Global Trends in Population Aging and Longevity Risk

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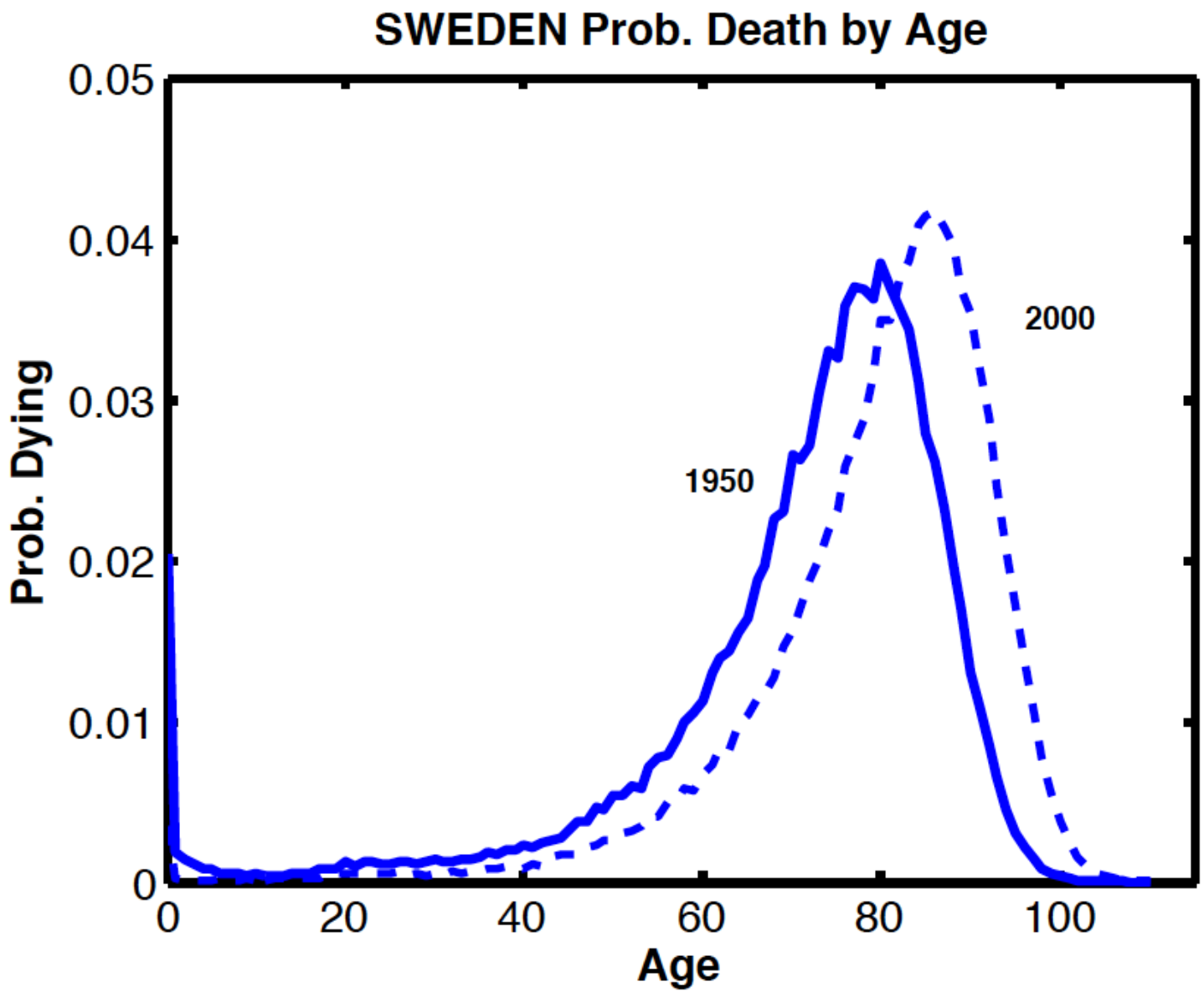
KEY INDICATORS

AGING

individual measures

LIFE EXPECTANCY AT BIRTH, e_0

LIFE EXPECTANCY AT age 65, e_{65}


SWEDEN Prob. Death by Age
Prob. Dying
0.05
0.04
0.03
0.02
0.01
0
0
20
40
60
80
100
Age
1950
2000

KEY INDICATORS

AGING

individual measures

LIFE EXPECTANCY AT BIRTH, e_0

LIFE EXPECTANCY AT age 65, e_{65}

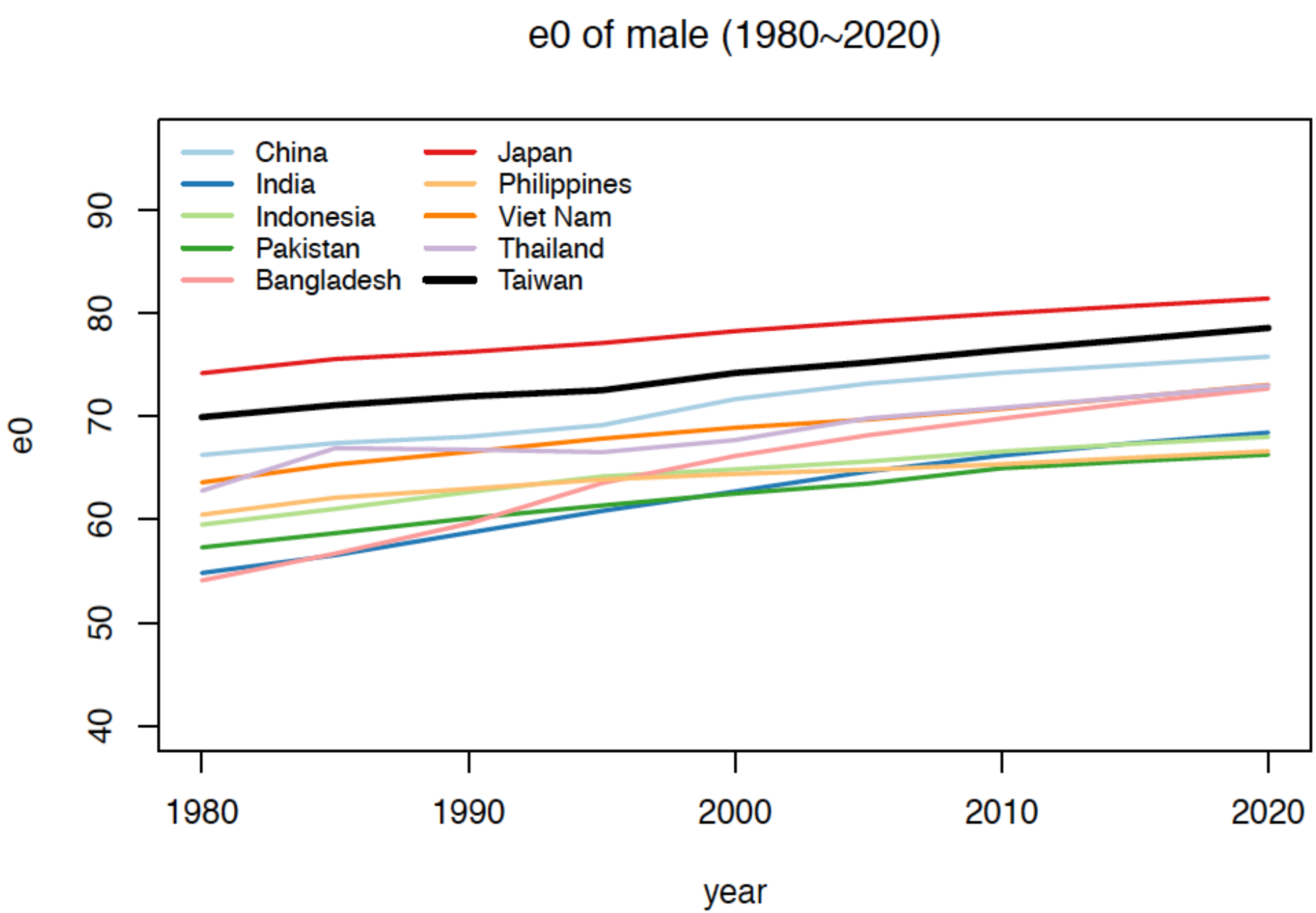
WHAT THE INDICATORS MEAN

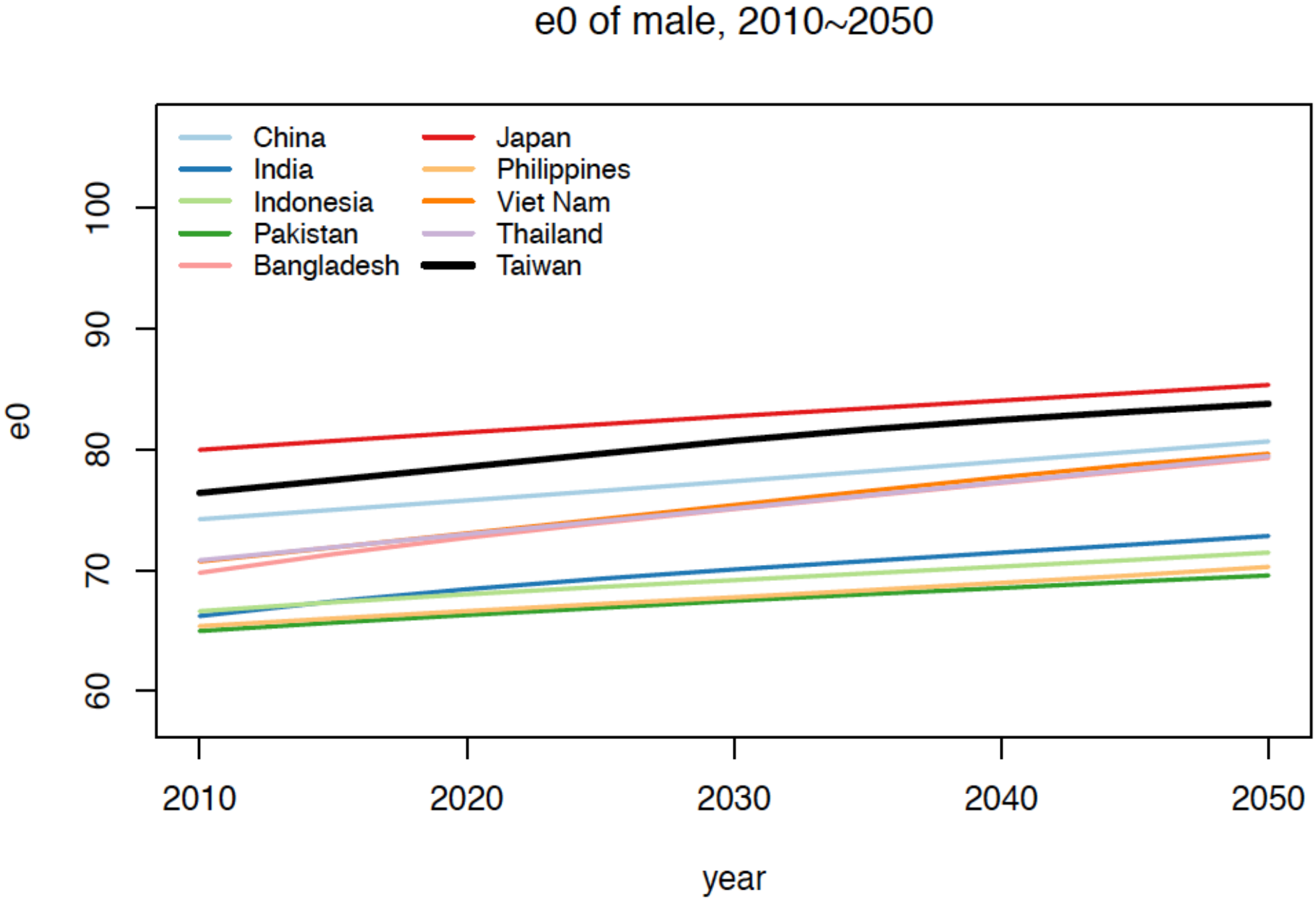
e_0

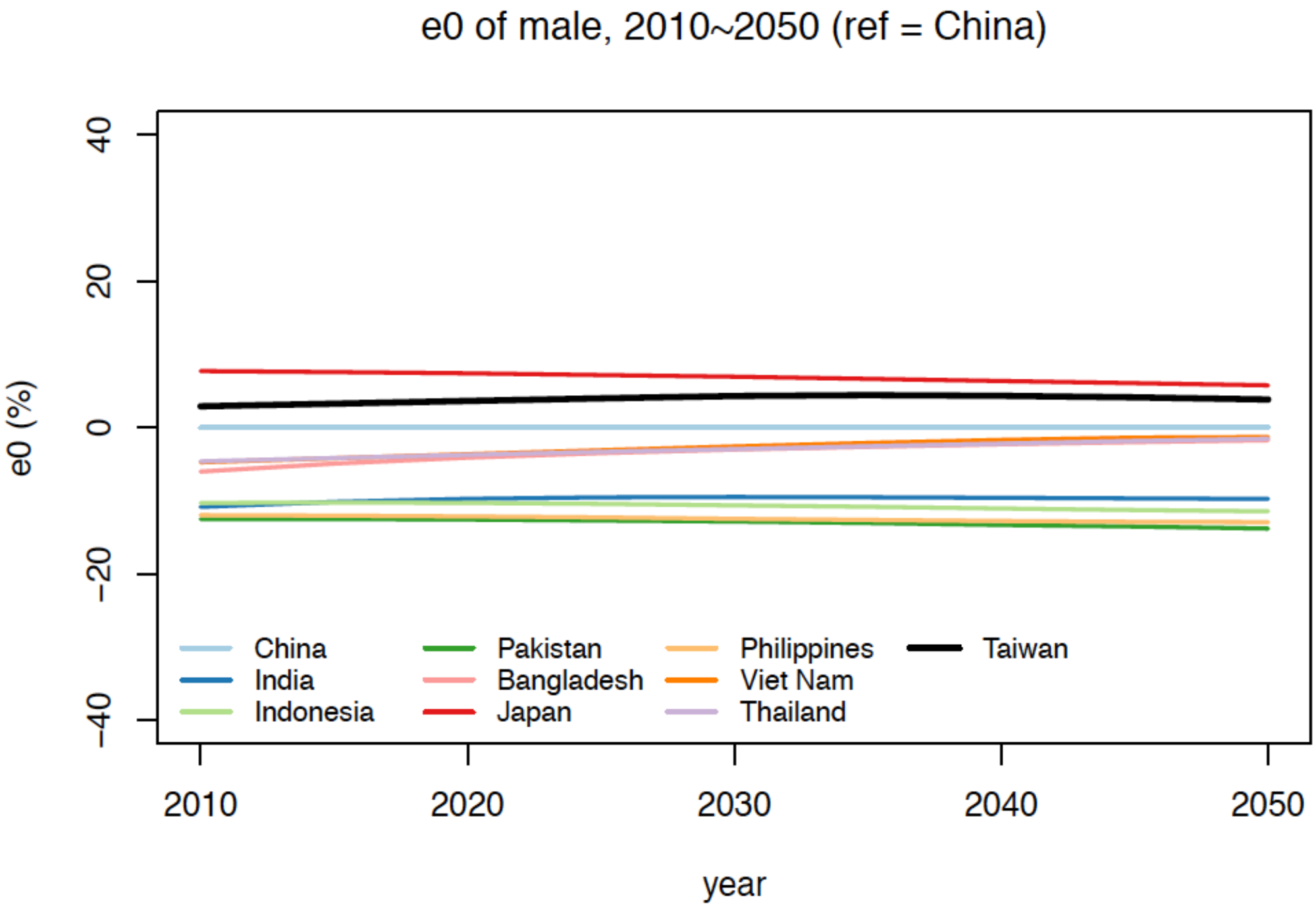
commonly used
average length of life

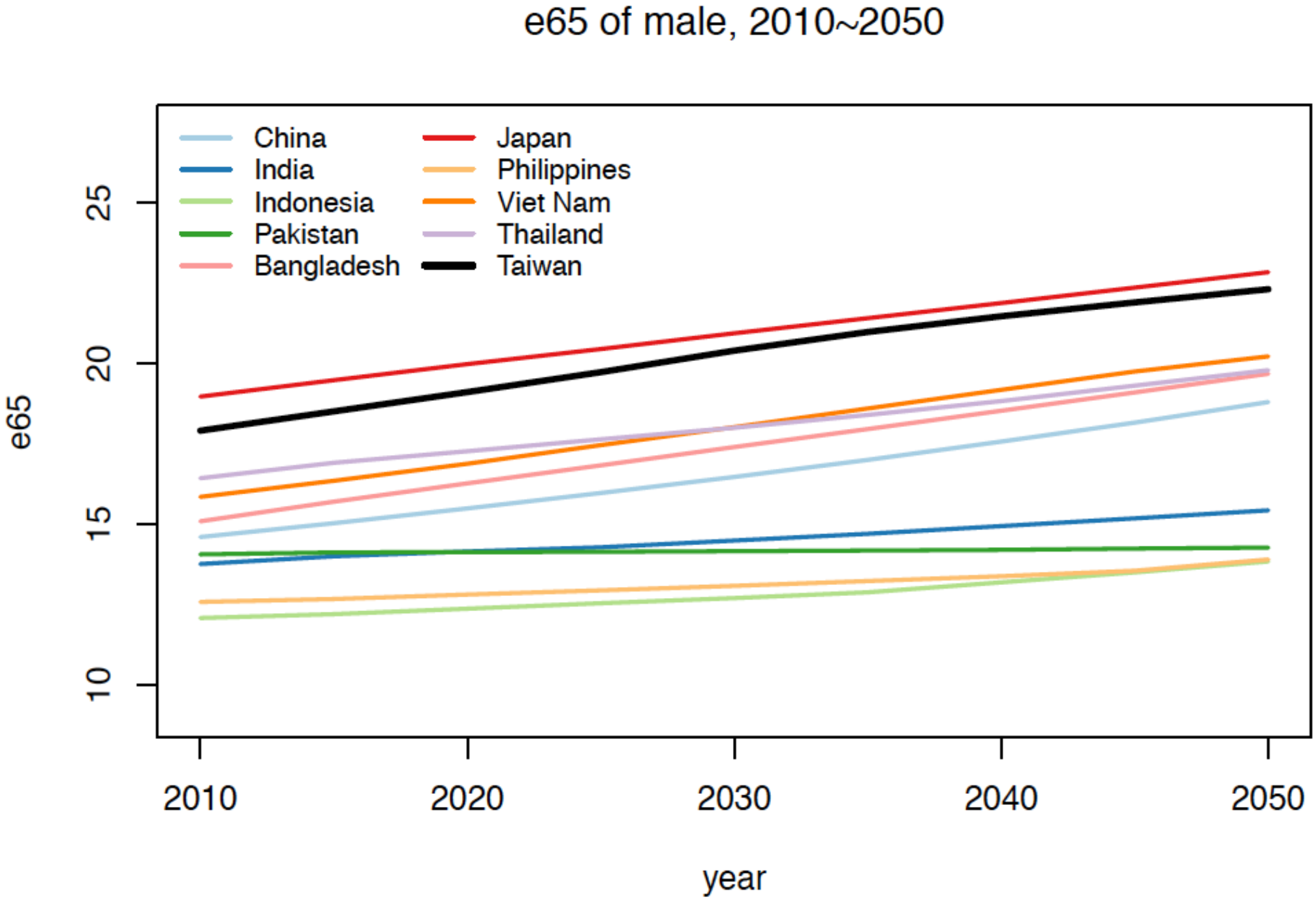
e_{65}

average remaining life at 65
retired/older –
annuity/insurance


e0 of male (1980~2020)
China
India
Indonesia
Pakistan
Bangladesh
Japan
Philippines
Viet Nam
Thailand
Taiwan
e0
40
50
60
70
80
90
1980
1990
2000
2010
2020
year


