

The 14th AIM International Workshop

Future Estimation of Iron Stock & Flow in Japan and China

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Tsukuba, Japan

Review of last year

Title: Development of Iron Stock & Flow Model in Japan and China

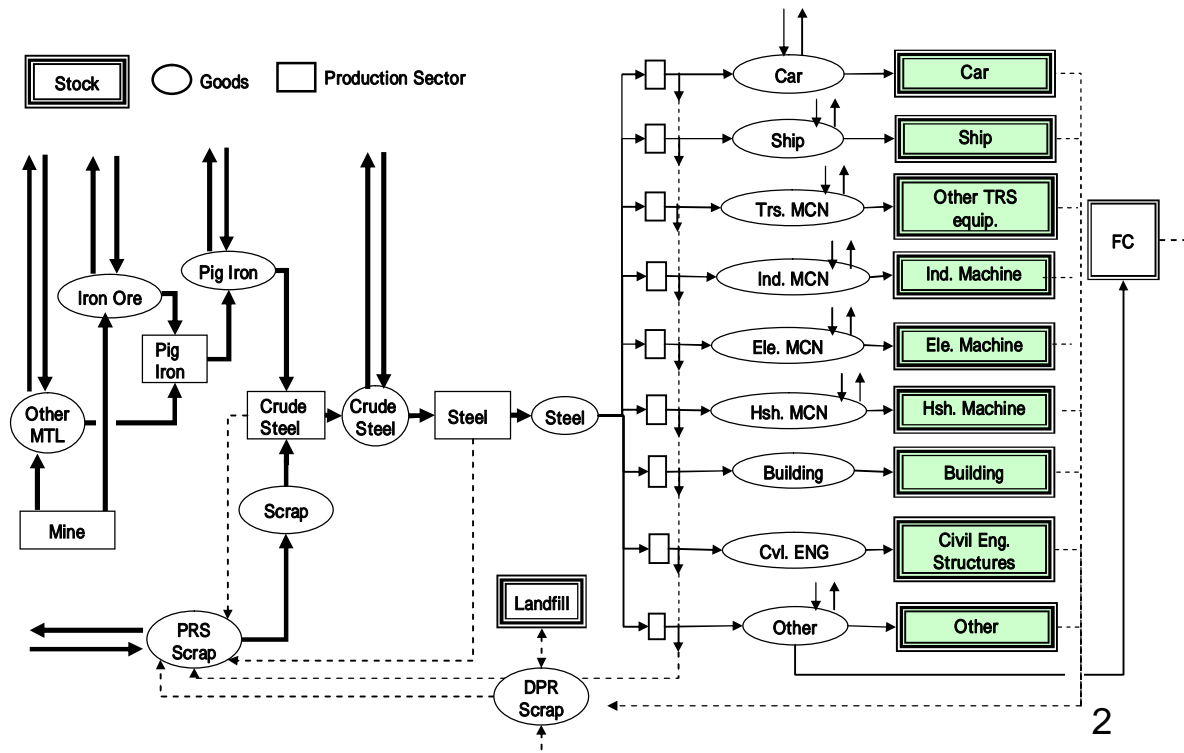
Description: Material Stock and Flow Model (MSFM)

Goods: Building, Civil engineering structures, Car, Ship, Other transport equipment, Machine, Electrical machine, Business machine, Others

9 kinds (JPN)
7 kinds (CHN)

Periods: 1970-2002(JPN)
1984-2005(CHN)

Outputs: Steel stock,
Input to stock,
Scrap generation
by final demand
goods



Methodology (Example of Japan)

1. Calculate Steel Stock by final demand goods :1970-2002

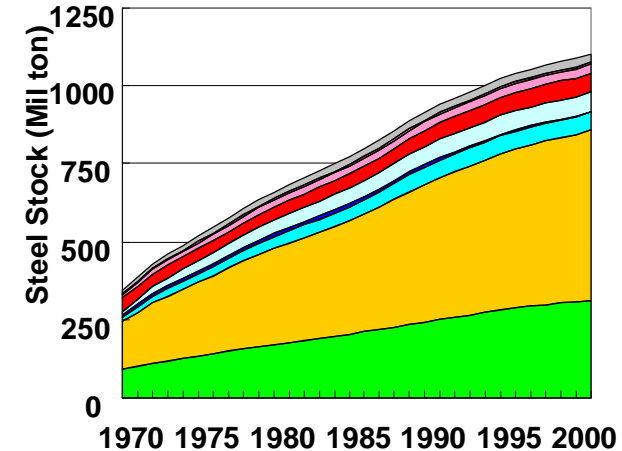
$$Steel_INP_i = \sum_k d_k \cdot Good_PRD_{i,k}$$

Steel stock by final demand goods

Required data: Steel input to goods
Goods production,,,,,,,,

Eq. Input-output relation
Goods balance
Sector balance ,,,,,,,,,

Regression analysis



2. Identify the relationship between the Steel Stock and Socio_economic index

Steel stock by goods = $f(\text{GDP per capita, POP, Const ? ? ?})$

3. Future estimation

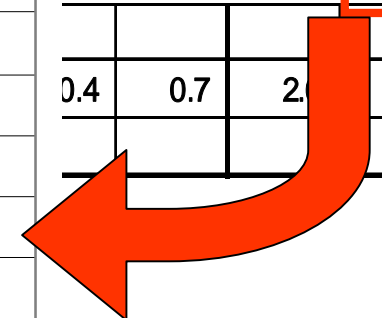
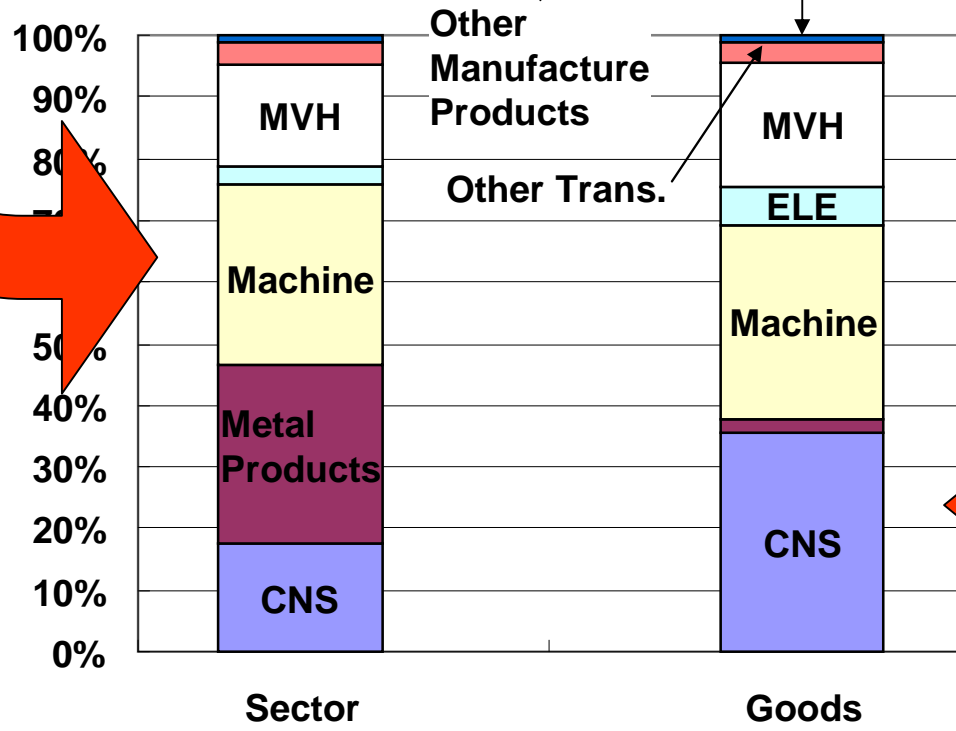
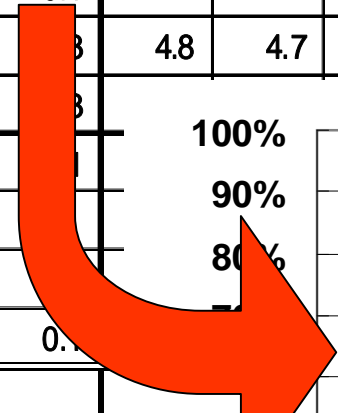
Assumption of exogenous variables (trade, tech_parameters)

