food products, beverages and tobacco	0.09	0.00	0.00	0.00	0.06	0.00	0.02
Real estate activities	0.13	0.00	0.01	0.00	0.10	0.01	0.01
Intermediate manufacturing	0.05	0.00	0.02	0.00	0.03	0.00	(0.01)
Retail Trade, except of motor vehicles and motorcycles; repair of household goods	0.03	(0.00)	0.01	0.00	0.06	(0.00)	(0.03)
Electricity, gas, and water supply	0.02	0.05	0.01	(0.00)	0.00	(0.00)	(0.04)
Coke, refined petroleum products and nuclear fuel	0.09	(0.01)	0.00	3.09	0.11	0.01	(2.48)

4. Further work

1. Classification of industries according to KLEMS industrial classification
2. Construction of databases
 - IT and Non-IT data
 - Labor data
 - Gender, Class of workers, Education of workers by industry, etc.
 - More data series for earlier years

THANK YOU