e0 of male, 2010~2050
China
India
Indonesia
Pakistan
Bangladesh
Japan
Philippines
Viet Nam
Thailand
Taiwan
e0
60
70
80
90
100
2010
2020
2030
2040
2050
year


e0 of male, 2010~2050 (ref = China)
e0 (%)
40
20
0
−20
−40
2010
2020
2030
2040
2050
year
China
India
Indonesia
Pakistan
Bangladesh
Japan
Philippines
Viet Nam
Thailand
Taiwan


e65 of male, 2010~2050
China
India
Indonesia
Pakistan
Bangladesh
Japan
Philippines
Viet Nam
Thailand
Taiwan
e65
10
15
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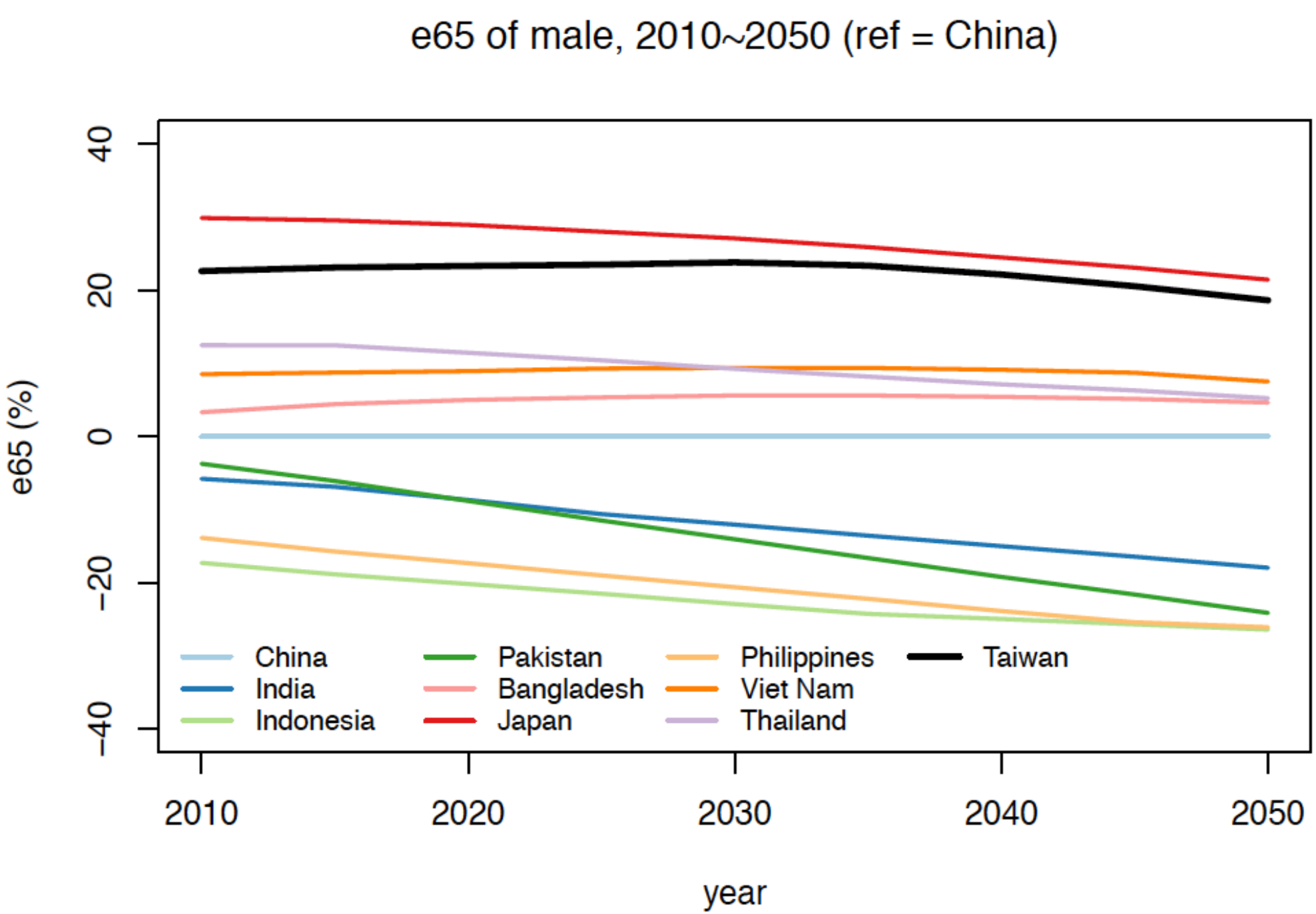
25
2010
2020
2030
2040
2050
year


e65 of male, 2010~2050 (ref = China)
e65 (%)
40
20
0
−20
−40
2010
2020
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year
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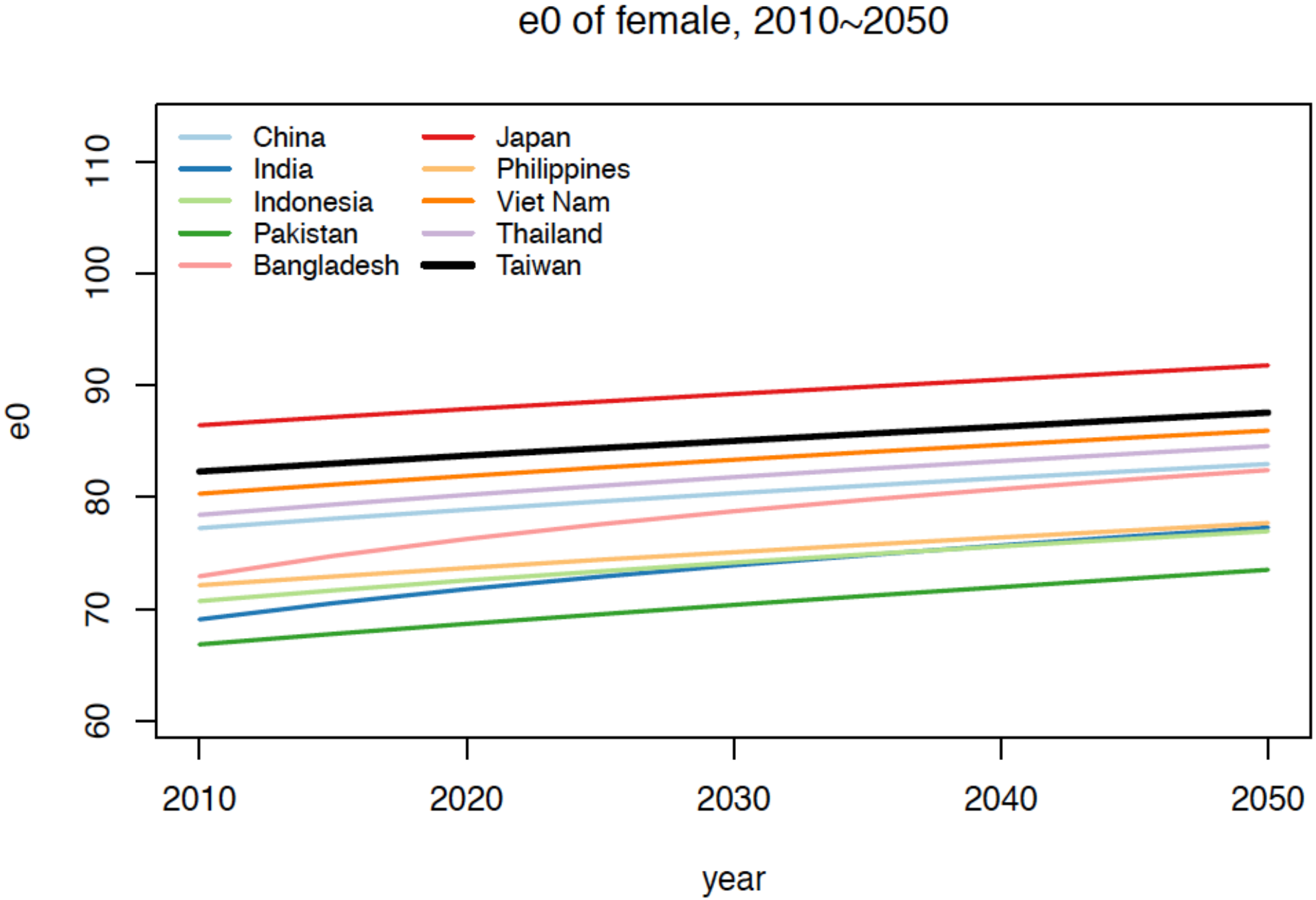
Thailand
Taiwan


e0 of female, 2010~2050
China
India
Indonesia
Pakistan
Bangladesh
Japan
Philippines
Viet Nam
Thailand
Taiwan
e0
60
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100
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2010
2020
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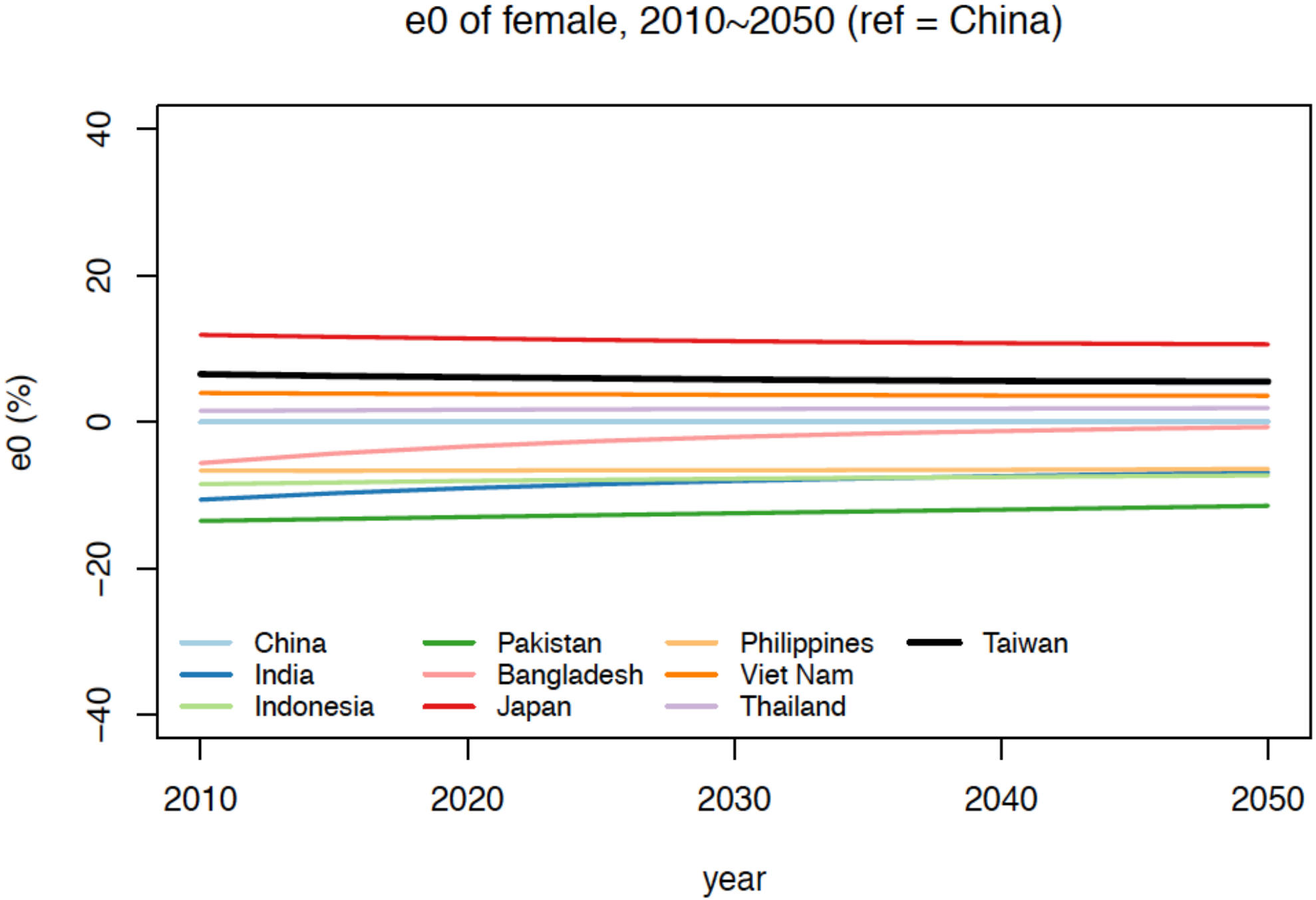
2050
year


e0 of female, 2010~2050 (ref = China)
e0 (%)
40
20
0
−20
−40
2010
2020
2030
2040
2050
year
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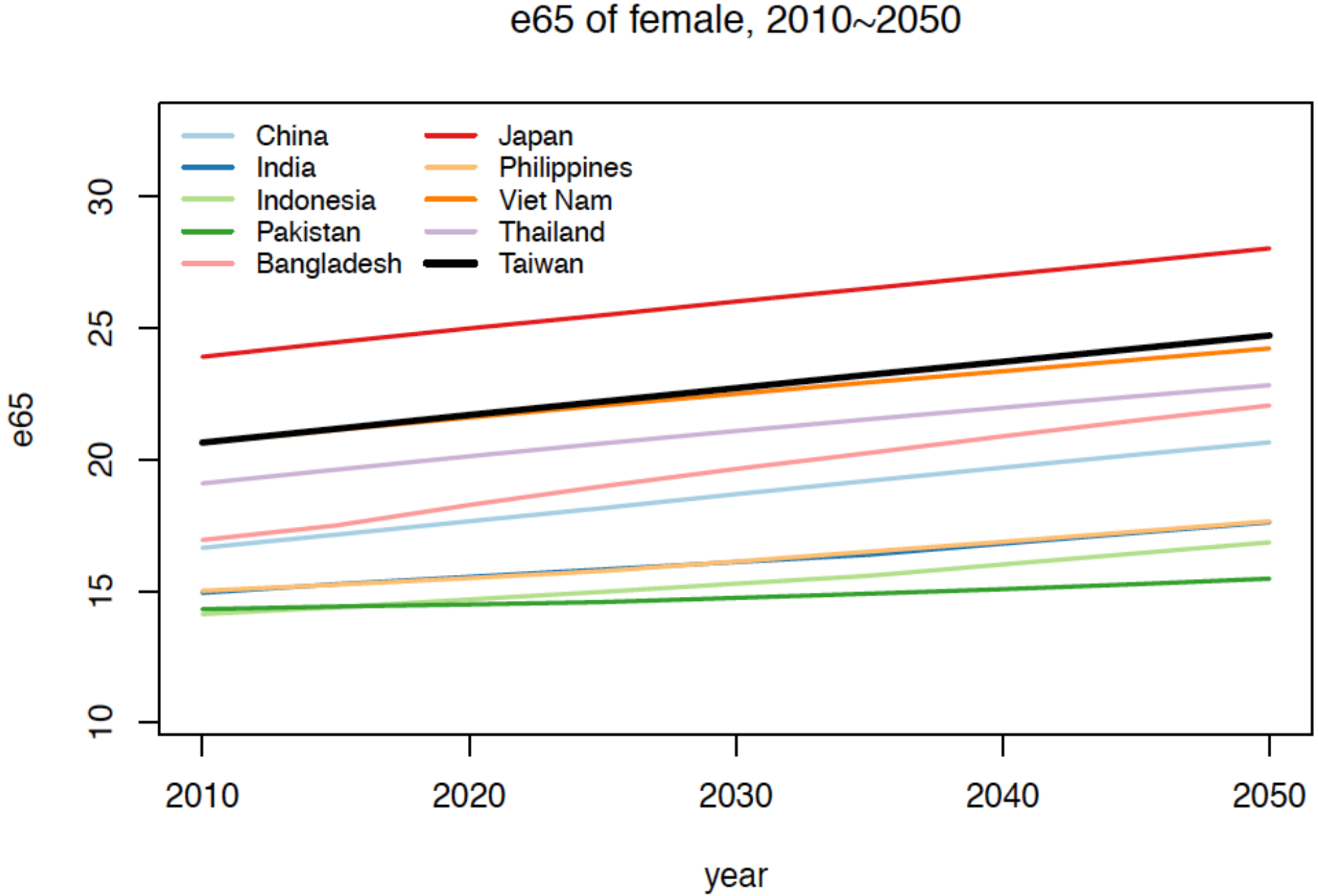
Indonesia
Pakistan
Bangladesh
Japan
Philippines
Viet Nam
Thailand
Taiwan


e65 of female, 2010~2050
China
India
Indonesia
Pakistan
Bangladesh
Japan
Philippines
Viet Nam
Thailand
Taiwan
e65
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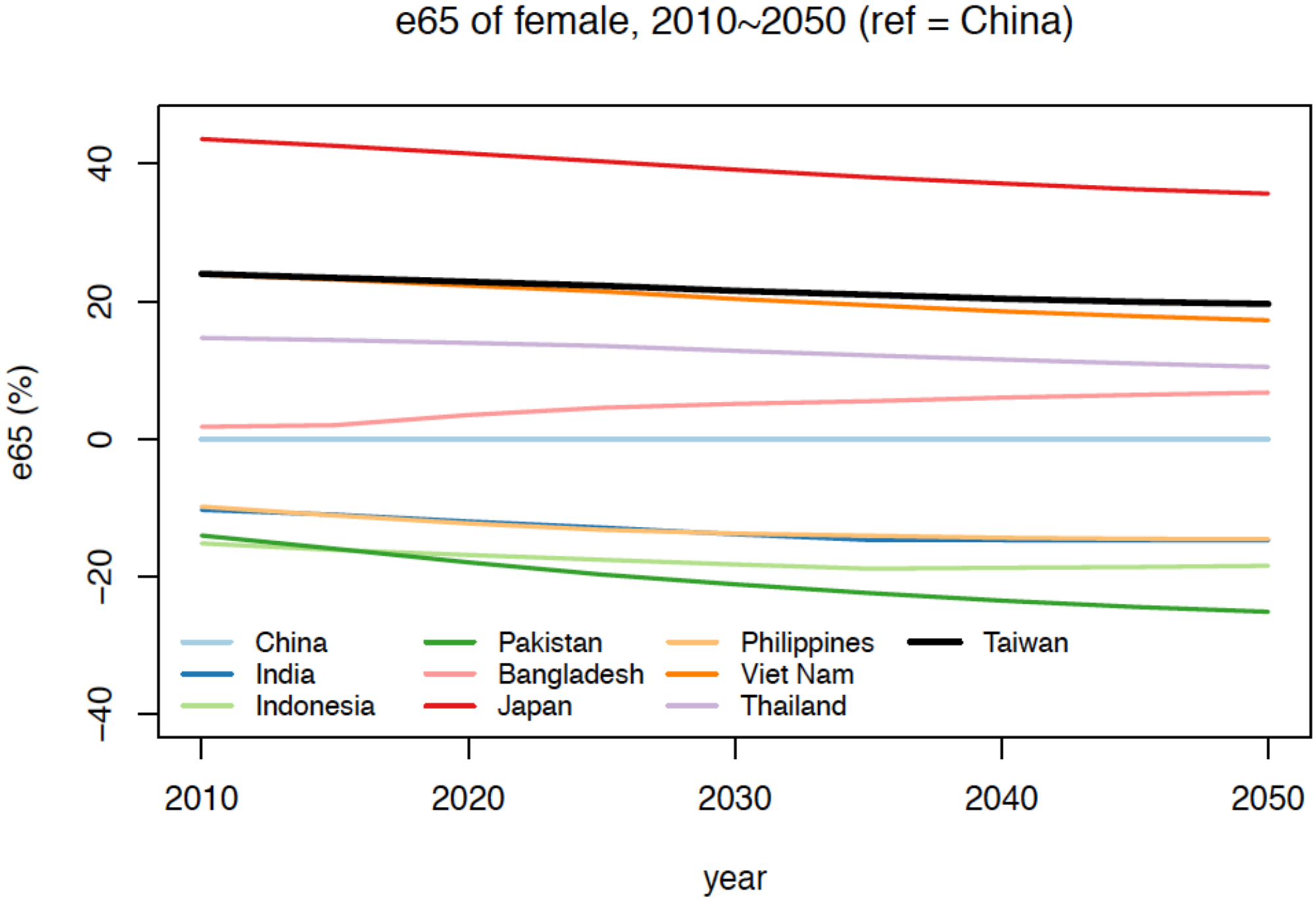
20
25
30
2010
2020
2030
2040
2050
year