Steel input to final demand goods

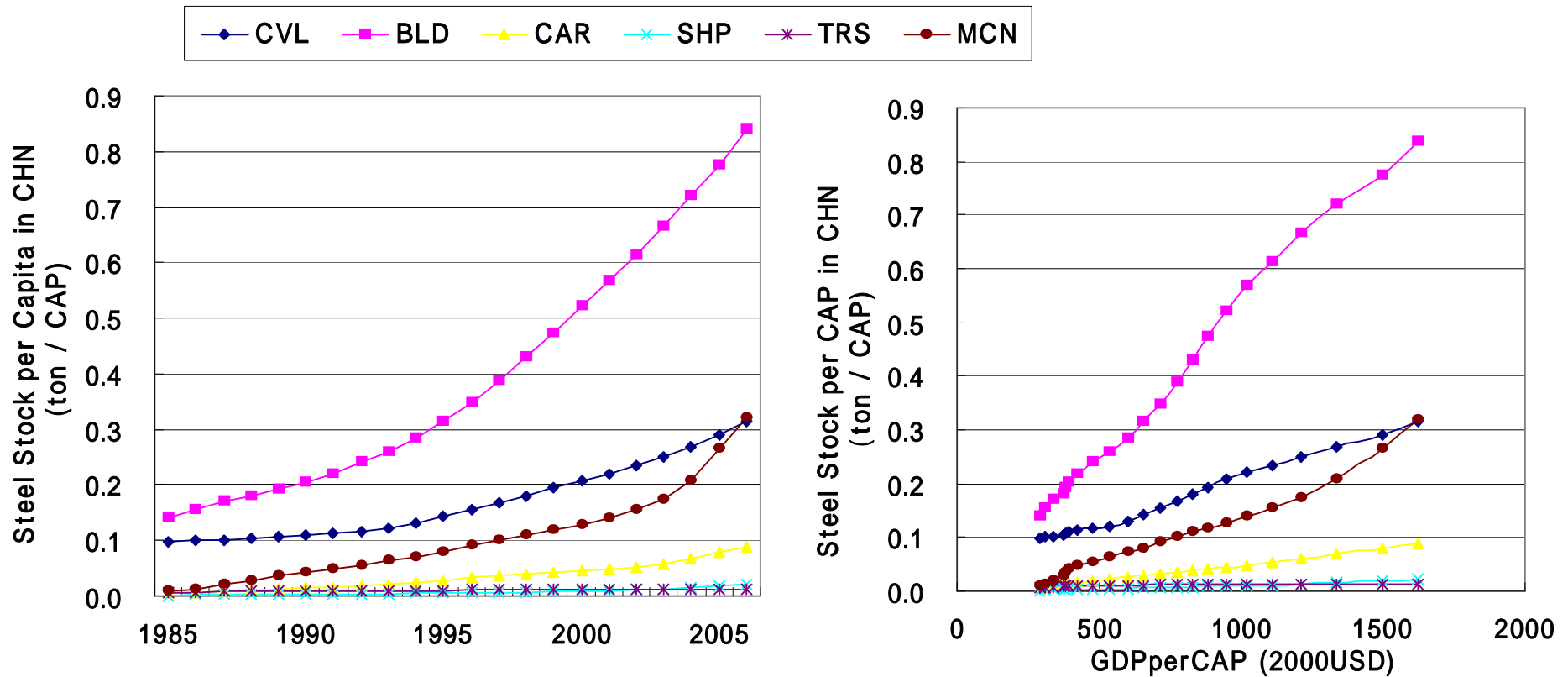
Steel Flow (100 = input to I_S sector)

	Intermediate										Final				
	I_S	CNS	FMP	OME	ELE	MVH	OTN	OMF	OTH	total	CGD	HOU	IMP	EXP	total
OMN	100.0										0.0	0.0	102.3	2.3	
I_S		17.0	28.4	28.4	2.7	16.0	3.7	1.0		97.3	0.0	0.0	7.8	30.9	
CNS		0.1								0.1	25.5	0.0	0.0	0.0	25.5
FMP		0.2	3.8	4.8	4.7	1.9	1.5	0.2	0.8	5.2	29.5	1.1	0.6	2.1	1.9
OME		0.1	0.3										1.5	4.1	11.8
ELE													1.2	0.9	2.1
MVH													4.8	0.6	6.9
OTN													0.0	0.5	1.5
OMF													0.4	0.2	0.2
Environ.															
Scrap O	1.4	1.4											0.4	0.7	2.1
Scrap I	27.89														

Including extraction



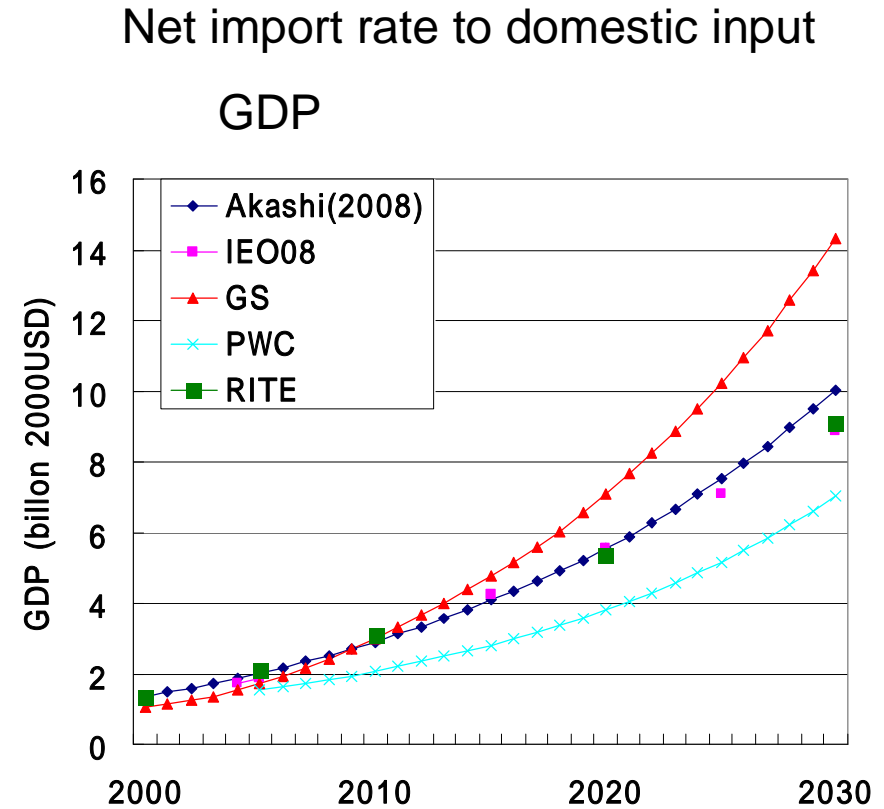
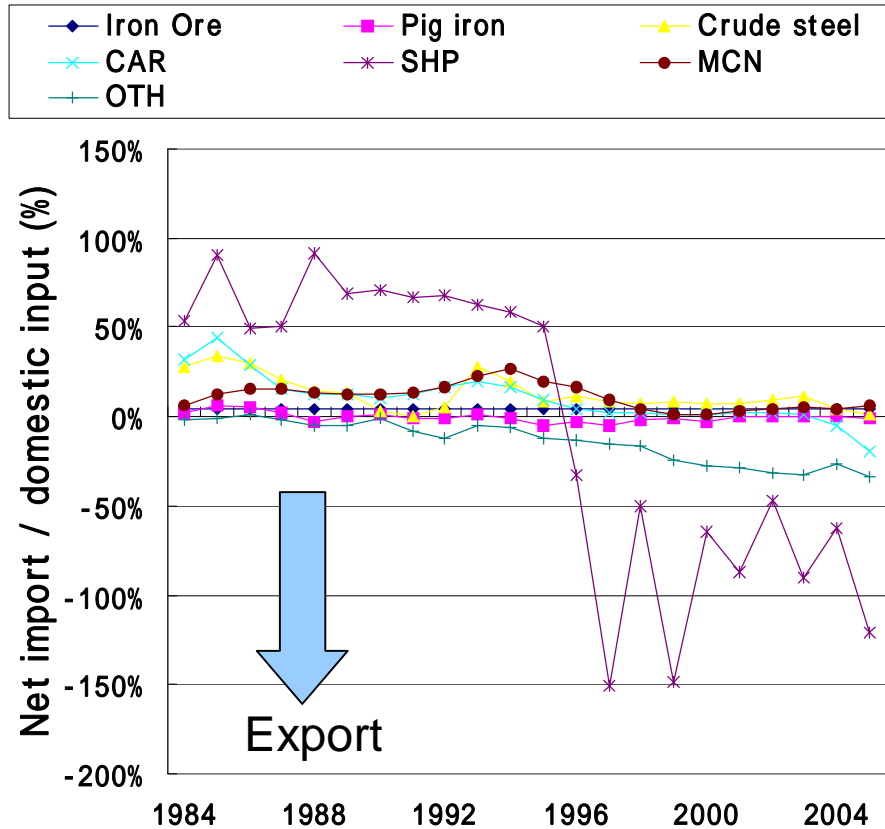
Identify the relationship between the Steel Stock and Socio_economic index (CHN)



Steel Stock per Capita increases in proportion to increase of GDP per Capita

$$\Rightarrow \text{Steel Stock per Capita} = a * \text{GDP / CAP} + b$$

Assumption of trade, future GDP

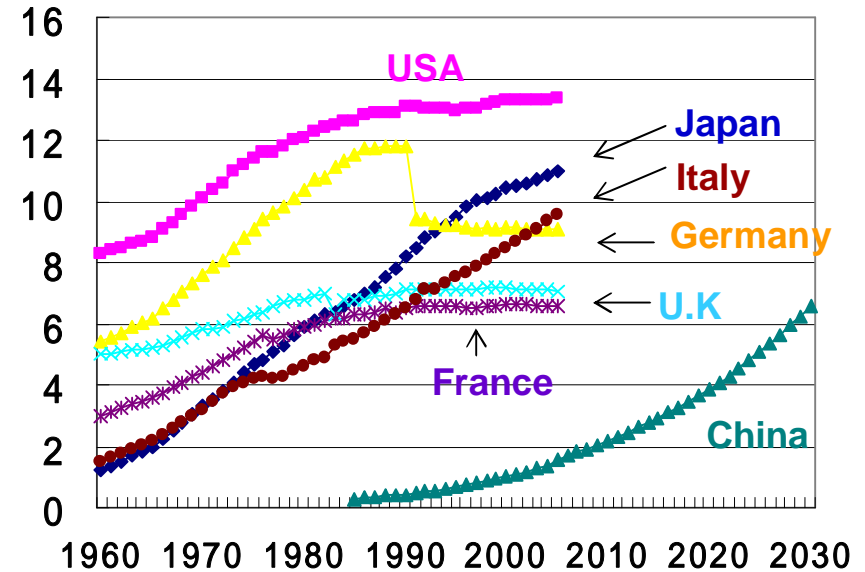
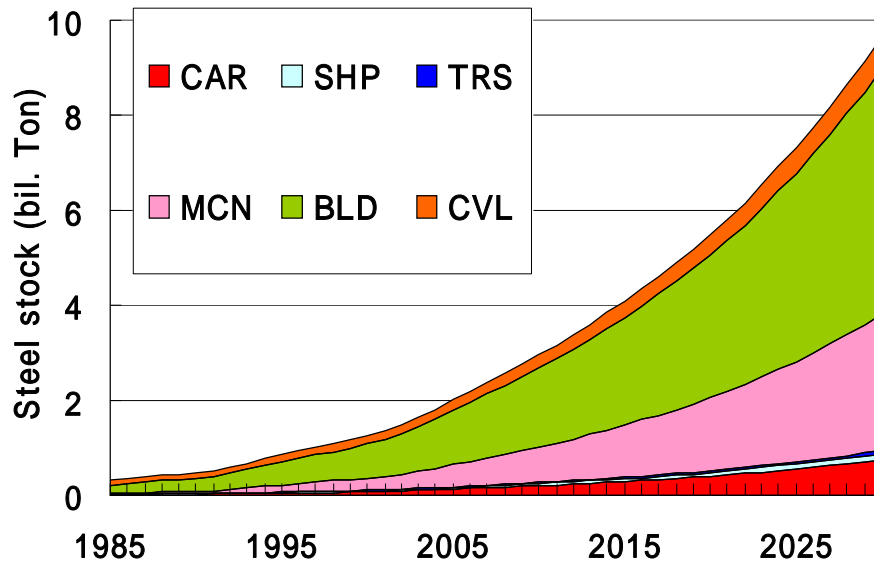