e65 of female, 2010~2050 (ref = China)
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20
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−20
−40
2010
2020
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year
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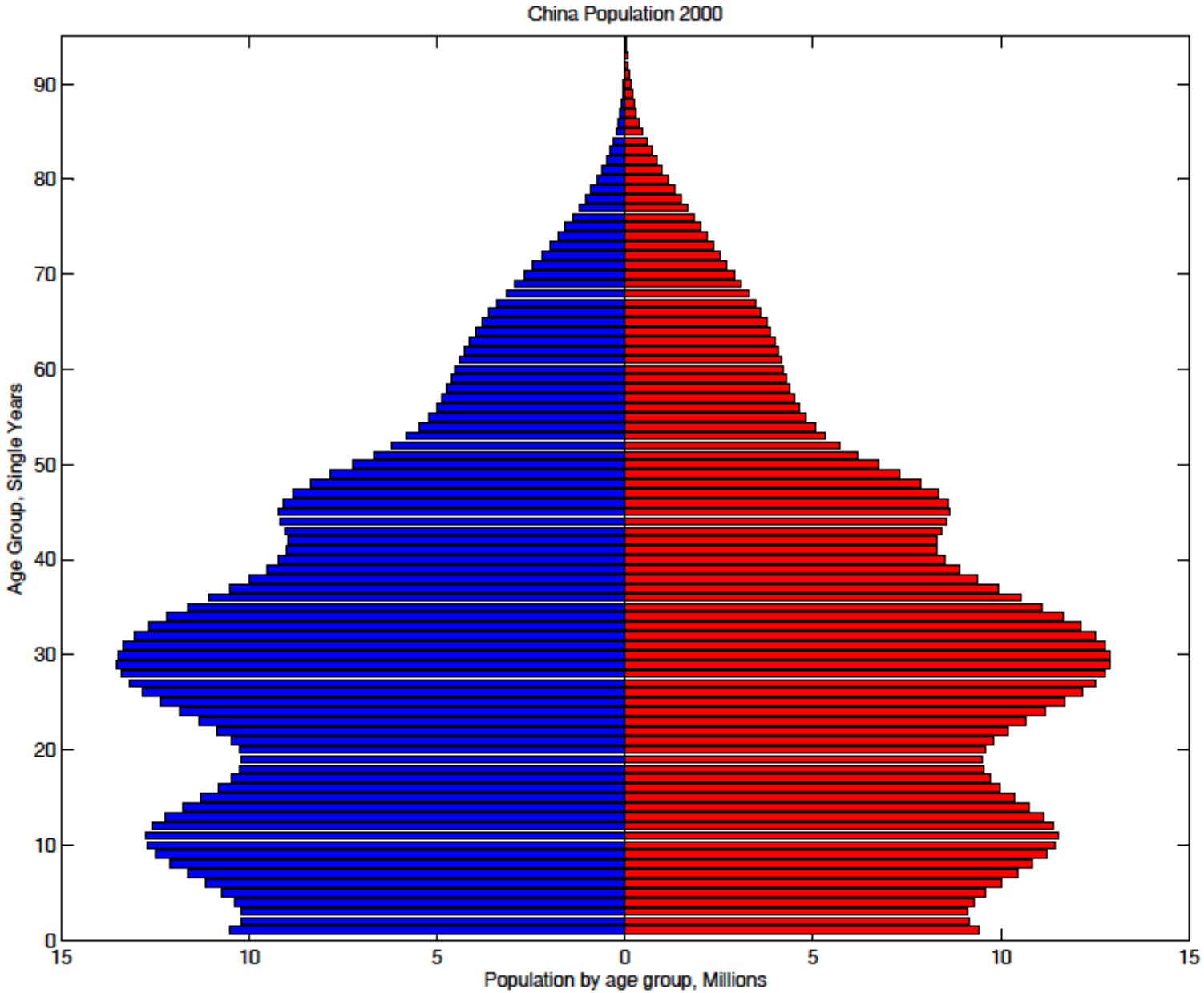
Taiwan



Population Pyramid

Blue = Male, Red = Female

KEY INDICATORS

AGING
individual measures

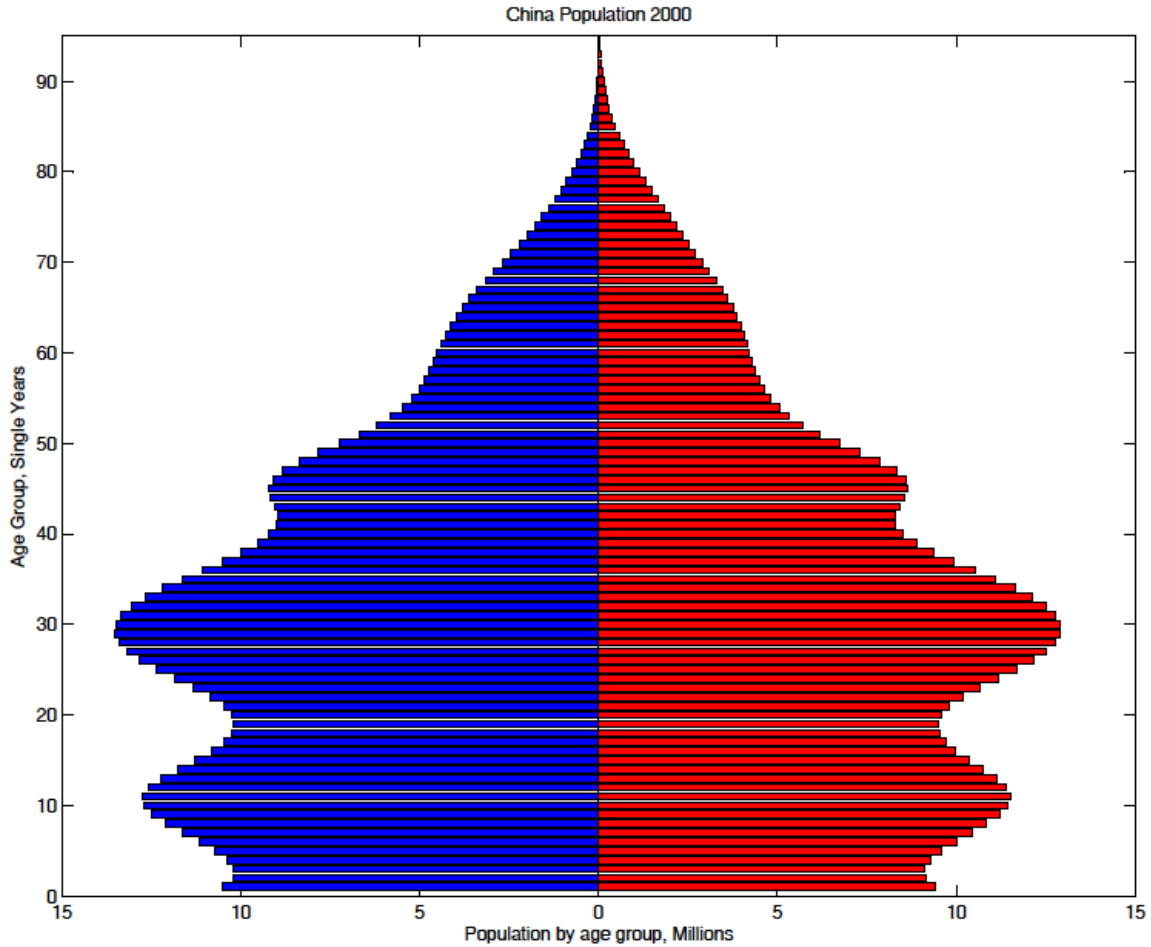
LIFE EXPECTANCY AT BIRTH, e_0

LIFE EXPECTANCY AT age 65, e_{65}

POPULATION
size & wealth

TOTAL POPULATION SIZE *scale*

PER-CAPITA GDP (*ppp*)
wealth/consumption/living standard



Population Pyramid

Blue = Male, Red = Female

Young 0-19

Working 20-64

Old 65+

YDR = Young/Working

ODR = Old/Working

STRUCTURAL INDICATORS

YDR (YOUNG 0-19)/(WORKING 20-64)

ODR (OLD 65+)/(WORKING 20-64)

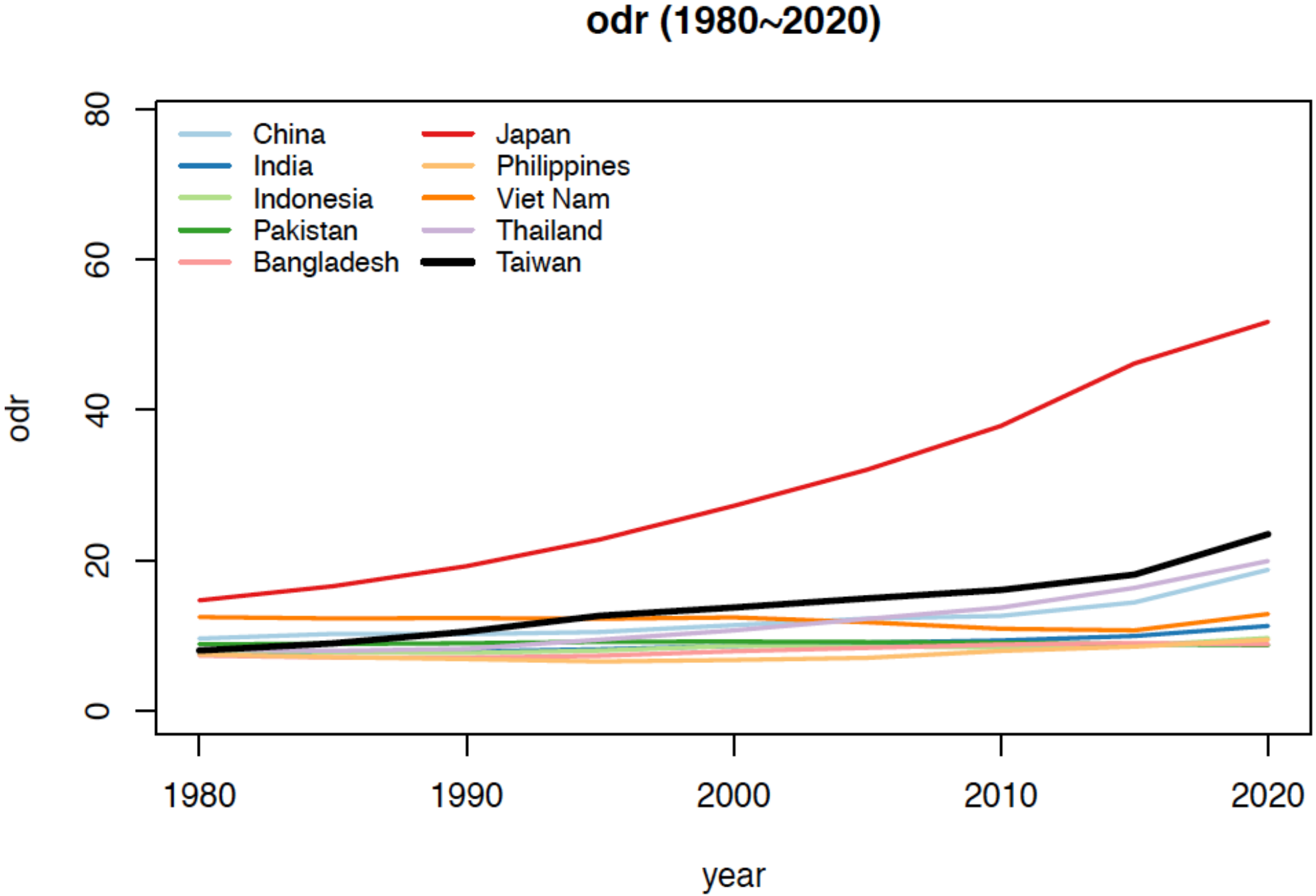
WHAT STRUCTURAL INDICATORS MEAN

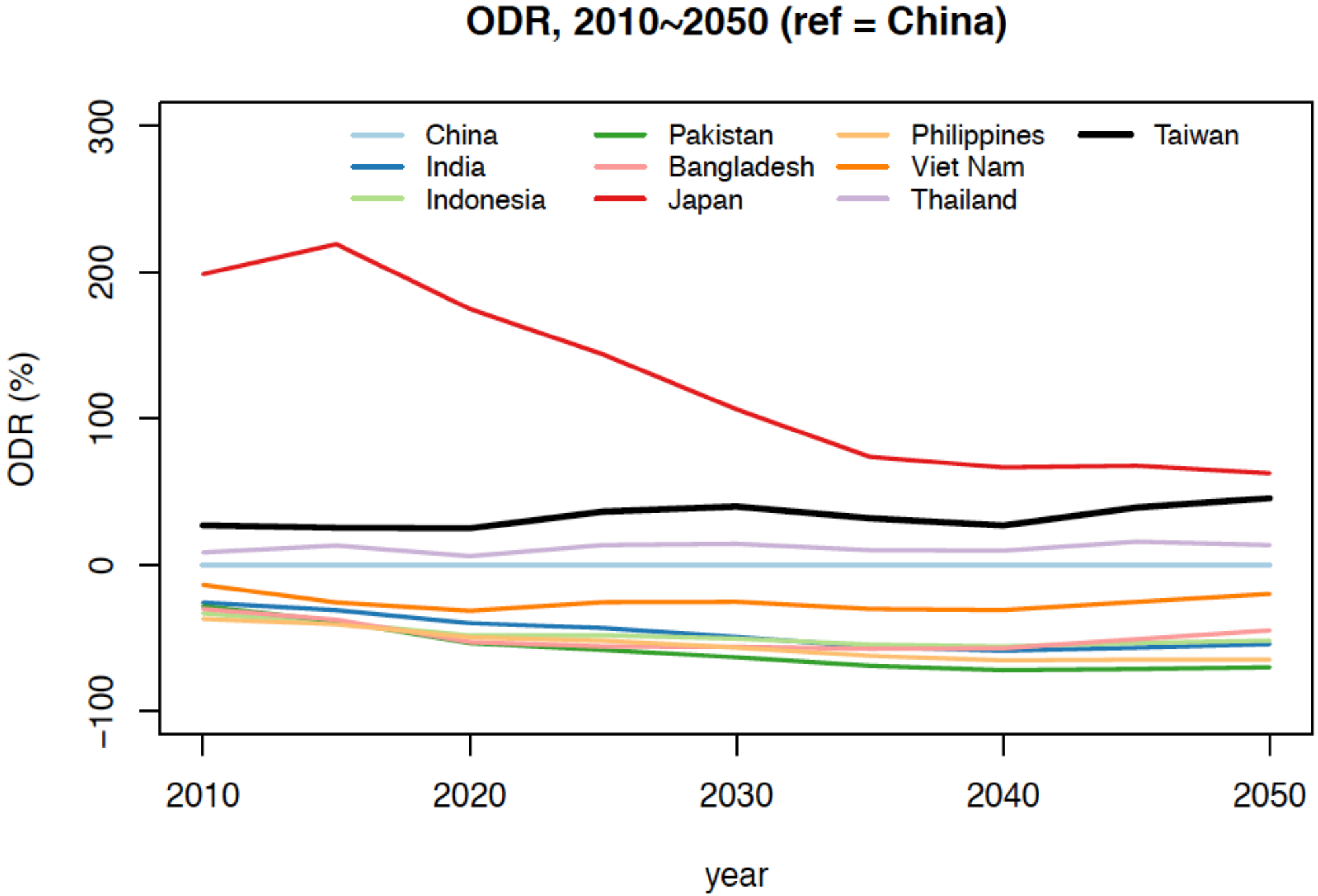
YDR

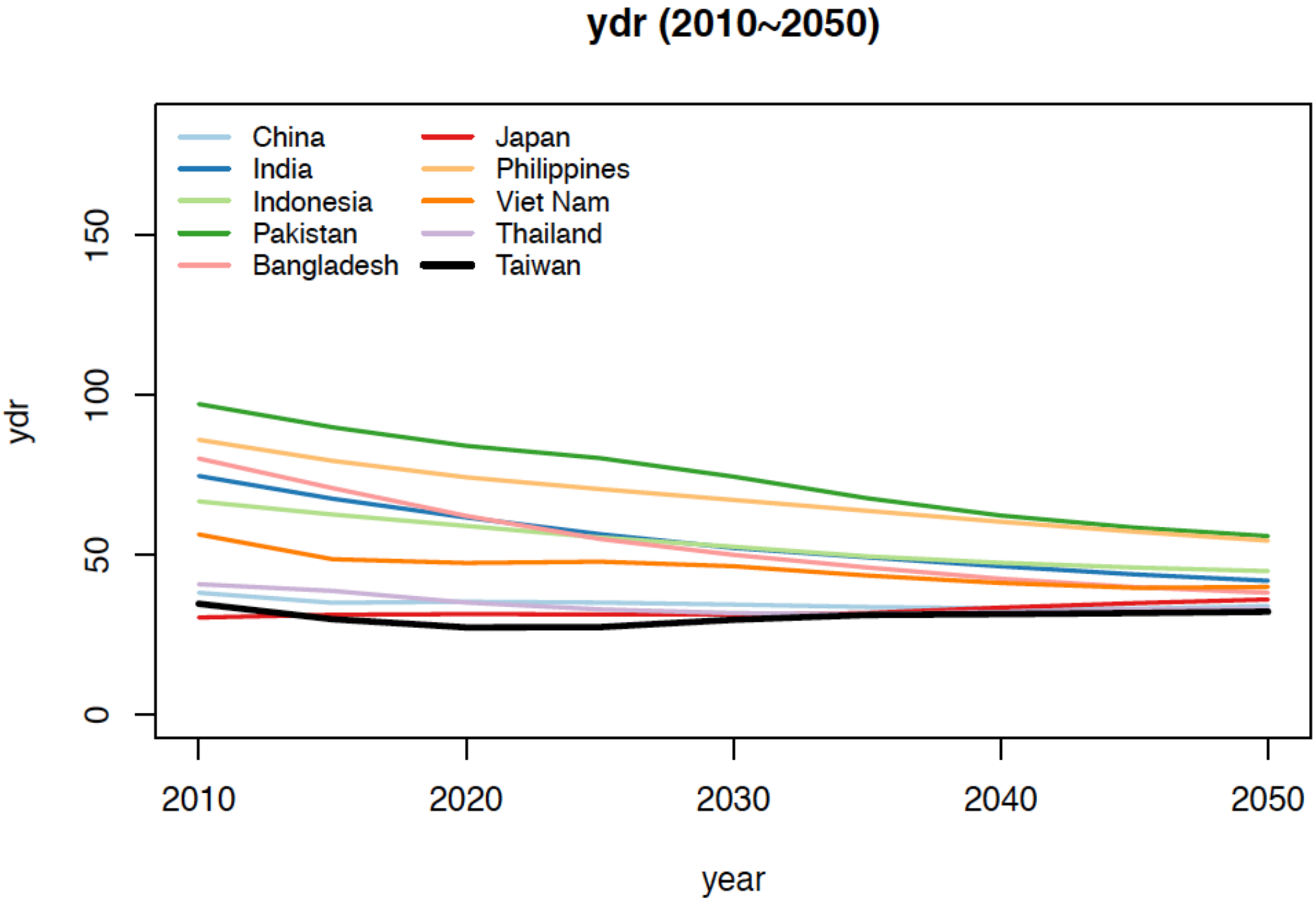
future labor supply
(tax or transfer costs of young
capital absorption/productivity growth)