Net import rate is fixed to

without large change : the rate in 2005

with large change : average rate of past 5 years

Steel Stock in CHN



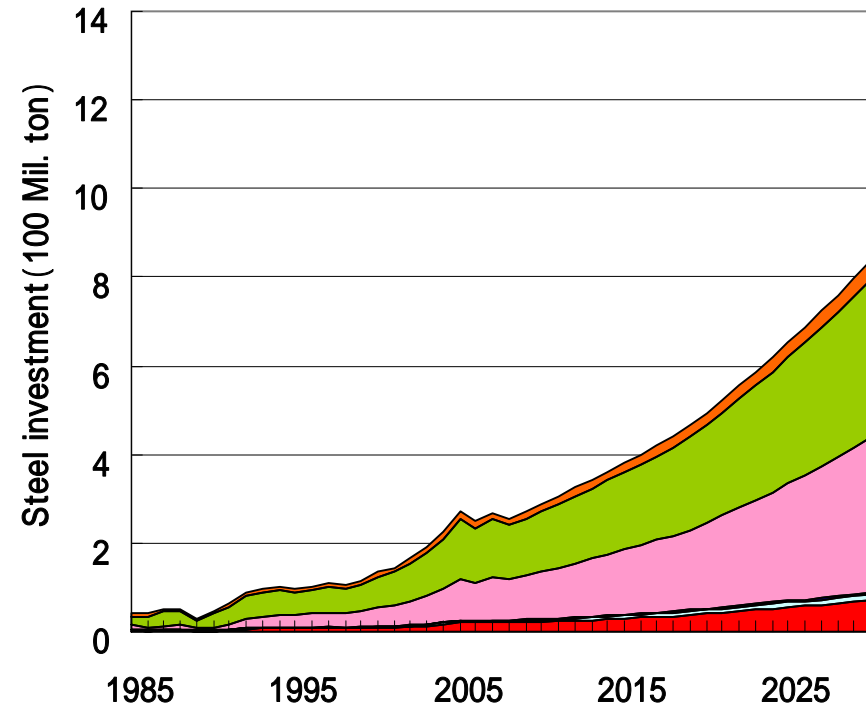
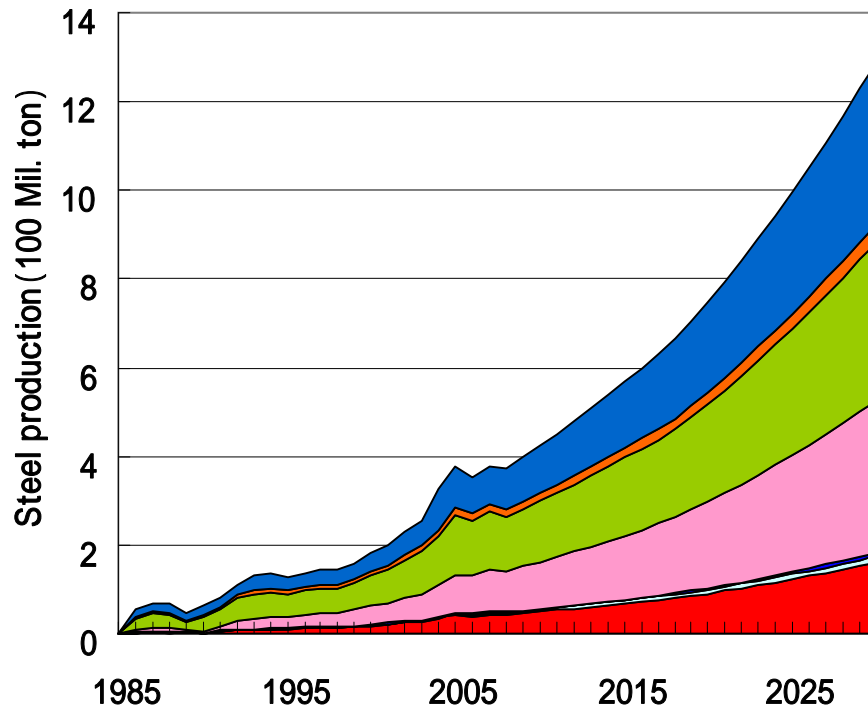
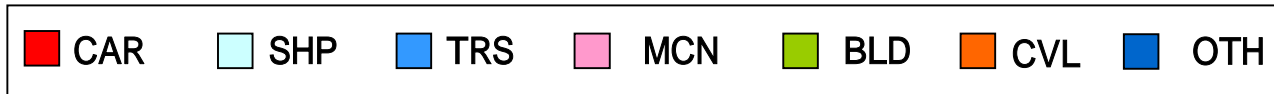
< Stock total >

- 2.02 bil ton (2005) , 9.64 bil ton (2030) .
- BLD = 53.6% , MCN = 29.8% . (From 2005, total of top 2 = 80%)

< Steel stock per capita >

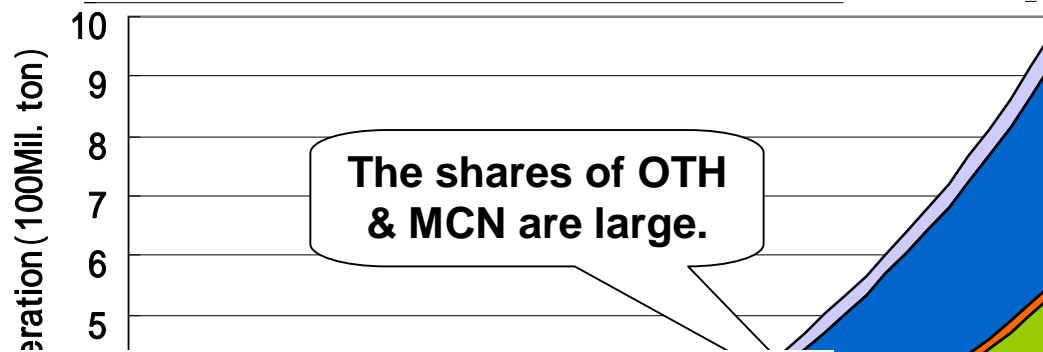
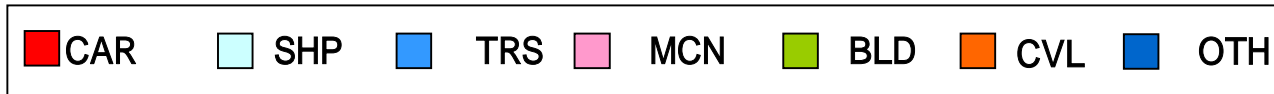
- 1.5 ton per capita (2005) , 6.6 ton per capita (2030) ,
- The serial changes = same as those of Japan and Italy as they were 40 years ago

Production and Investment



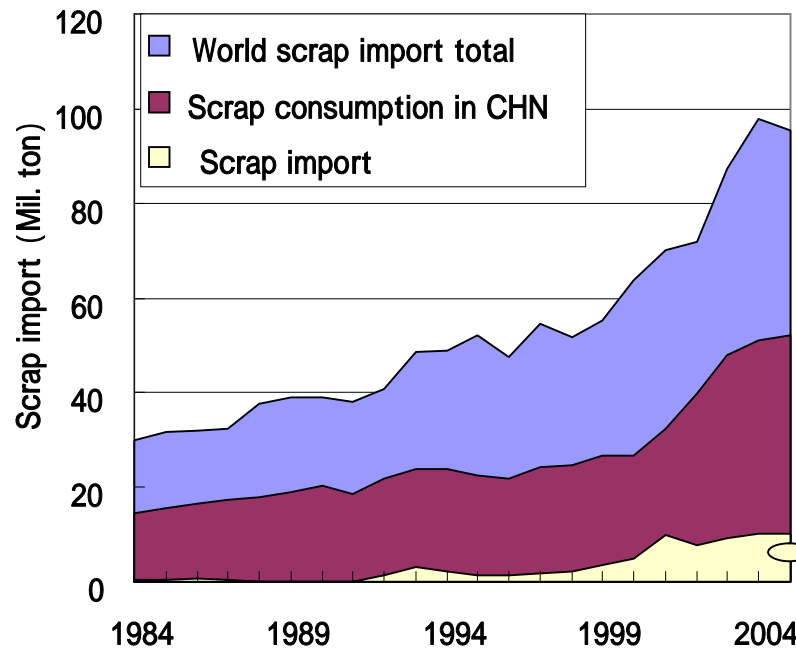
- Steel production: 1.22 bil. ton (2030, 3.3 times of 2005)
=World steel production in 2006
- Other= 28.2% , Buildings=27.7% , Machinery= 26.8% ,
- Steel investment: 0.84 bil. ton (2030) , export of CAR is large.

Scrap generation



OTH: not accumulated as stock. Consumption = Scrap .

MCN: shorter lifetime < CVL(30yr), BLD(25yr). Scrap generation from stock is large.