ODR

retired fraction
(tax or transfer cost pensions & health care
savings/available capital/annuity costs)


odr (1980~2020)
China
India
Indonesia
Pakistan
Bangladesh
Japan
Philippines
Viet Nam
Thailand
Taiwan
odr
0
20
40
60
80
1980
1990
2000
2010
2020
year

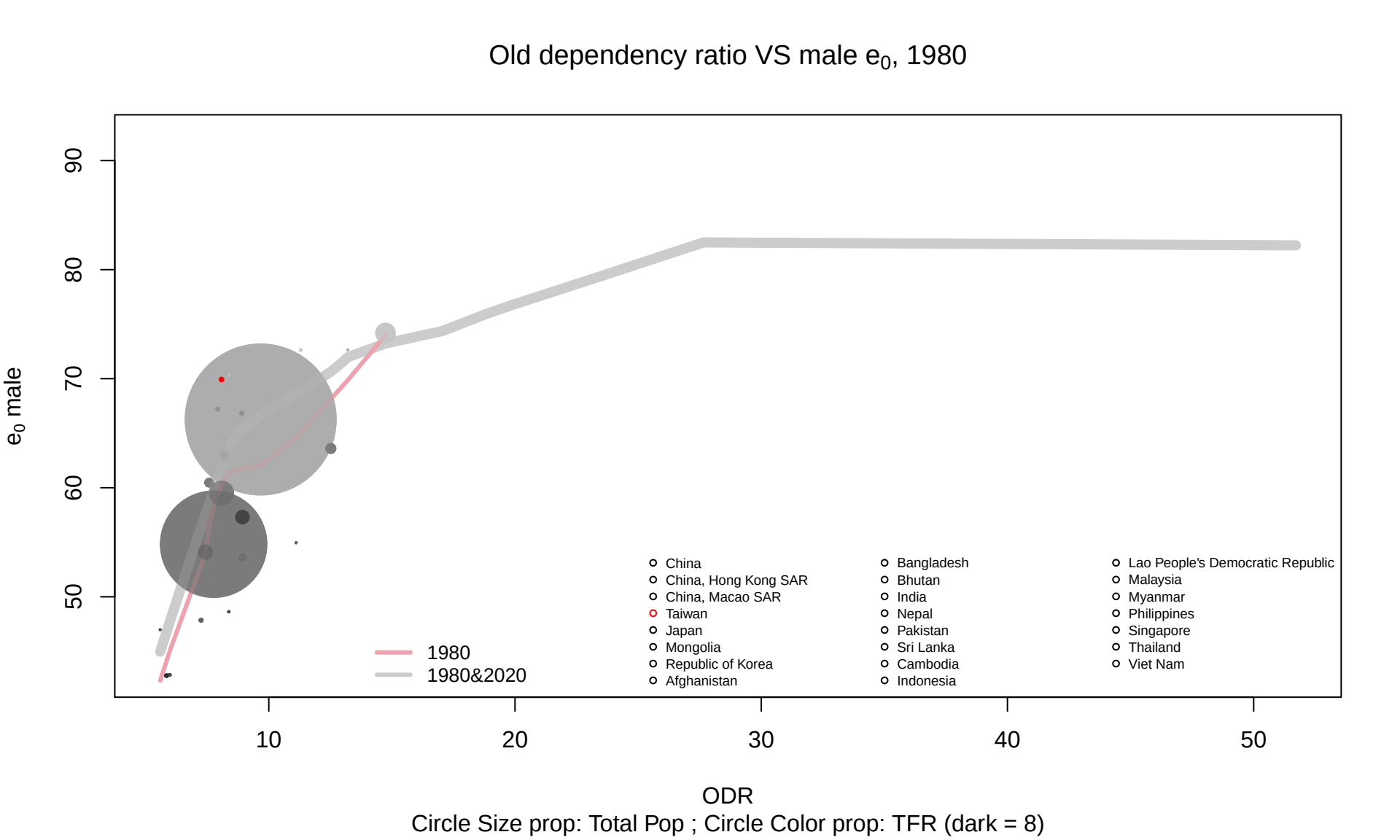

ODR, 2010~2050 (ref = China)
China
India
Indonesia
Pakistan
Bangladesh
Japan
Philippines
Viet Nam
Thailand
Taiwan
ODR (%)
300
200
100
0
−100
2010
2020
2030
2040
2050
year

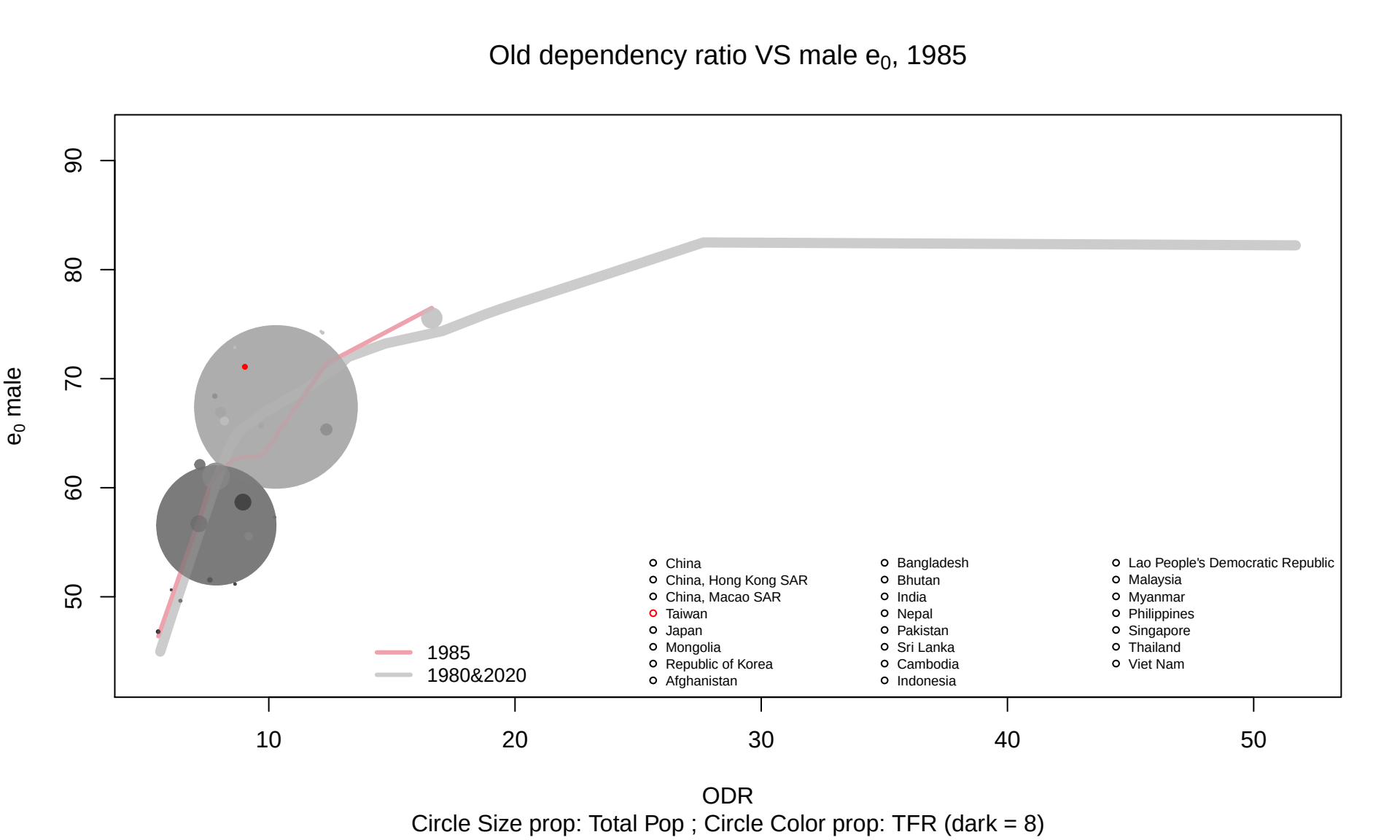

ydr (2010~2050)
China
India
Indonesia
Pakistan
Bangladesh
Japan
Philippines
Viet Nam
Thailand
Taiwan
ydr
0
50
100
150
2010
2020
2030
2040
2050
year

ODR should increase with e0

But at what rate?

Use Total Population as Index


Old dependency ratio VS male e_0, 1980
e_0 male
90
80
70
60
50
10
20
30
40
50
ODR
1980
1980&2020
China
China, Hong Kong SAR
China, Macao SAR
Taiwan
Japan
Mongolia
Republic of Korea
Afghanistan
Bangladesh
Bhutan
India
Nepal
Pakistan
Sri Lanka
Cambodia
Indonesia
Lao People's Democratic Republic
Malaysia
Myanmar
Philippines
Singapore
Thailand
Viet Nam
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS male e_0, 1985
e_0 male
90
80
70
60
50
10
20
30
40
50
ODR
1985
1980&2020
China
China, Hong Kong SAR
China, Macao SAR
Taiwan
Japan
Mongolia
Republic of Korea
Afghanistan
Bangladesh
Bhutan
India
Nepal
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Sri Lanka
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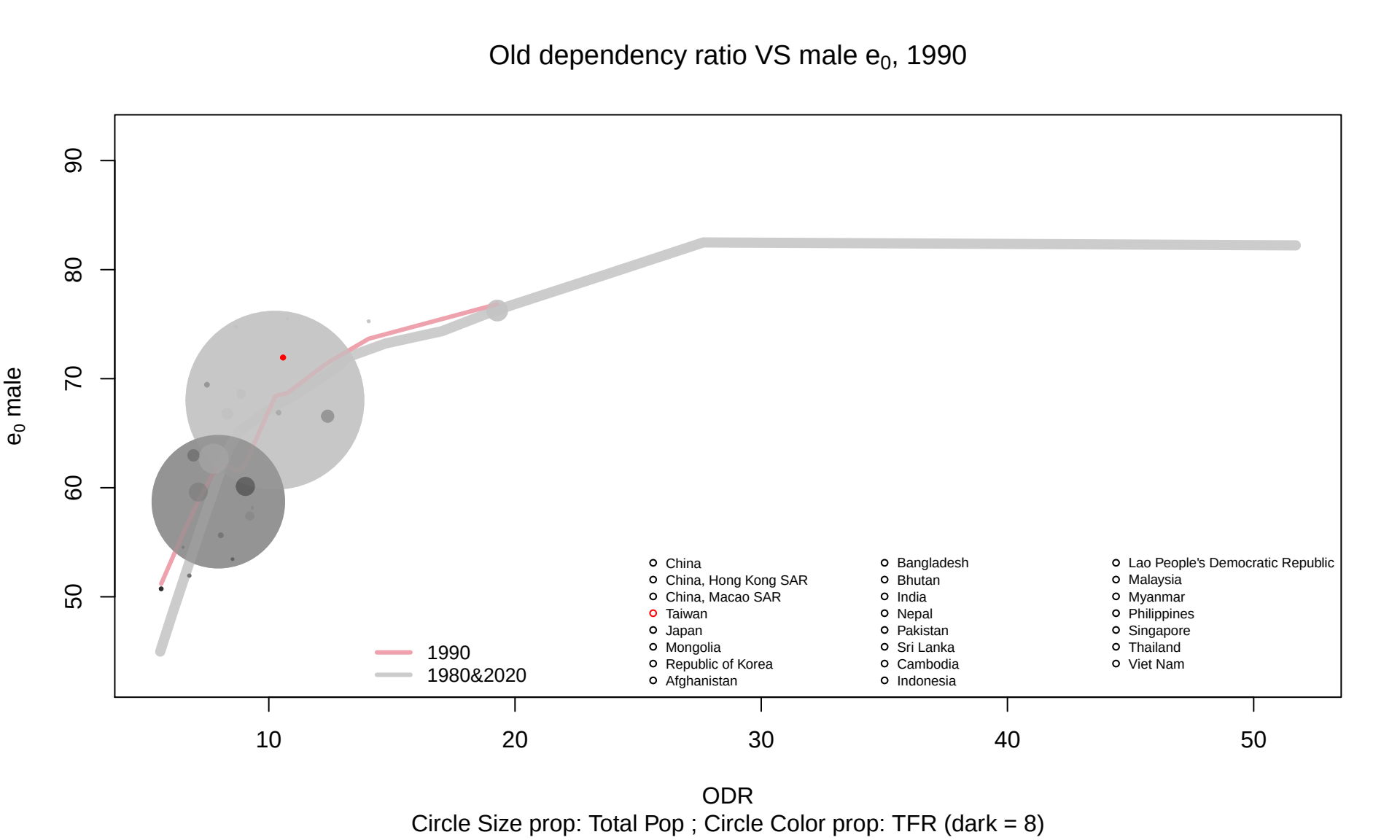
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS male e_0, 1990
e_0 male
90
80
70
60
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ODR
1990
1980&2020
China
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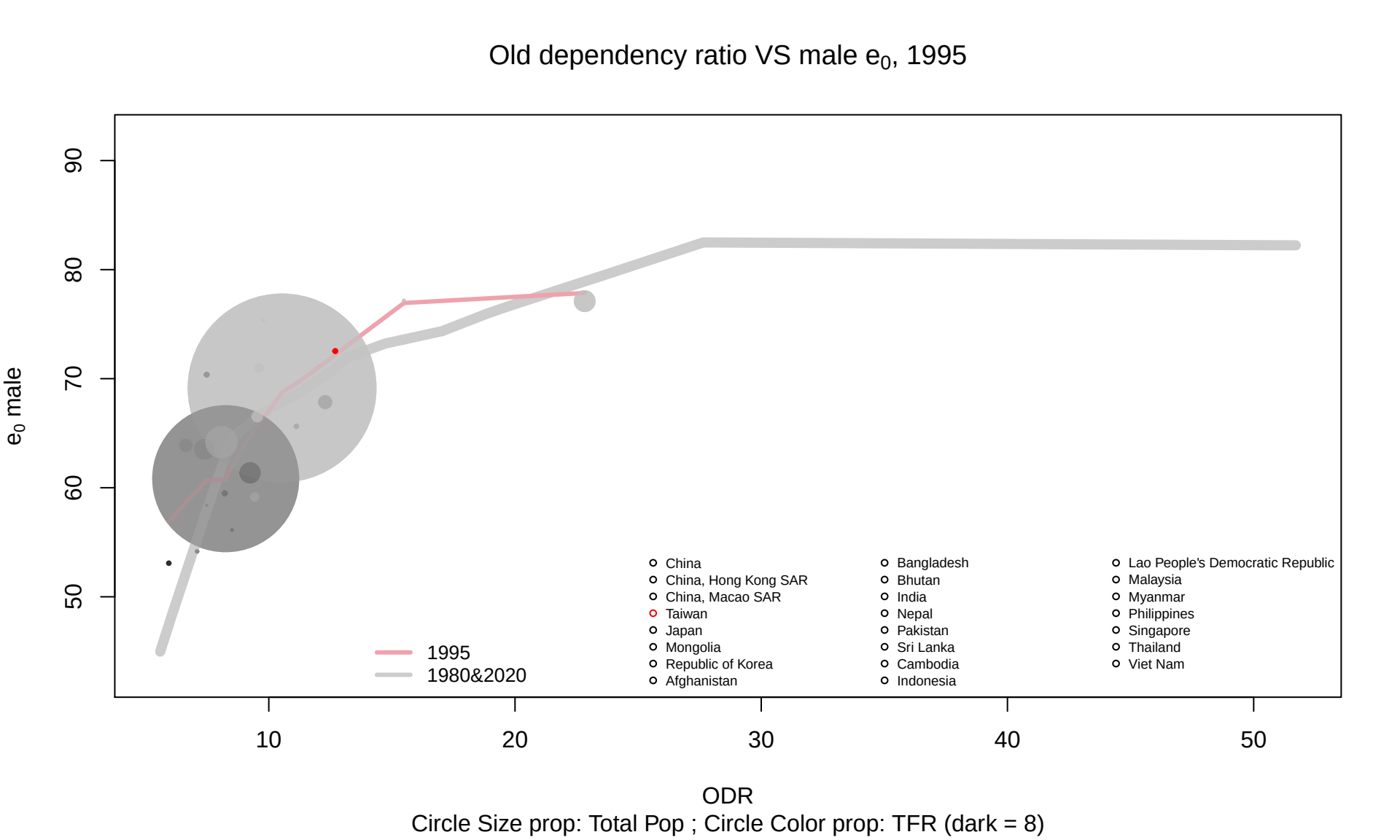
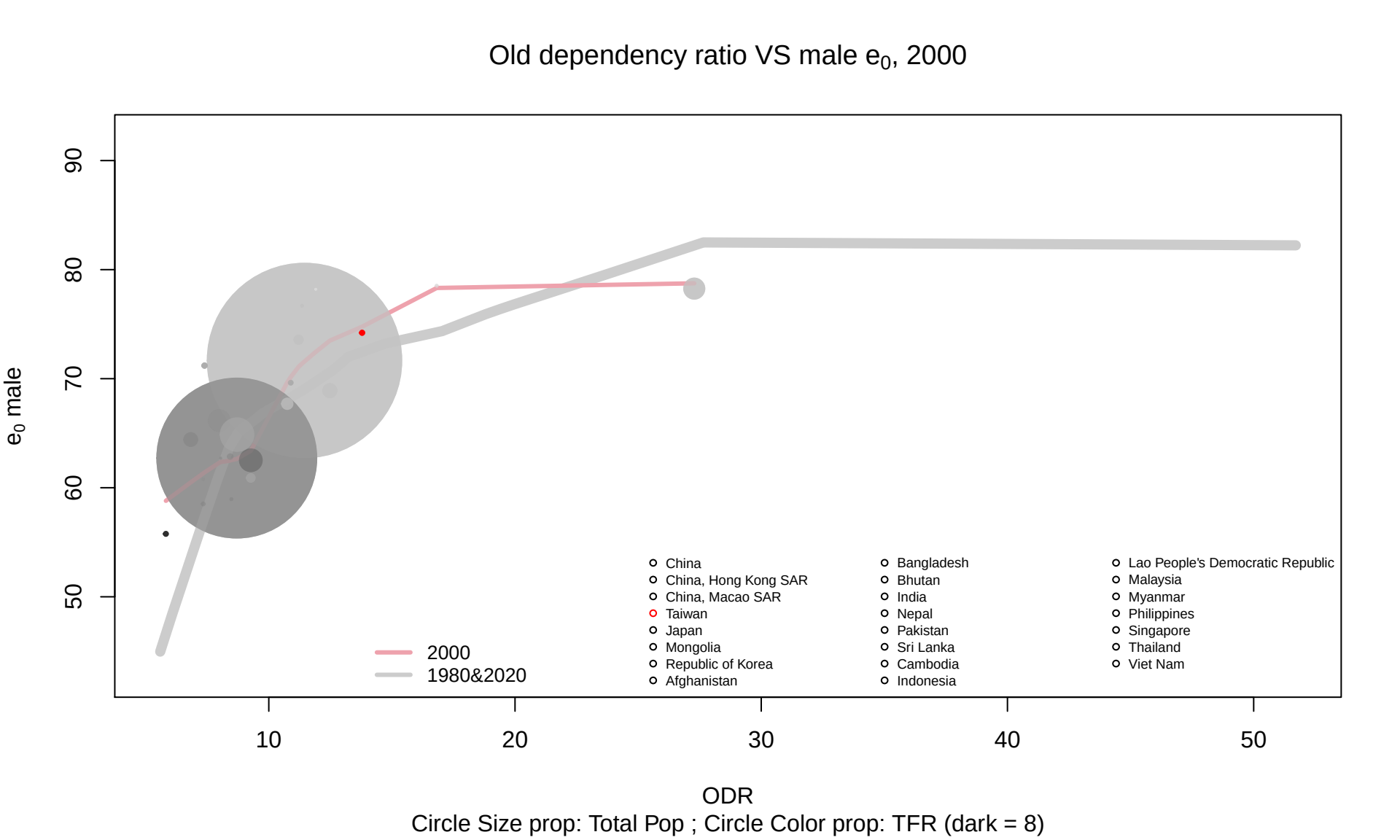
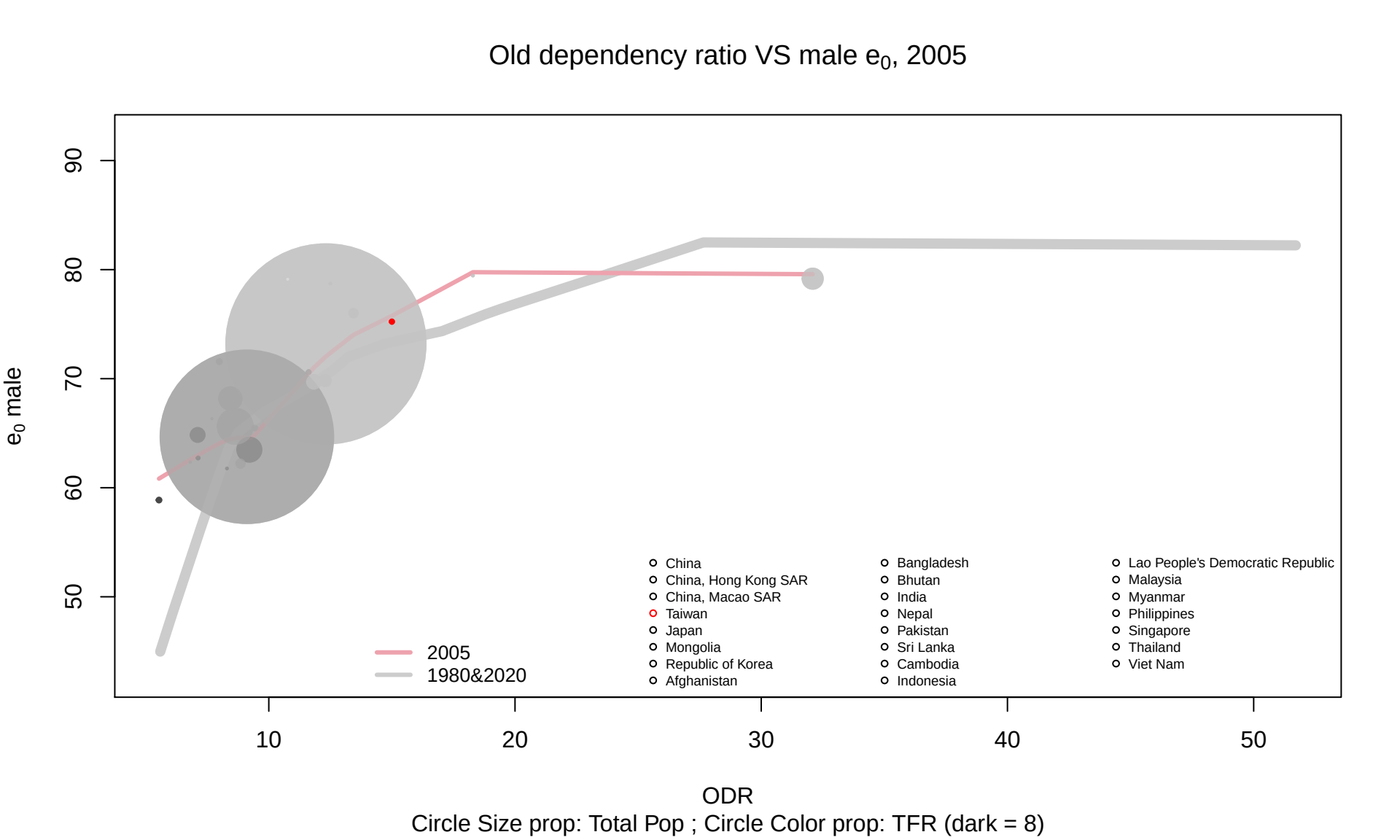
Viet Nam
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS male e_0, 1995
e_0 male
90
80
70
60
50
10
20
30
40
50
ODR
1995
1980&2020
China
China, Hong Kong SAR
China, Macao SAR
Taiwan
Japan
Mongolia
Republic of Korea
Afghanistan
Bangladesh
Bhutan
India
Nepal
Pakistan
Sri Lanka
Cambodia
Indonesia
Lao People's Democratic Republic
Malaysia
Myanmar
Philippines
Singapore
Thailand
Viet Nam
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS male e_0, 2000
e_0 male
90
80
70
60
50
10
20
30
40
50
ODR
2000
1980&2020
China
China, Hong Kong SAR
China, Macao SAR
Taiwan
Japan
Mongolia
Republic of Korea
Afghanistan
Bangladesh
Bhutan
India
Nepal
Pakistan
Sri Lanka
Cambodia
Indonesia
Lao People's Democratic Republic