2025 2030

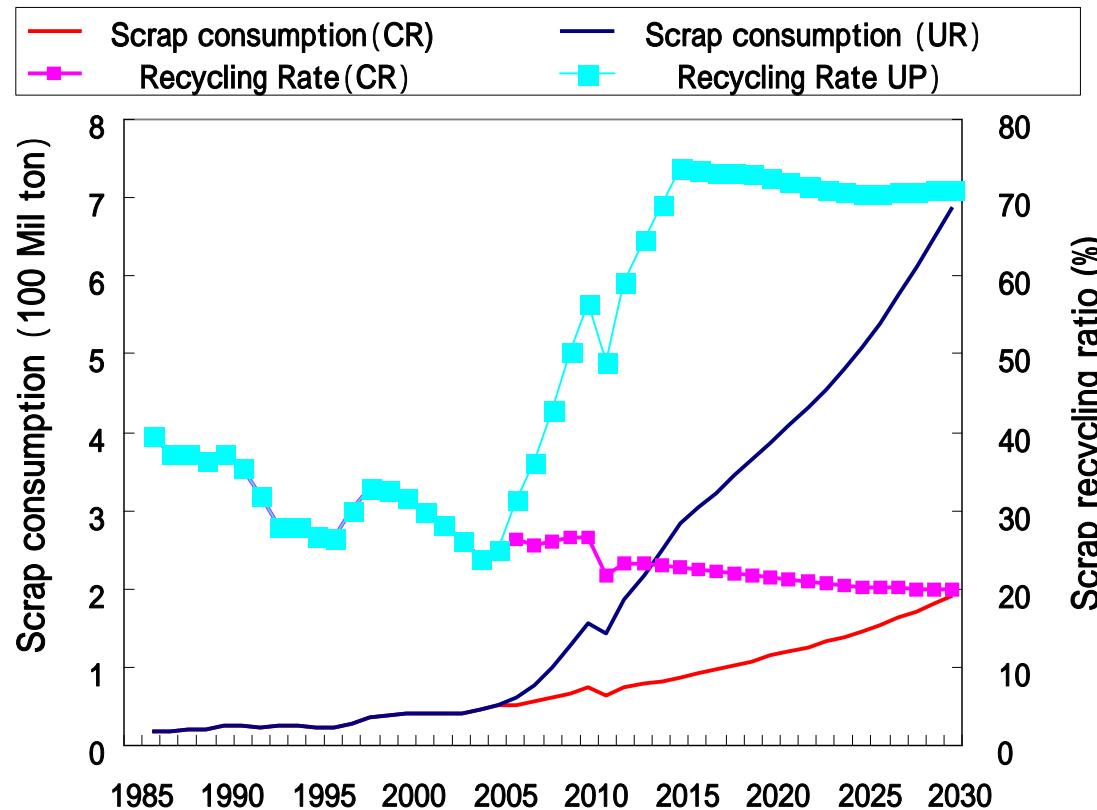
Is it possible that scrap demand is supplied by scrap generation within China?

Scenario analysis of recycle rate of scrap

Scrap consumption for crude steel production

Current case (CR) : 15% at current level

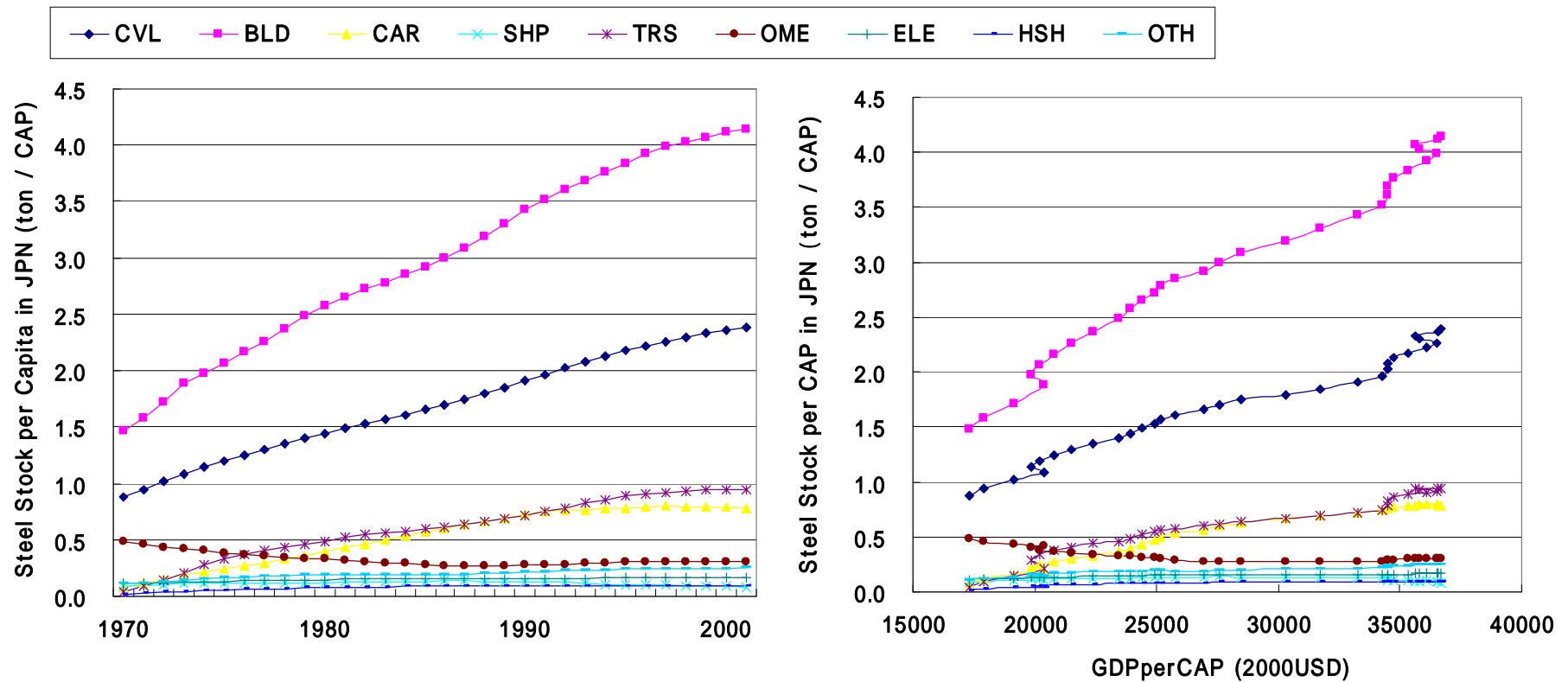
Up case (UR): increase up to 45% by 2015 same as Japan's rate



In the “Current case”, scrap generation increases more than scrap consumption, so recycling rate doesn't increase .

In the “Up case”, scrap consumption would be able to be supplied within China. **But high recycling levels of over 70% would be required.**

Identify the relationship between the Steel Stock and Socio_economic index (JPN)



Except for CVL and BLD, steel stock per capita is almost constant.

The growth of CVL and BLD is gradual. => constant

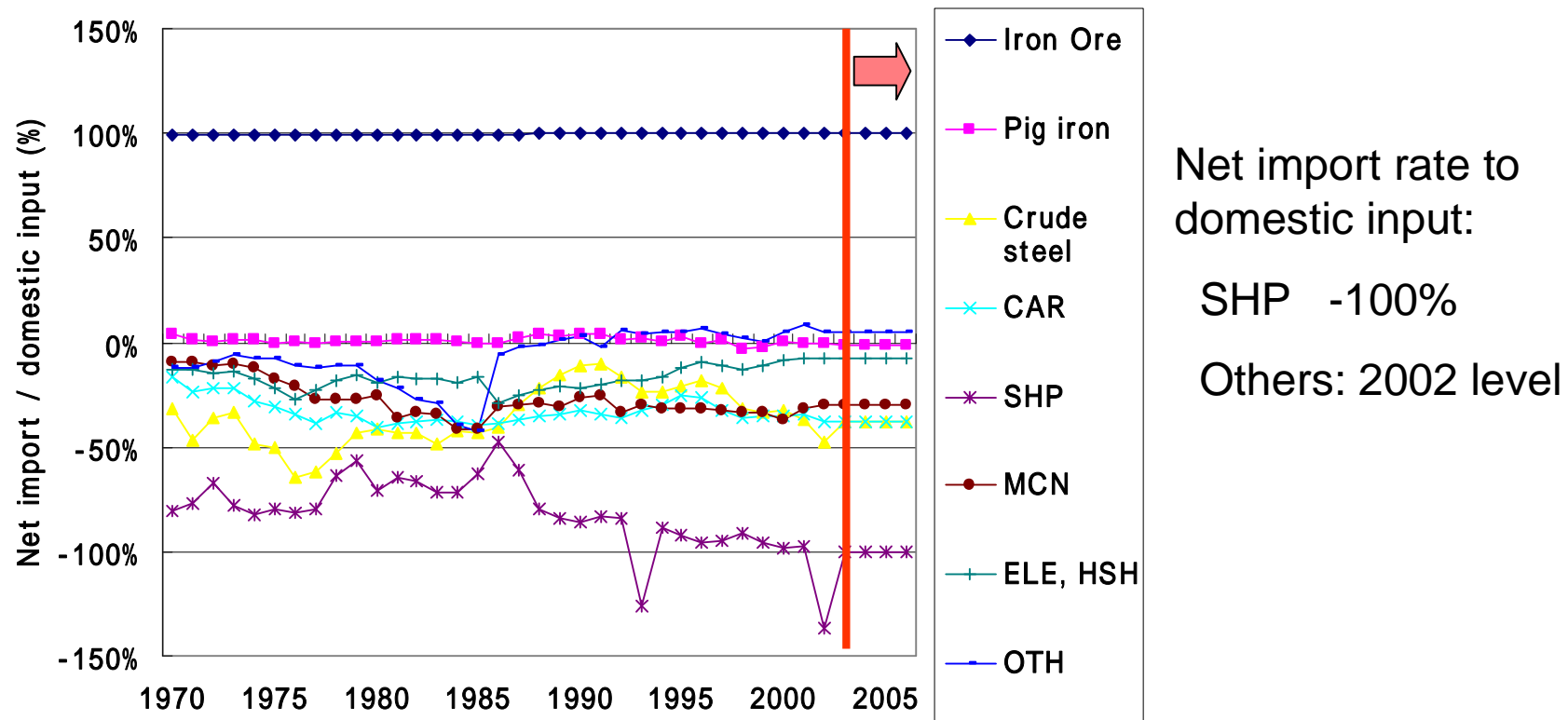
Assumption of Population, Trade

Population 128 million (2008)

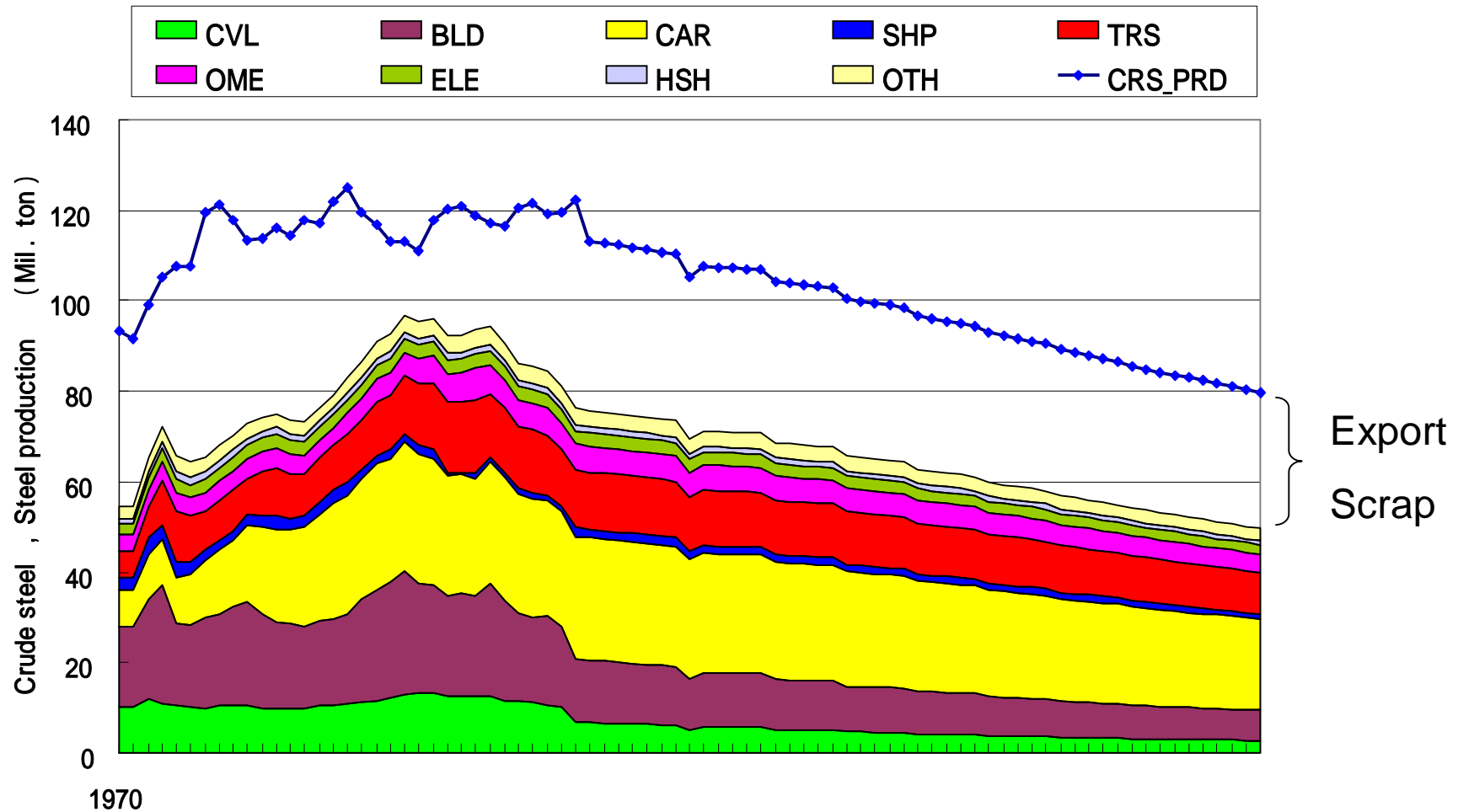
scenarioA 94 mil. (73% of 2008 level)

scenarioB 100 mil. (78% of 2008 level)