Malaysia
Myanmar
Philippines
Singapore
Thailand
Viet Nam
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS male e_0, 2005
e_0 male
90
80
70
60
50
10
20
30
40
50
ODR
2005
1980&2020
China
China, Hong Kong SAR
China, Macao SAR
Taiwan
Japan
Mongolia
Republic of Korea
Afghanistan
Bangladesh
Bhutan
India
Nepal
Pakistan
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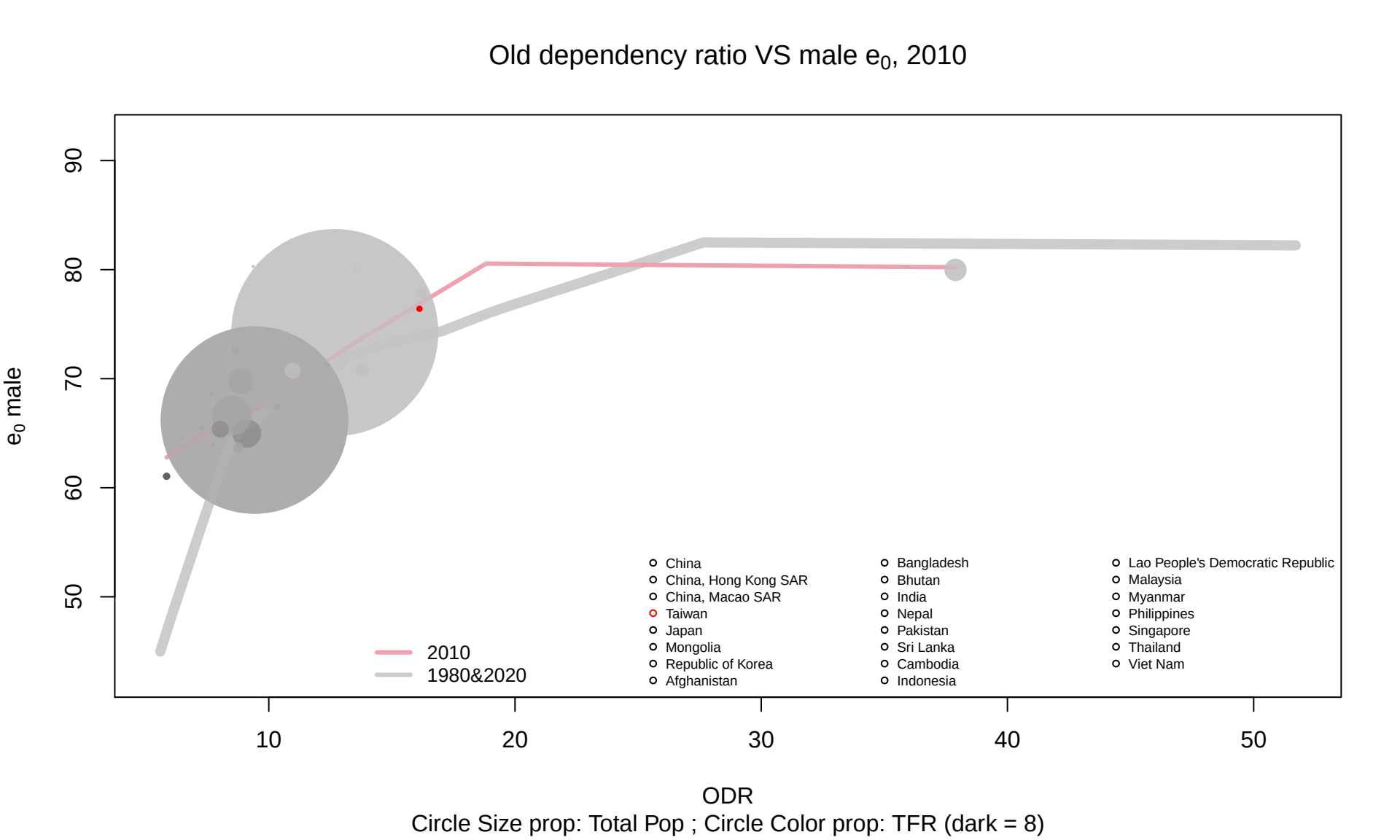
Indonesia
Lao People's Democratic Republic
Malaysia
Myanmar
Philippines
Singapore
Thailand
Viet Nam
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS male e_0, 2010
e_0 male
90
80
70
60
50
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ODR
2010
1980&2020
China
China, Hong Kong SAR
China, Macao SAR
Taiwan
Japan
Mongolia
Republic of Korea
Afghanistan
Bangladesh
Bhutan
India
Nepal
Pakistan
Sri Lanka
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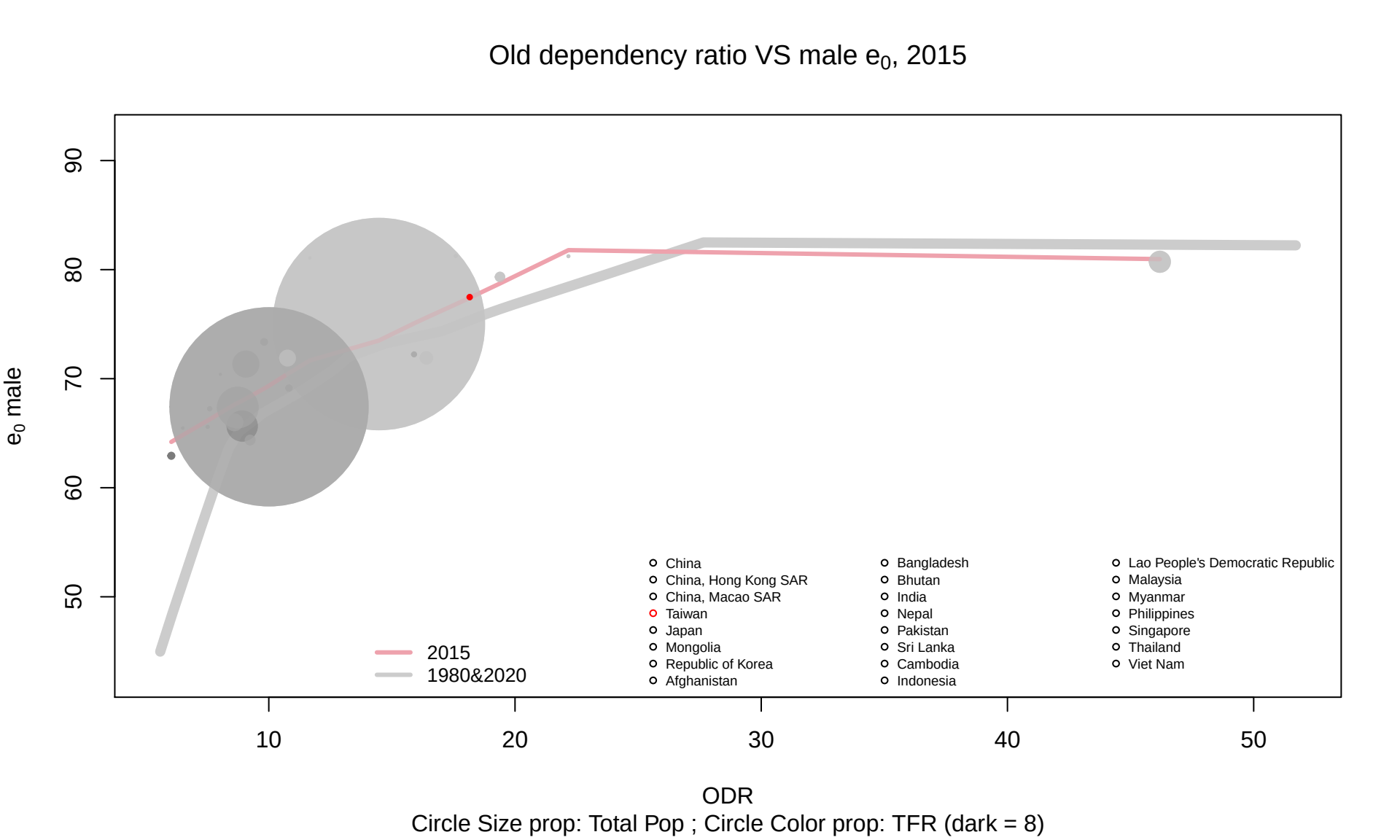
Viet Nam
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS male e_0, 2015
e_0 male
90
80
70
60
50
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20
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40
50
ODR
2015
1980&2020
China
China, Hong Kong SAR
China, Macao SAR
Taiwan
Japan
Mongolia
Republic of Korea
Afghanistan
Bangladesh
Bhutan
India
Nepal
Pakistan
Sri Lanka
Cambodia
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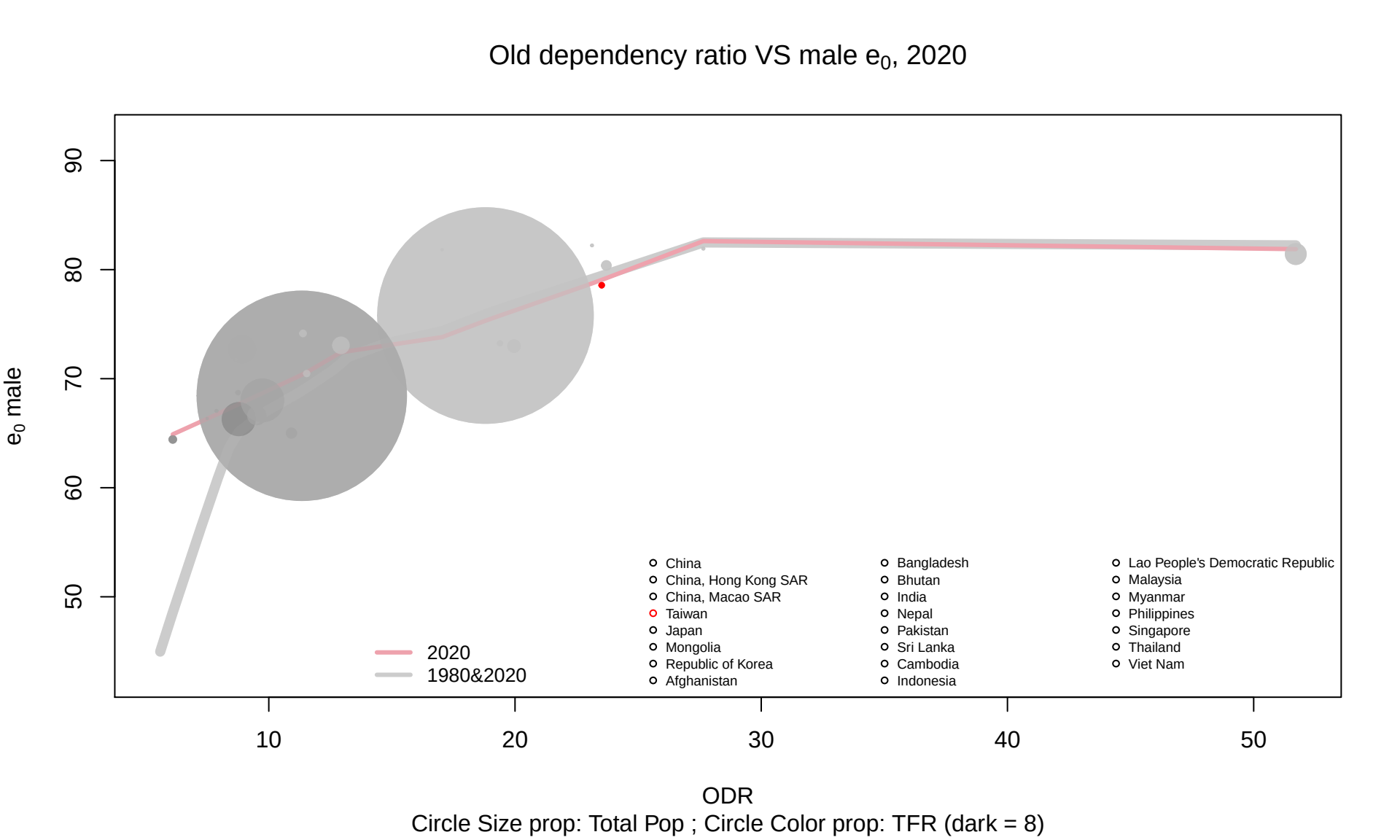
Thailand
Viet Nam
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS male e_0, 2020
e_0 male
90
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ODR
2020
1980&2020
China
China, Hong Kong SAR
China, Macao SAR
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Japan
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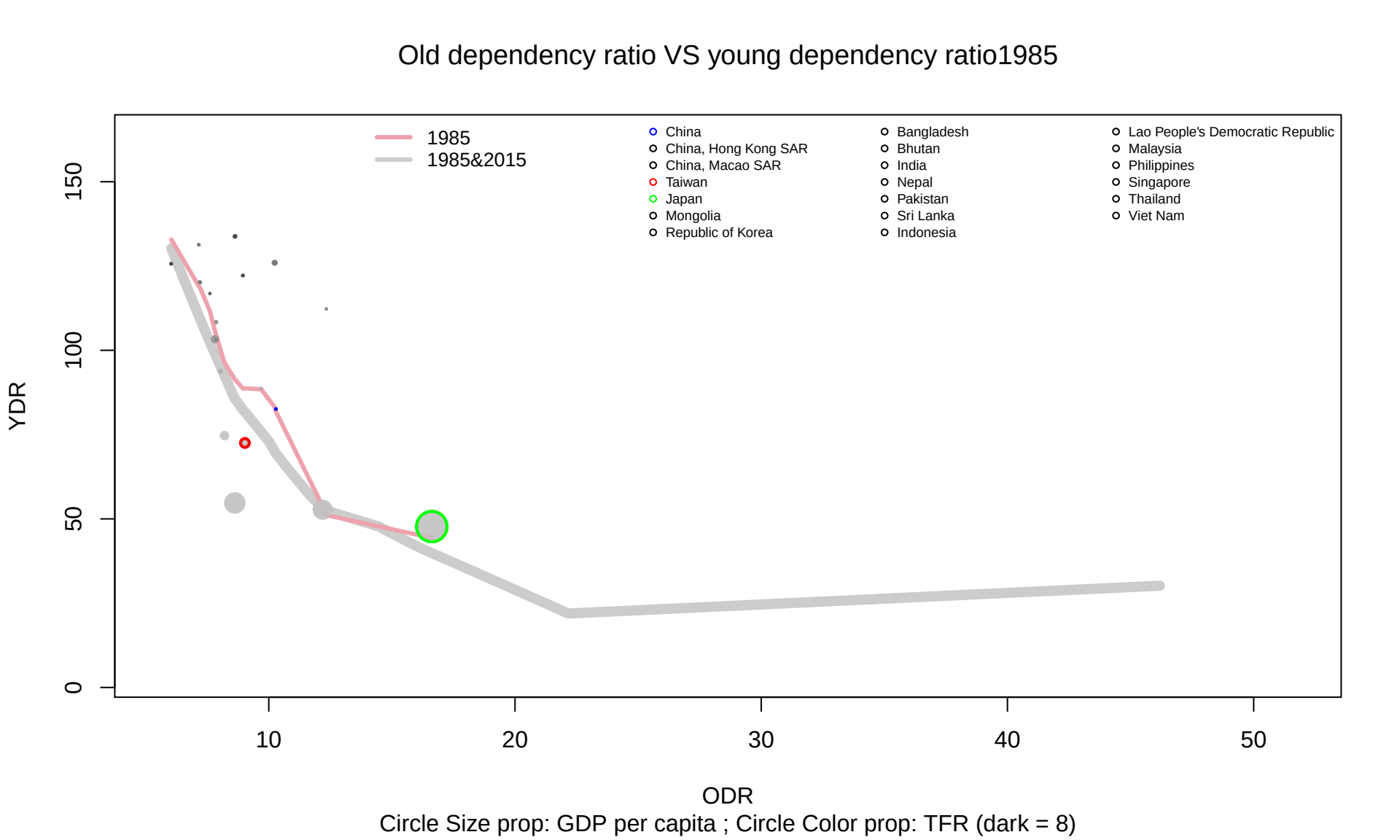
Viet Nam
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)

ODR and YDR change over time

Change depends on fertility, GDP

Use Per-cap GDP as Index


Old dependency ratio VS young dependency ratio1985
1985
1985&2015
China
China, Hong Kong SAR
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Malaysia
Philippines
Singapore
Thailand
Viet Nam
YDR
0
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100
150
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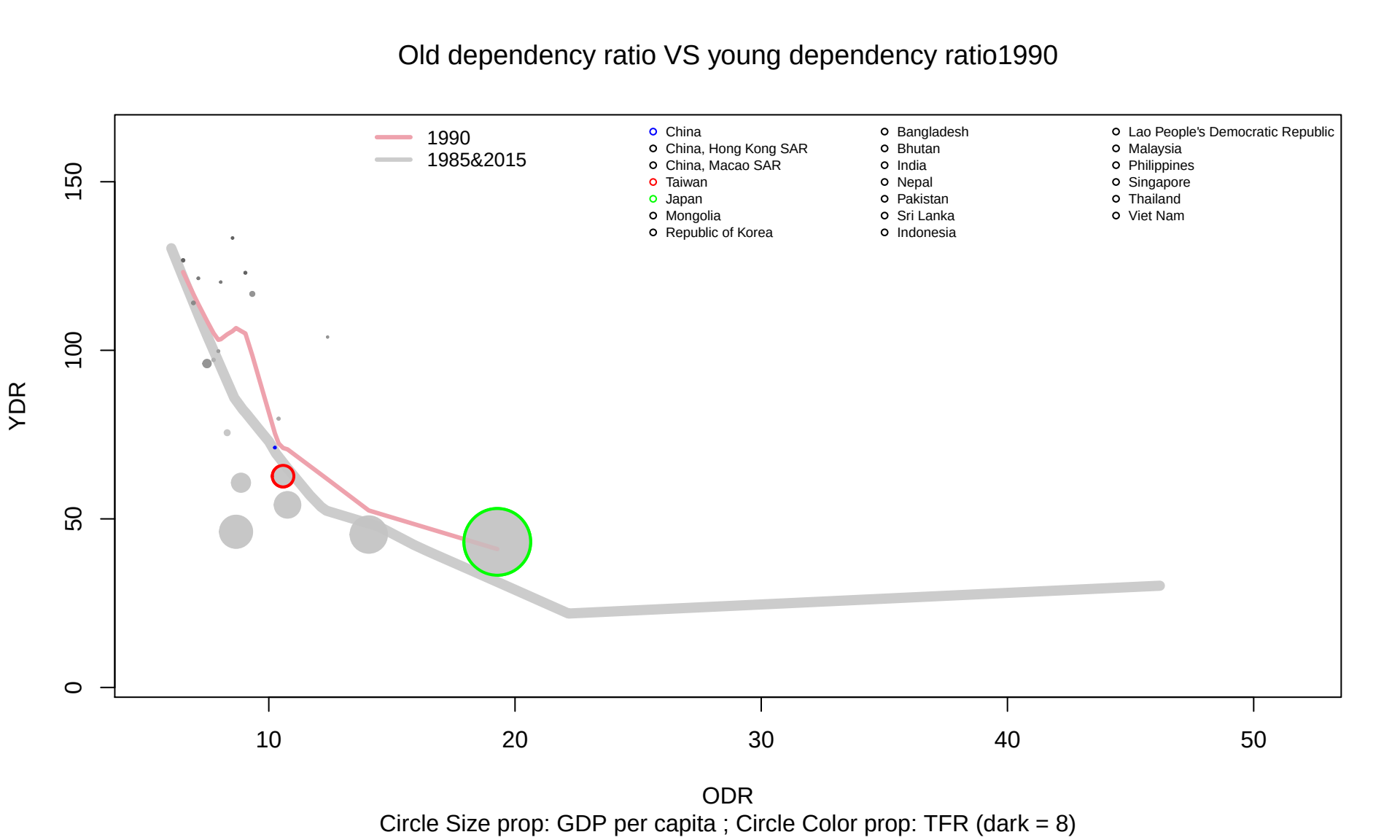
50
ODR
Circle Size prop: GDP per capita ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS young dependency ratio1990
1990
1985&2015
China
China, Hong Kong SAR
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Viet Nam
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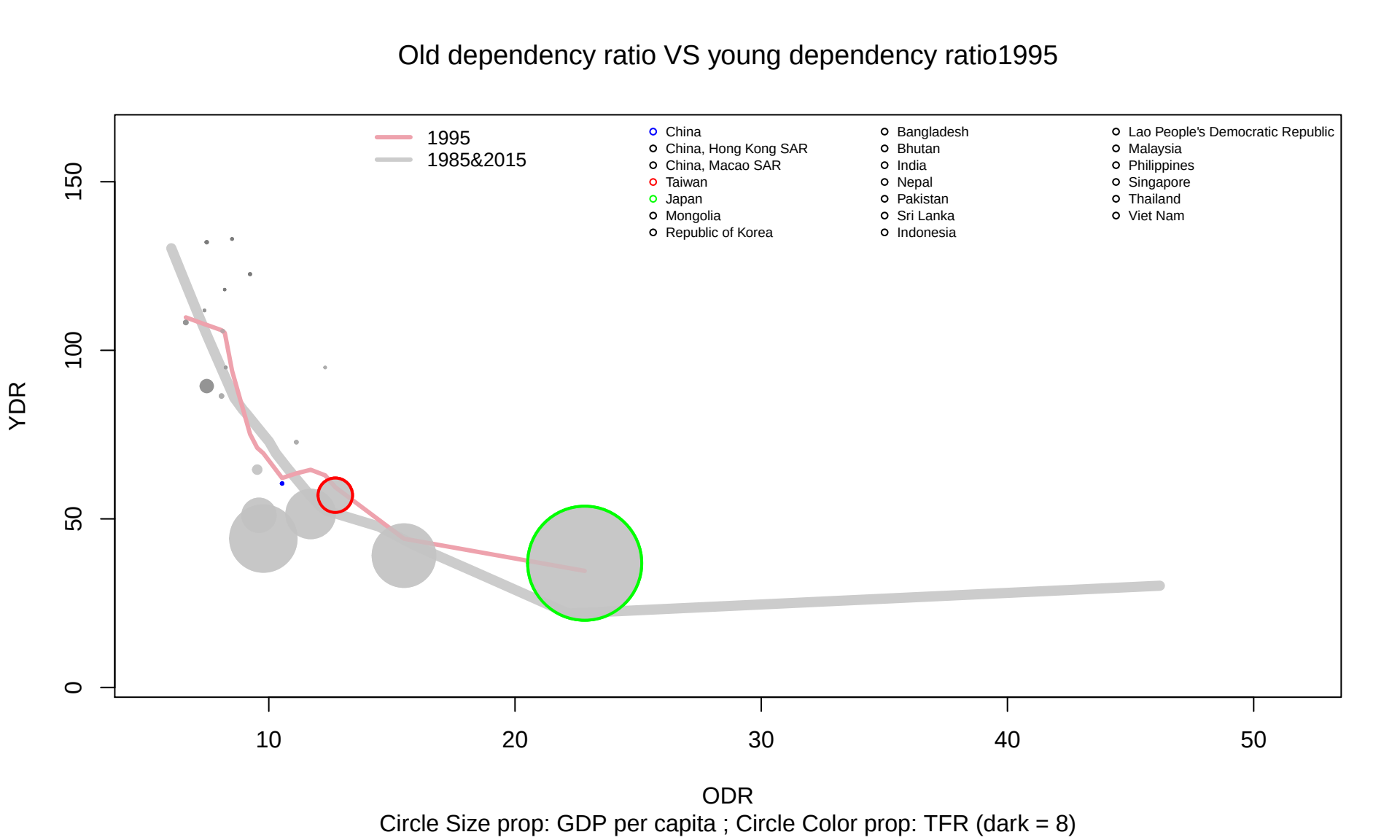
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1985&2015
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Lao People's Democratic Republic
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Philippines
Singapore
Thailand
Viet Nam
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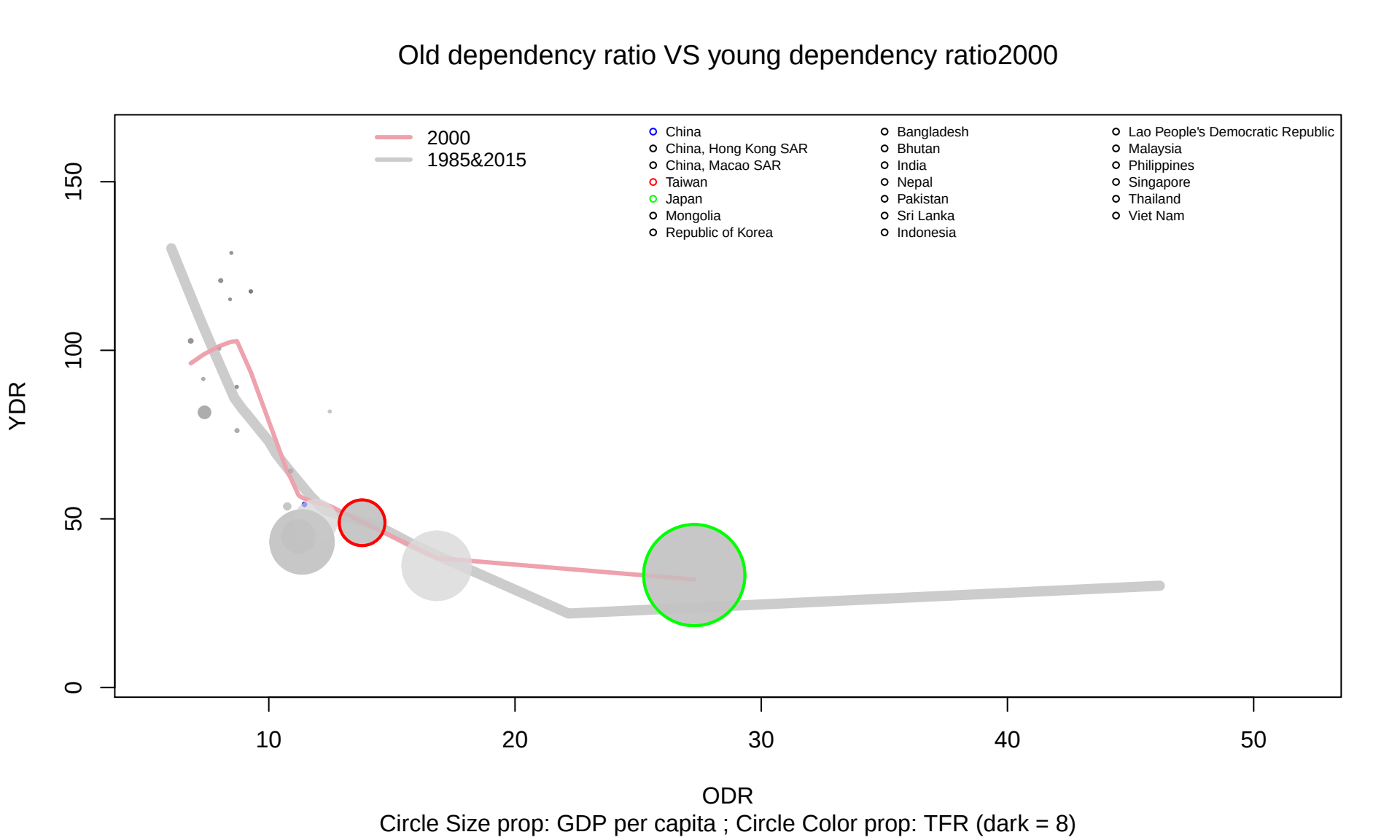
Circle Size prop: GDP per capita ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS young dependency ratio2000
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1985&2015
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Bangladesh
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Lao People's Democratic Republic
Malaysia
Philippines
Singapore
Thailand
Viet Nam
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0
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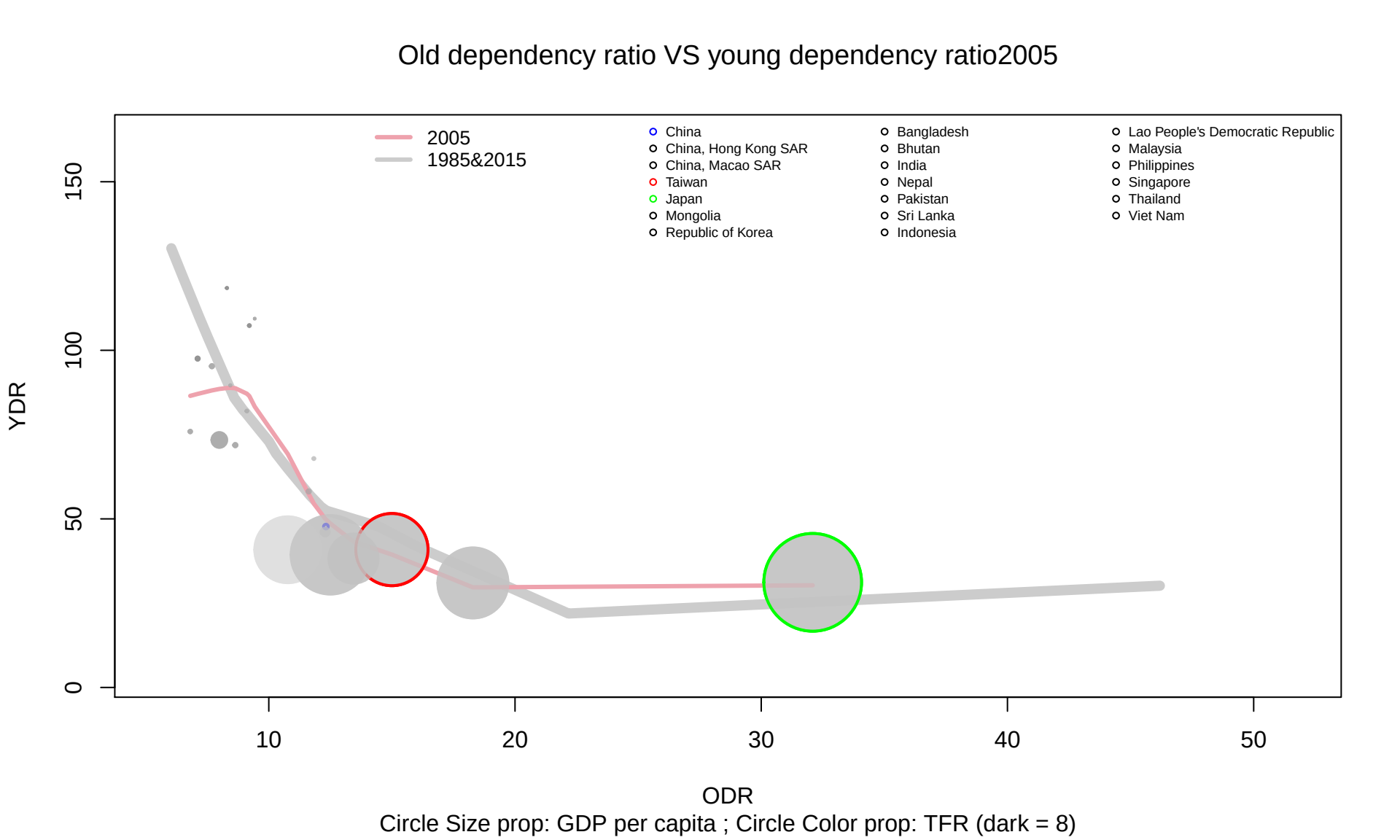
Circle Size prop: GDP per capita ; Circle Color prop: TFR (dark = 8)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2005
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China, Macao SAR
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Mongolia
Republic of Korea
Bangladesh
Bhutan
India
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Pakistan
Sri Lanka
Indonesia
Lao People's Democratic Republic
Malaysia
Philippines
Singapore
Thailand
Viet Nam
YDR
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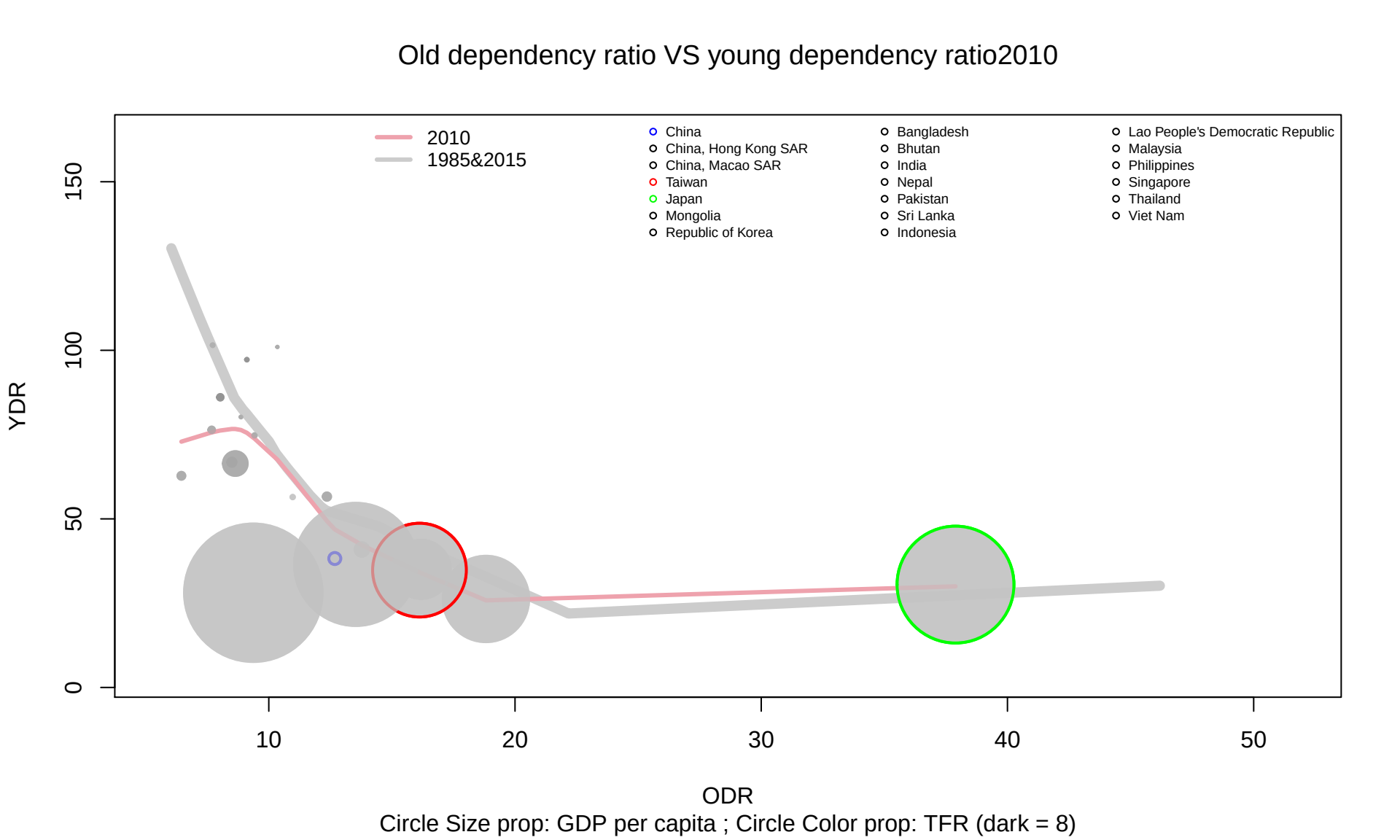
ODR
Circle Size prop: GDP per capita ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS young dependency ratio2010
2010
1985&2015
China
China, Hong Kong SAR
China, Macao SAR
Taiwan
Japan
Mongolia
Republic of Korea
Bangladesh
Bhutan
India
Nepal
Pakistan
Sri Lanka
Indonesia
Lao People's Democratic Republic
Malaysia
Philippines
Singapore
Thailand
Viet Nam
YDR
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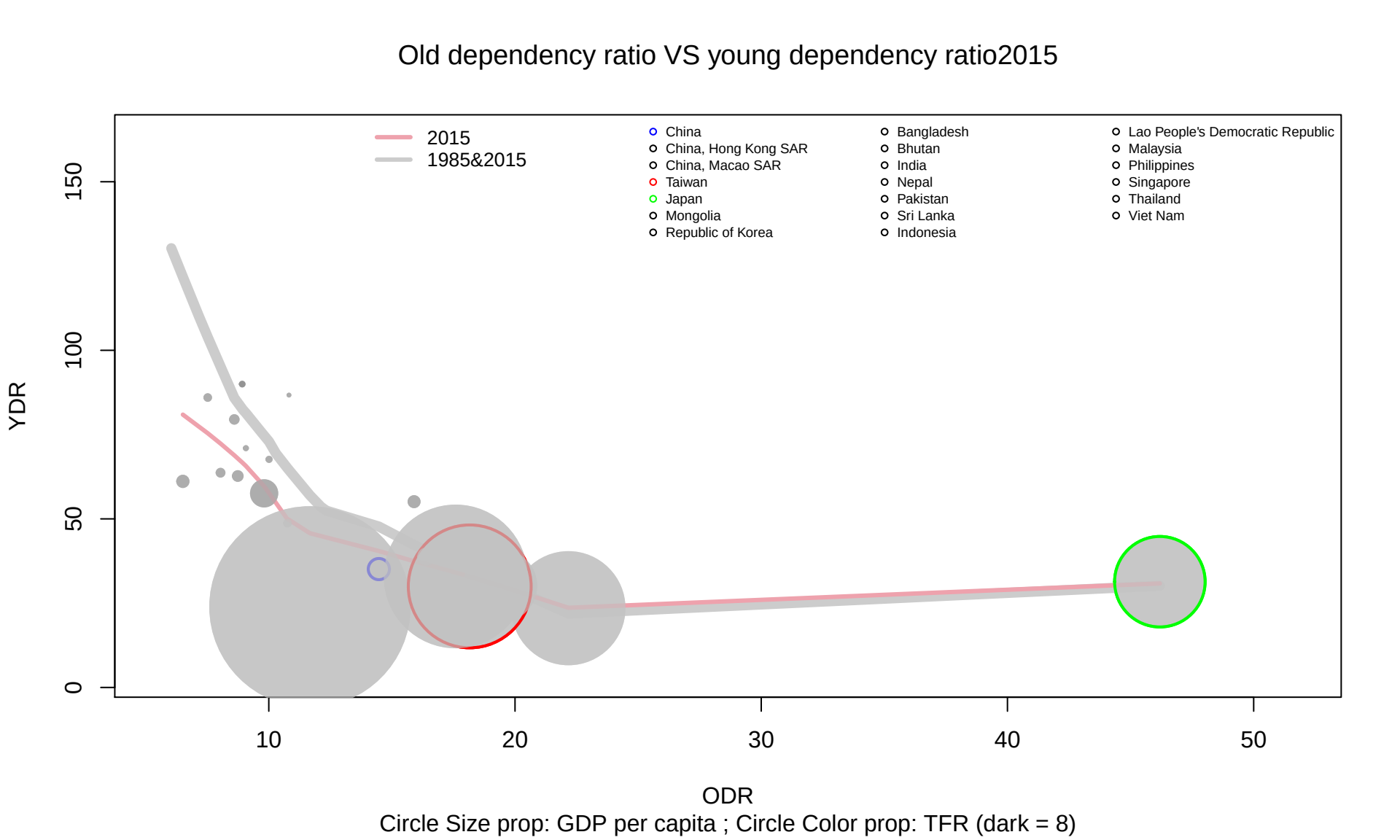
ODR
Circle Size prop: GDP per capita ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS young dependency ratio2015
2015
1985&2015
China
China, Hong Kong SAR
China, Macao SAR
Taiwan
Japan
Mongolia
Republic of Korea
Bangladesh
Bhutan
India
Nepal
Pakistan
Sri Lanka
Indonesia
Lao People's Democratic Republic
Malaysia
Philippines
Singapore
Thailand
Viet Nam
YDR
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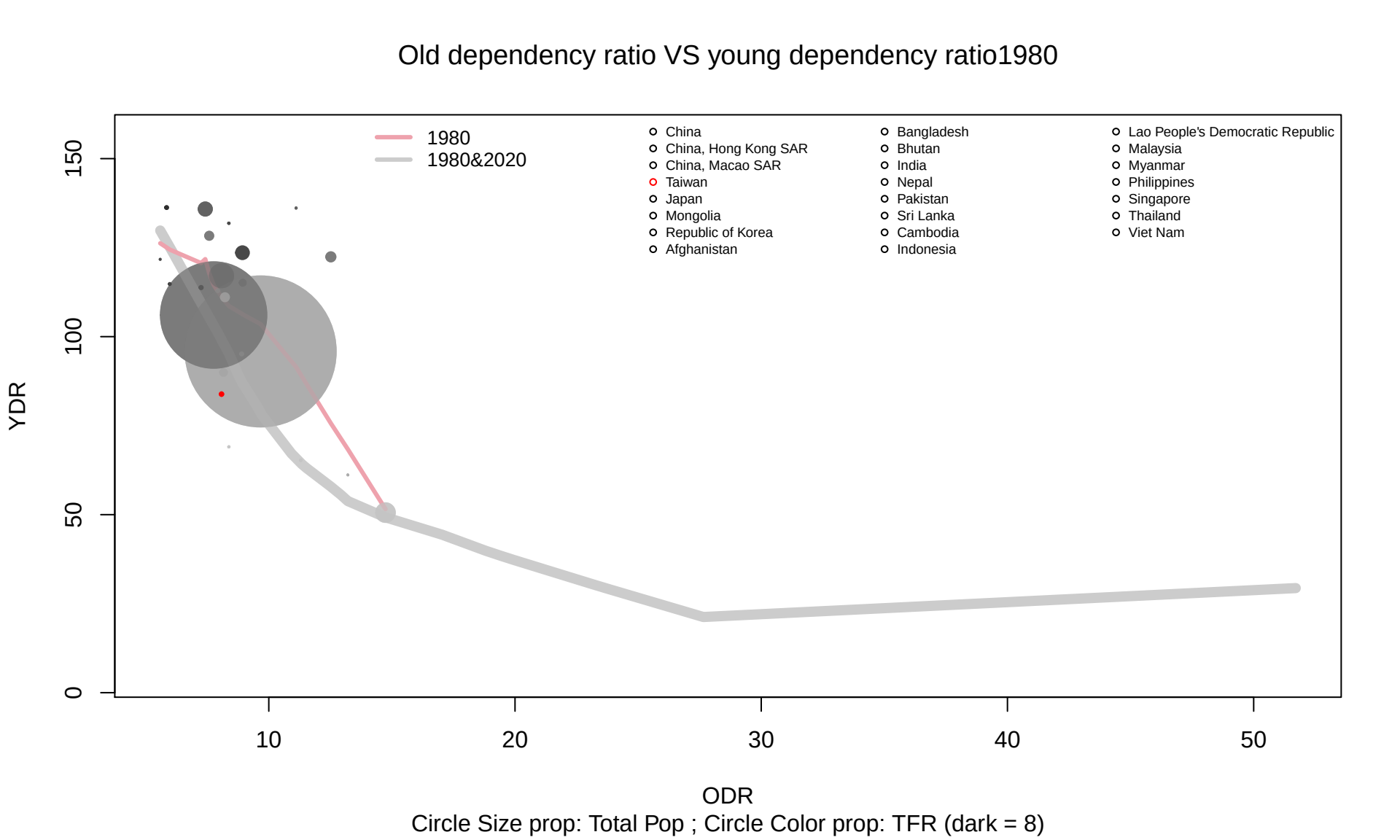
ODR
Circle Size prop: GDP per capita ; Circle Color prop: TFR (dark = 8)