Trade



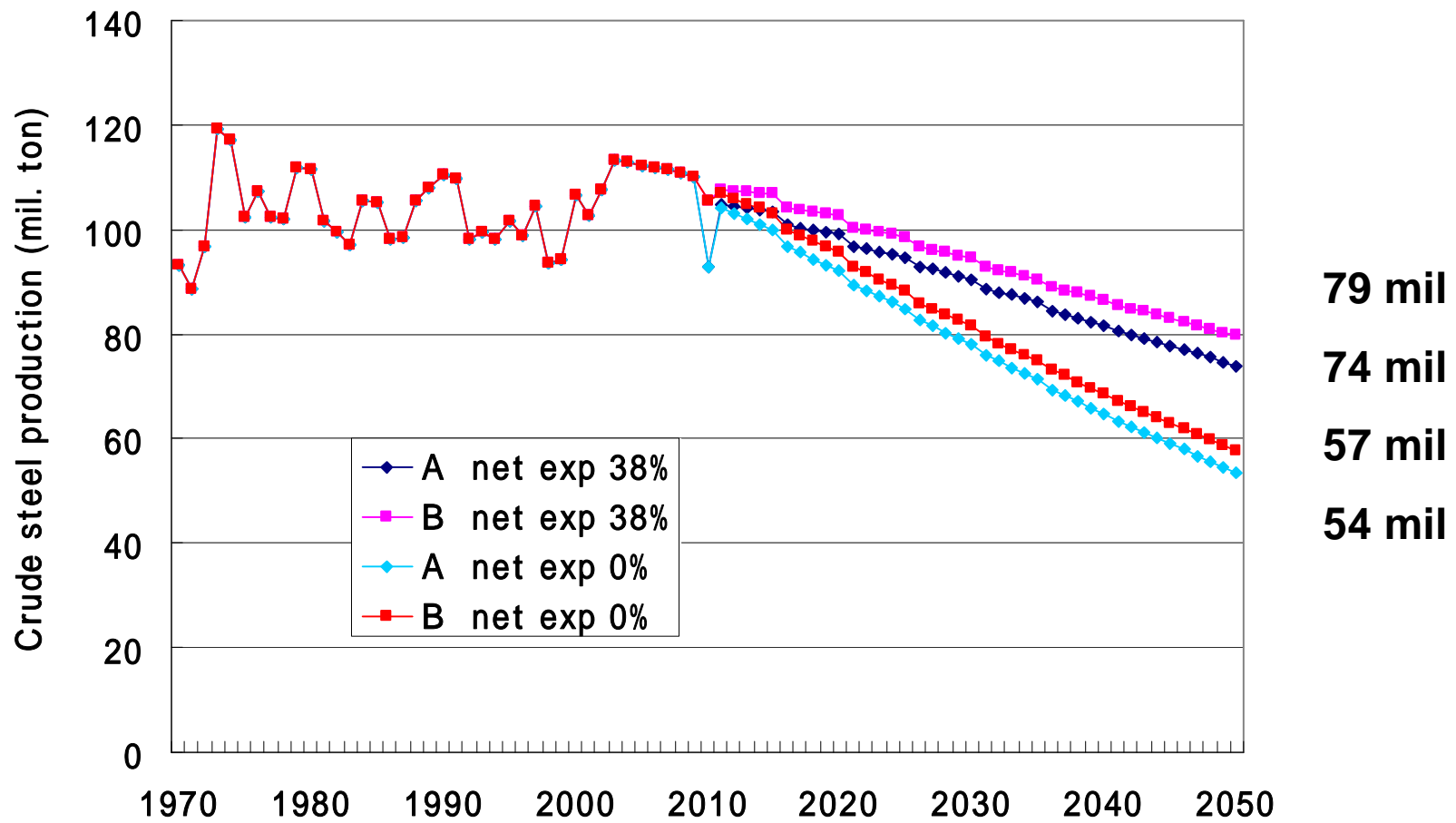
Crude steel Production



Population is driving force of crude steel production => 22-27% reduction

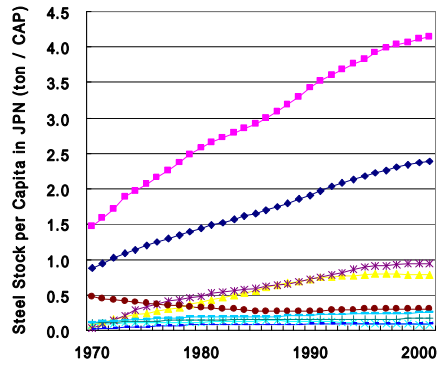
How much is the export rate of crude steel reduced?

Scenario analysis 1: crude steel Production



Current Import rate: 5%, Export: 43% => Net Export 8%

Scenario analysis 2: CVL investment (B)



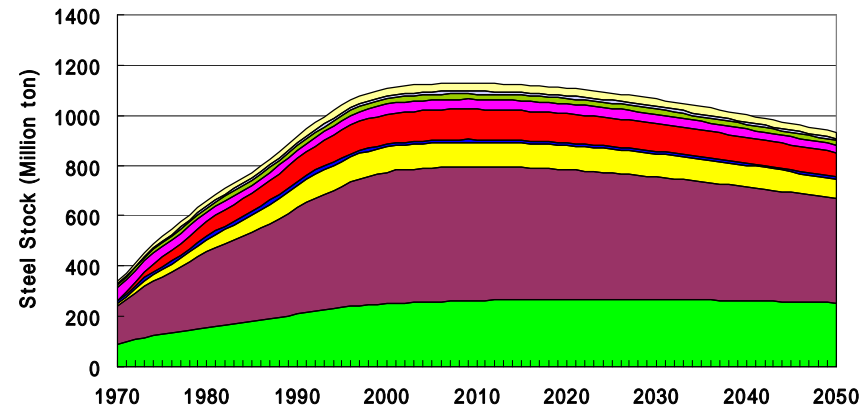
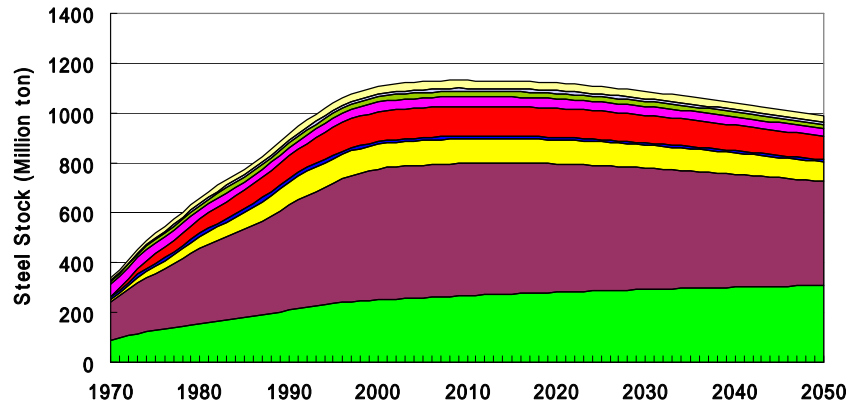
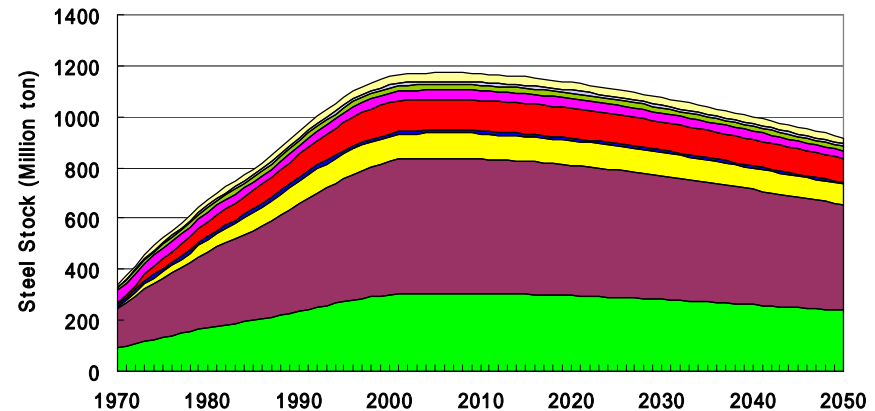
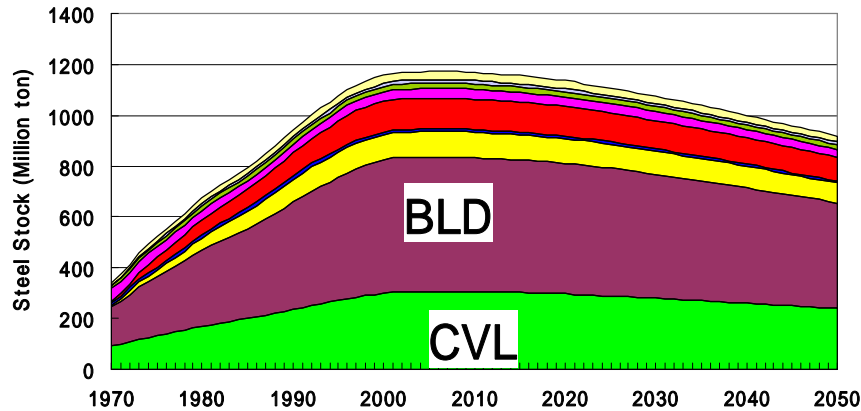
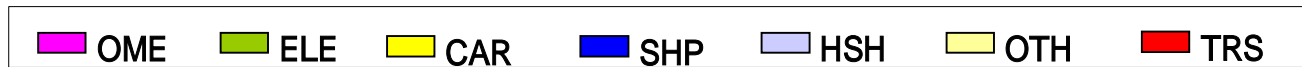
Future CVL: Ministry of Land, Infrastructure, Transport and Tourism

Base case

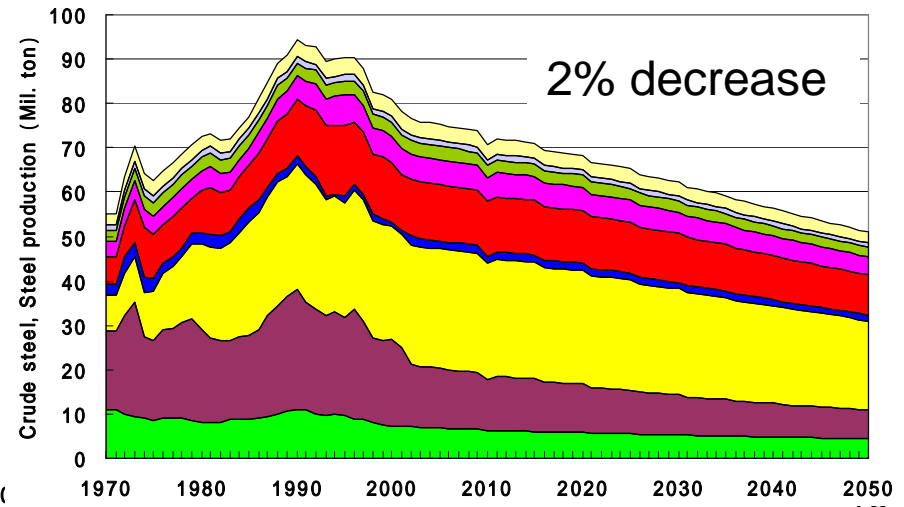
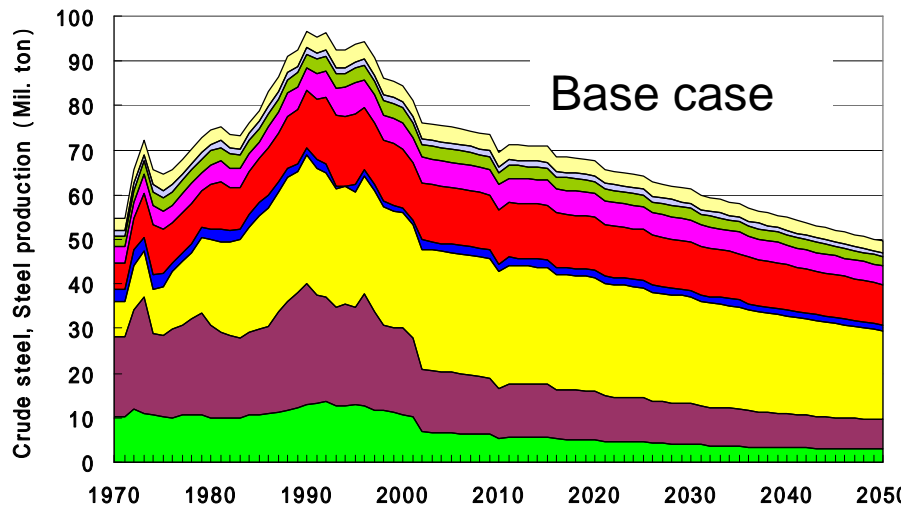
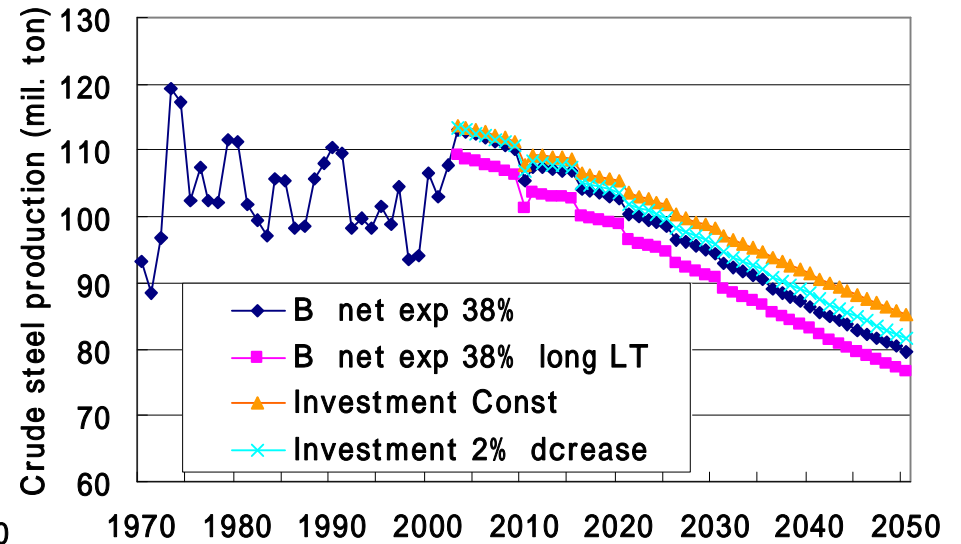
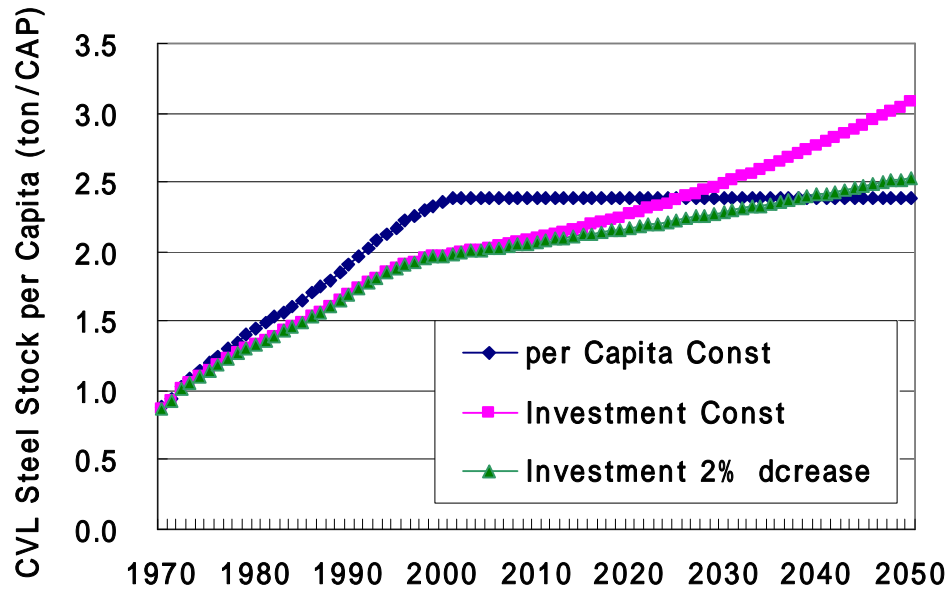
lengthen Lifetime 30%

Investment Constant

Investment 2% decrease



Scenario analysis 3: perCAP, Production



Thank you



Steel Flow