A Different View: ODR & YDR

Use Total Population size as index


Old dependency ratio VS young dependency ratio1980
1980
1980&2020
China
China, Hong Kong SAR
China, Macao SAR
Taiwan
Japan
Mongolia
Republic of Korea
Afghanistan
Bangladesh
Bhutan
India
Nepal
Pakistan
Sri Lanka
Cambodia
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Lao People's Democratic Republic
Malaysia
Myanmar
Philippines
Singapore
Thailand
Viet Nam
YDR
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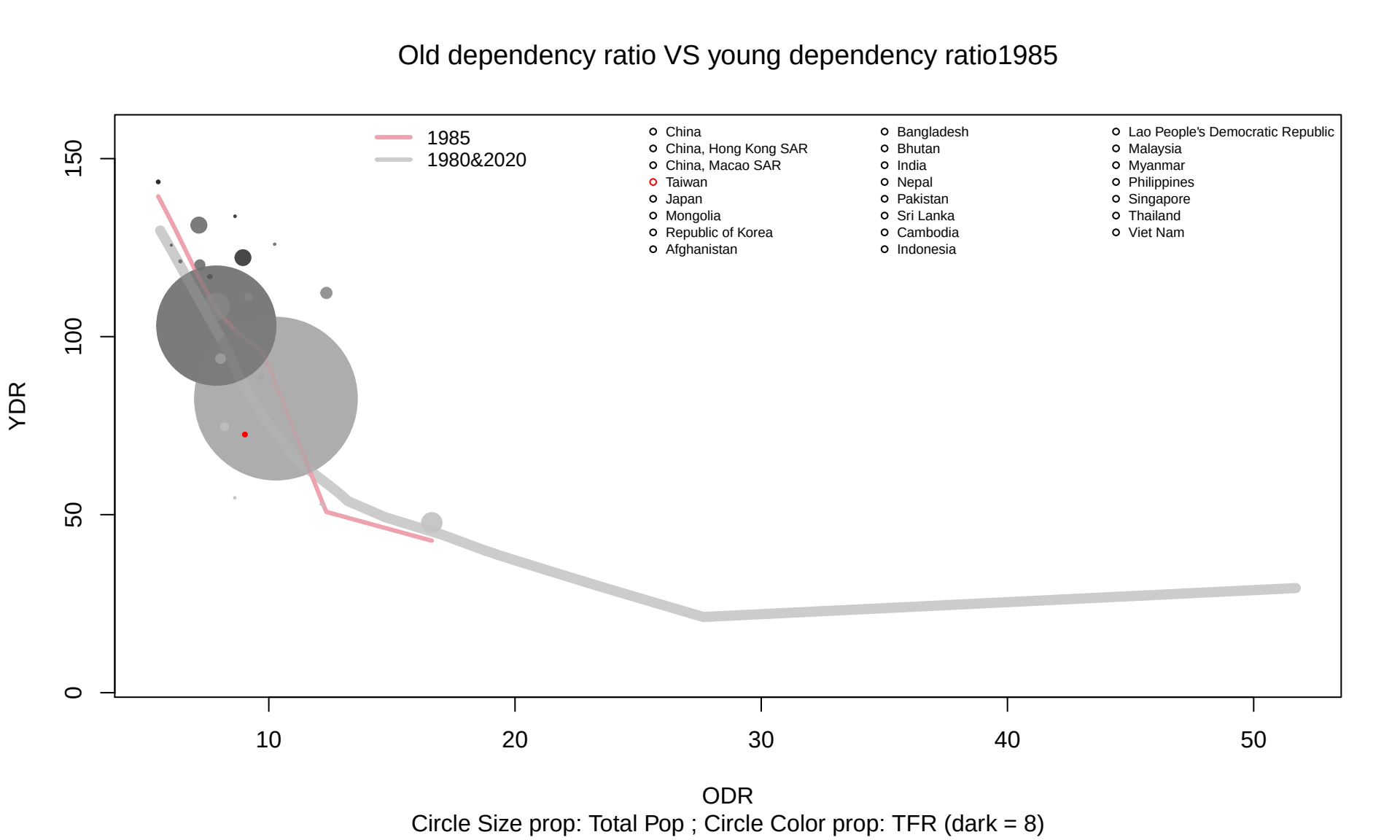
ODR
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS young dependency ratio1985
1985
1980&2020
China
China, Hong Kong SAR
China, Macao SAR
Taiwan
Japan
Mongolia
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Afghanistan
Bangladesh
Bhutan
India
Nepal
Pakistan
Sri Lanka
Cambodia
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Malaysia
Myanmar
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Thailand
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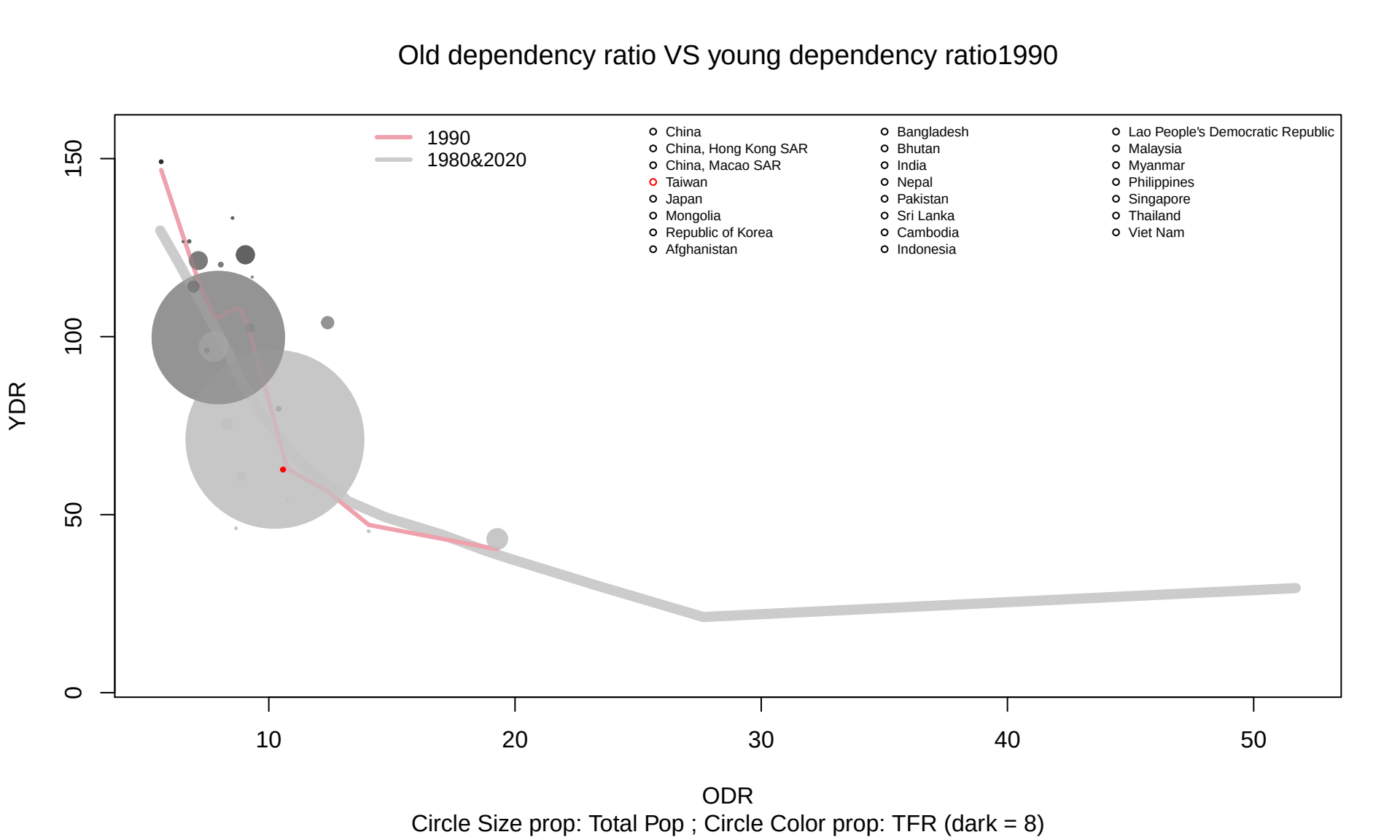
ODR
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS young dependency ratio1990
1990
1980&2020
China
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China, Macao SAR
Taiwan
Japan
Mongolia
Republic of Korea
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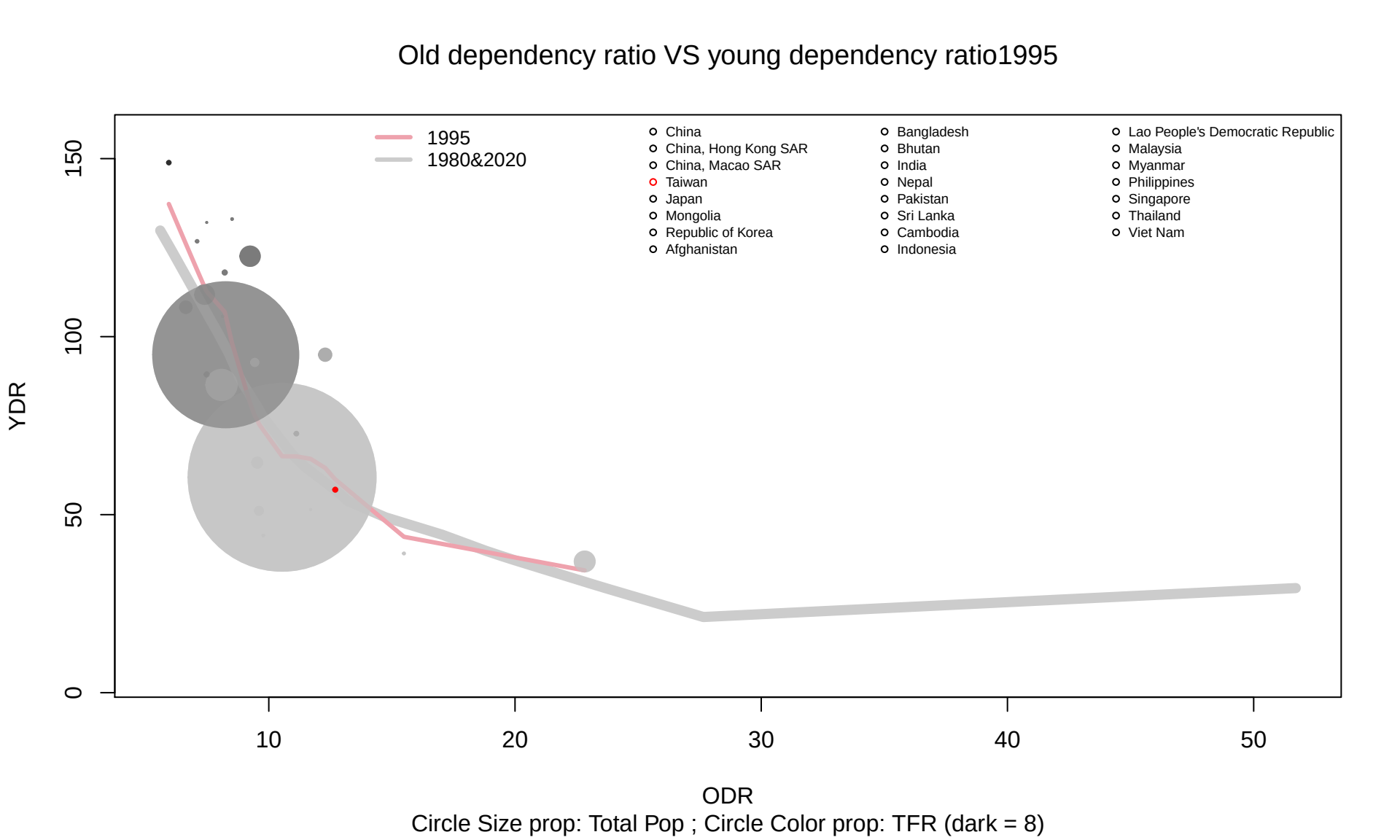
ODR
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS young dependency ratio1995
1995
1980&2020
China
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China, Macao SAR
Taiwan
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Mongolia
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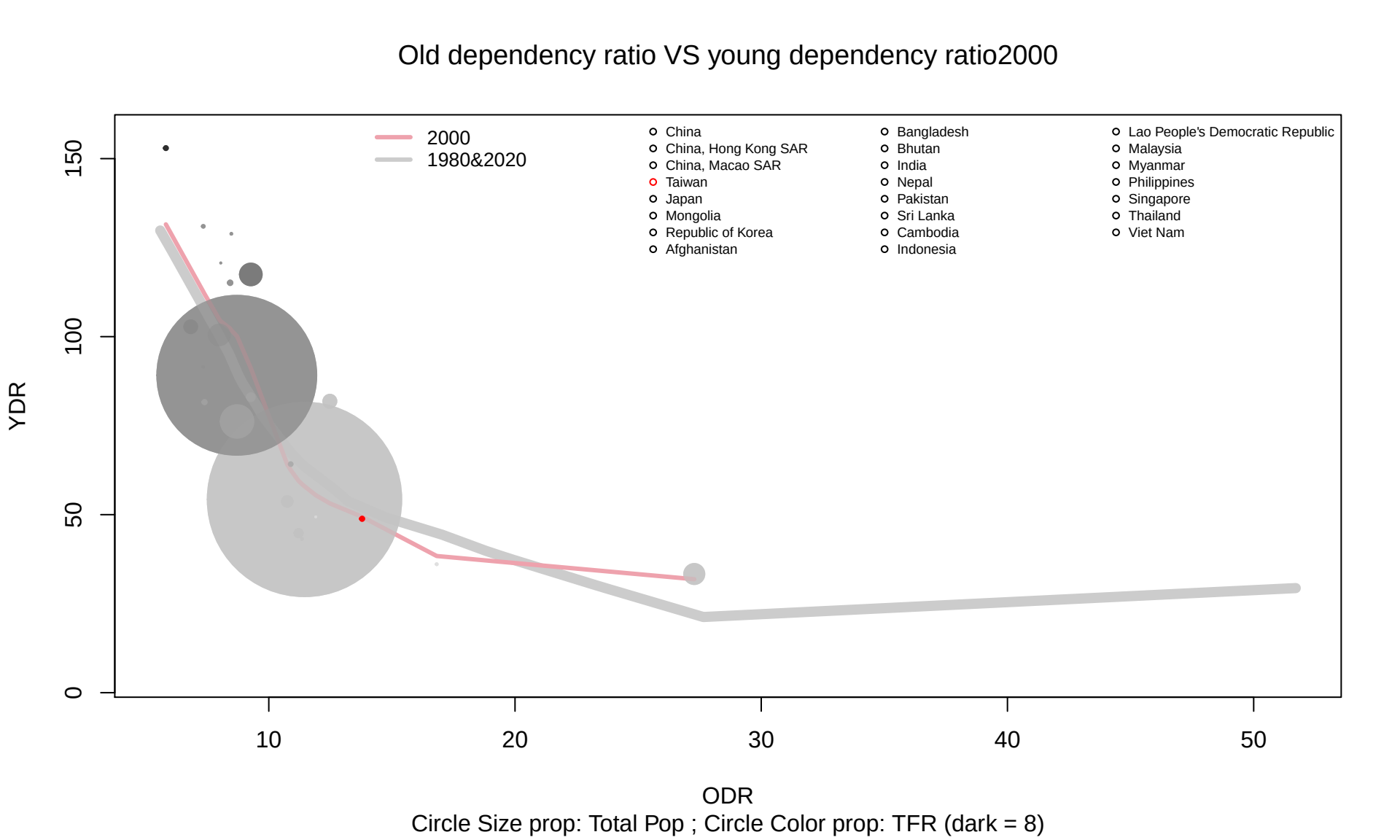
ODR
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS young dependency ratio2000
2000
1980&2020
China
China, Hong Kong SAR
China, Macao SAR
Taiwan
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Mongolia
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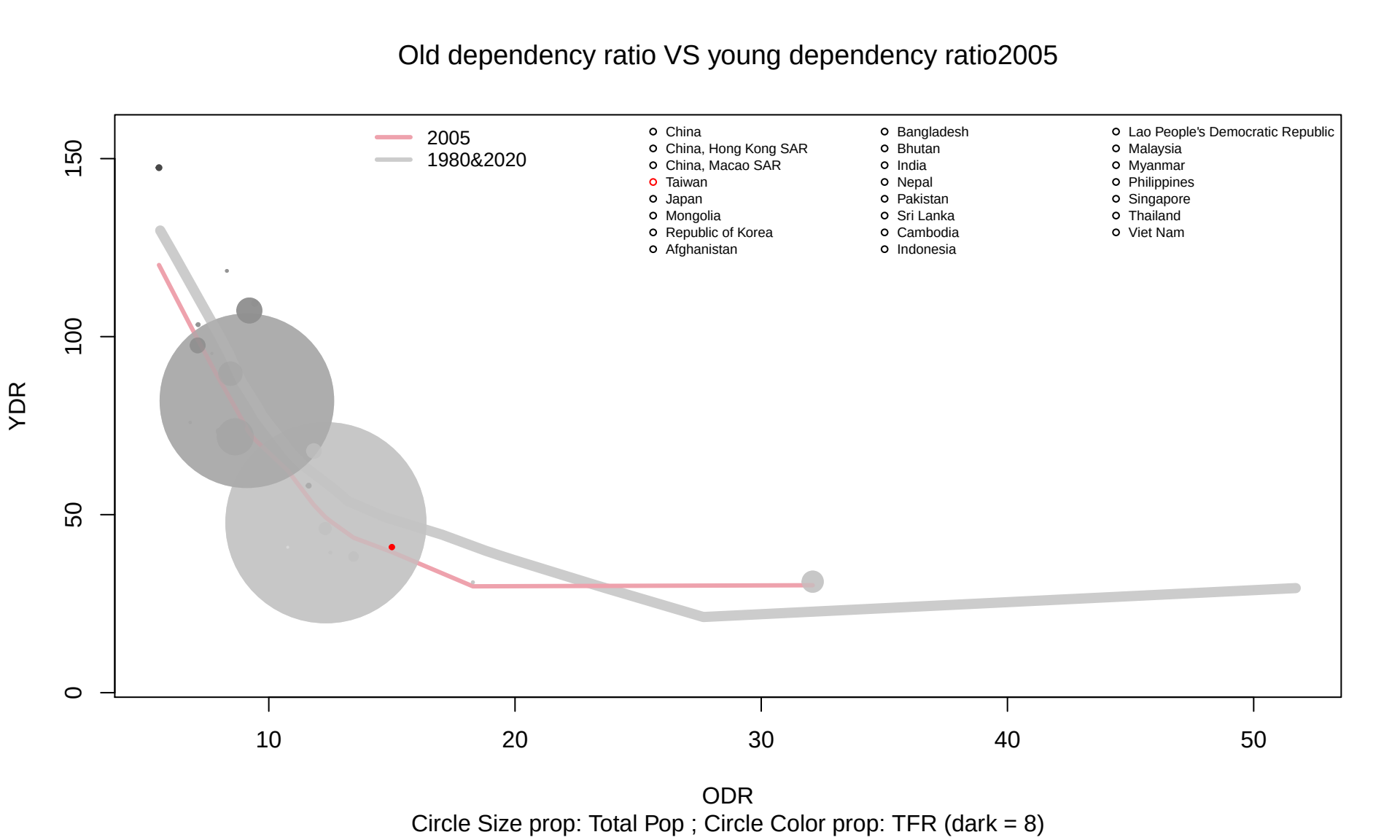
ODR
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS young dependency ratio2005
2005
1980&2020
China
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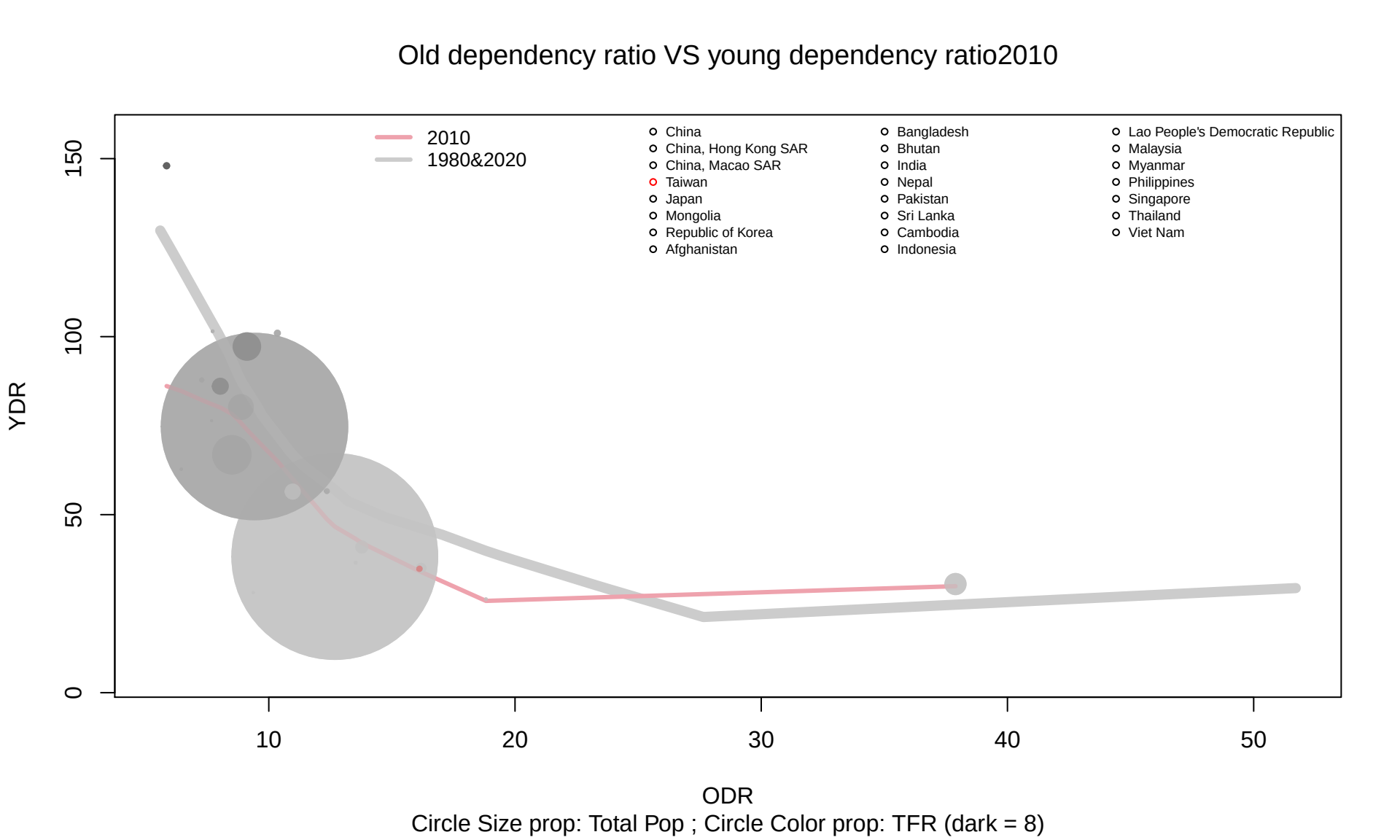
ODR
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS young dependency ratio2010
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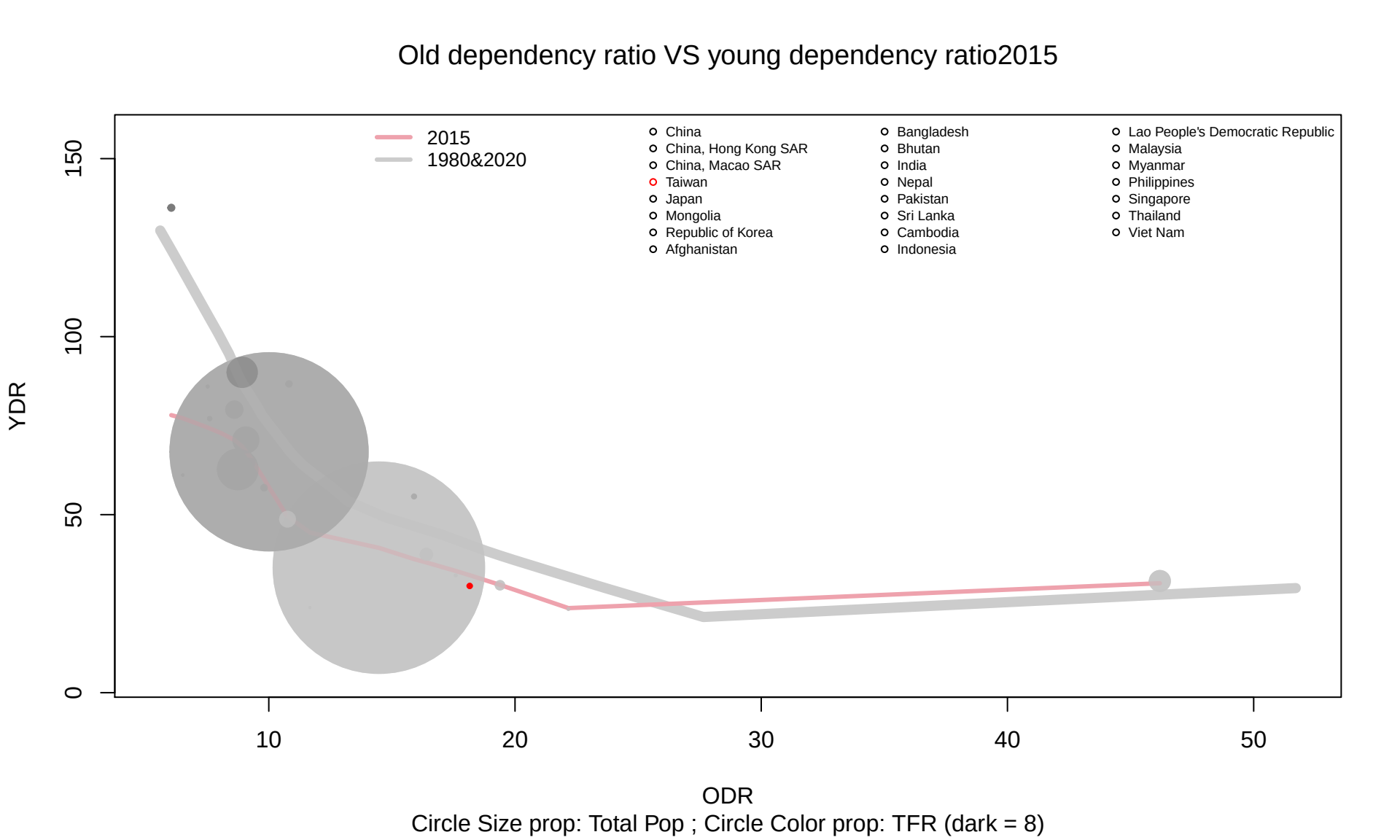
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS young dependency ratio2015
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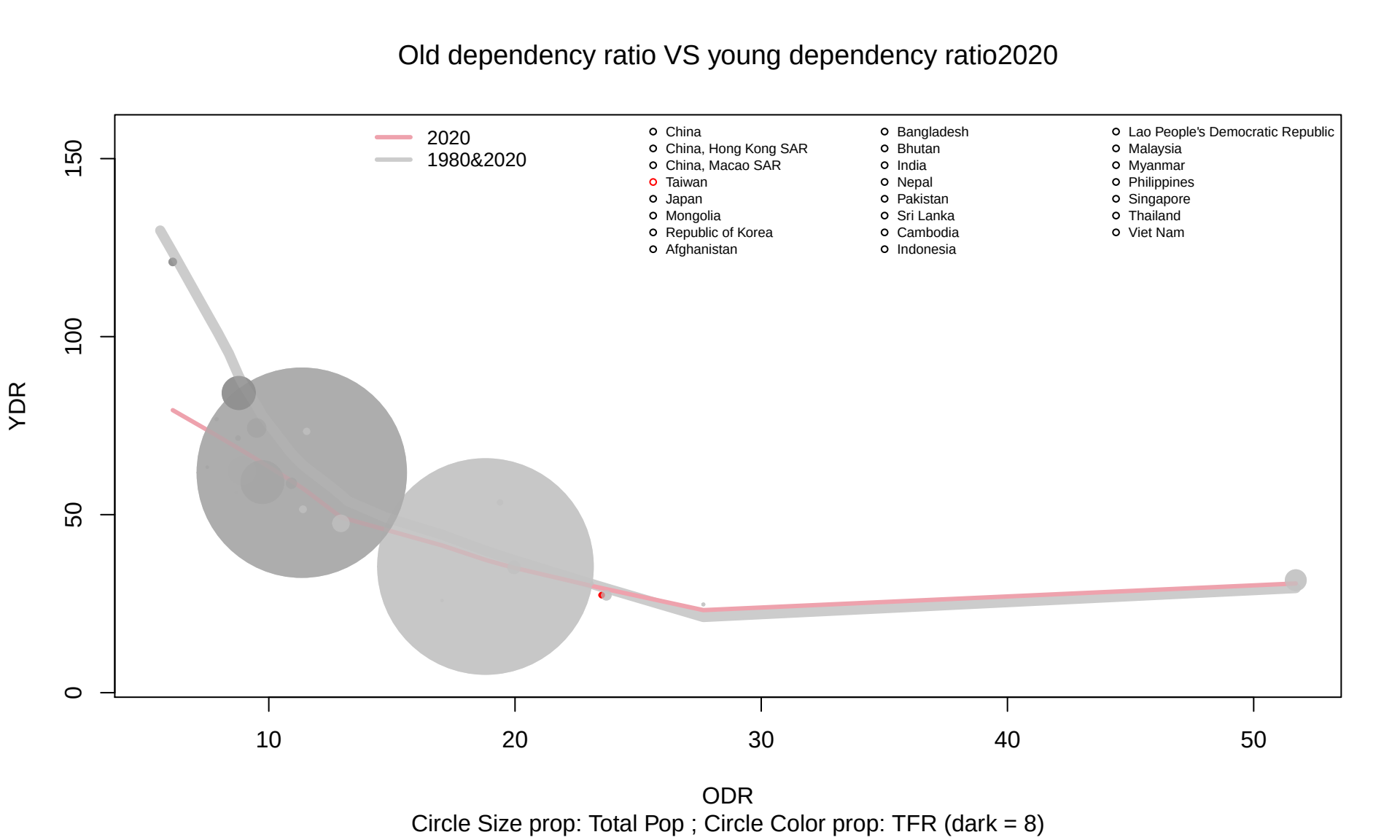
Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)


Old dependency ratio VS young dependency ratio2020
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Circle Size prop: Total Pop ; Circle Color prop: TFR (dark = 8)