Phenomenological modelling scenario of future wood demand by 2050

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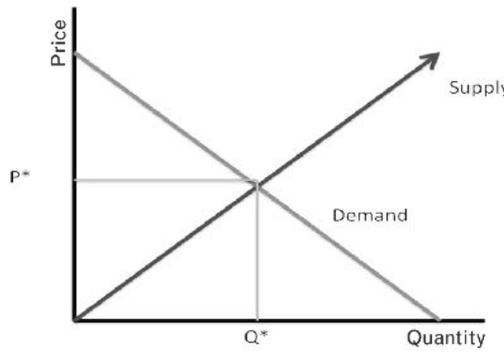
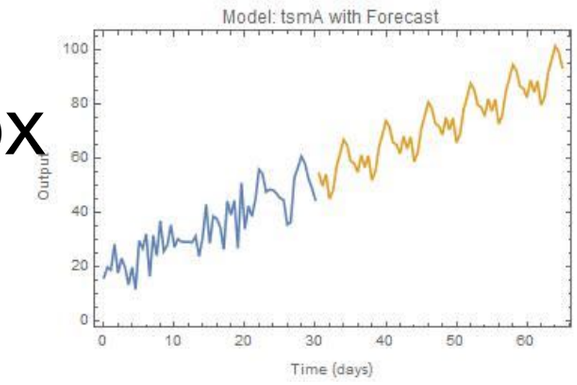
Sustainable Agricultural Landscapes in Southeast Asia

A simplified typology of economic models

- **Theoretical models**
  - Price, Quantities, Offer, Demand, Equilibrium,
  => how various factors may structurally influence the formers, no forecasts



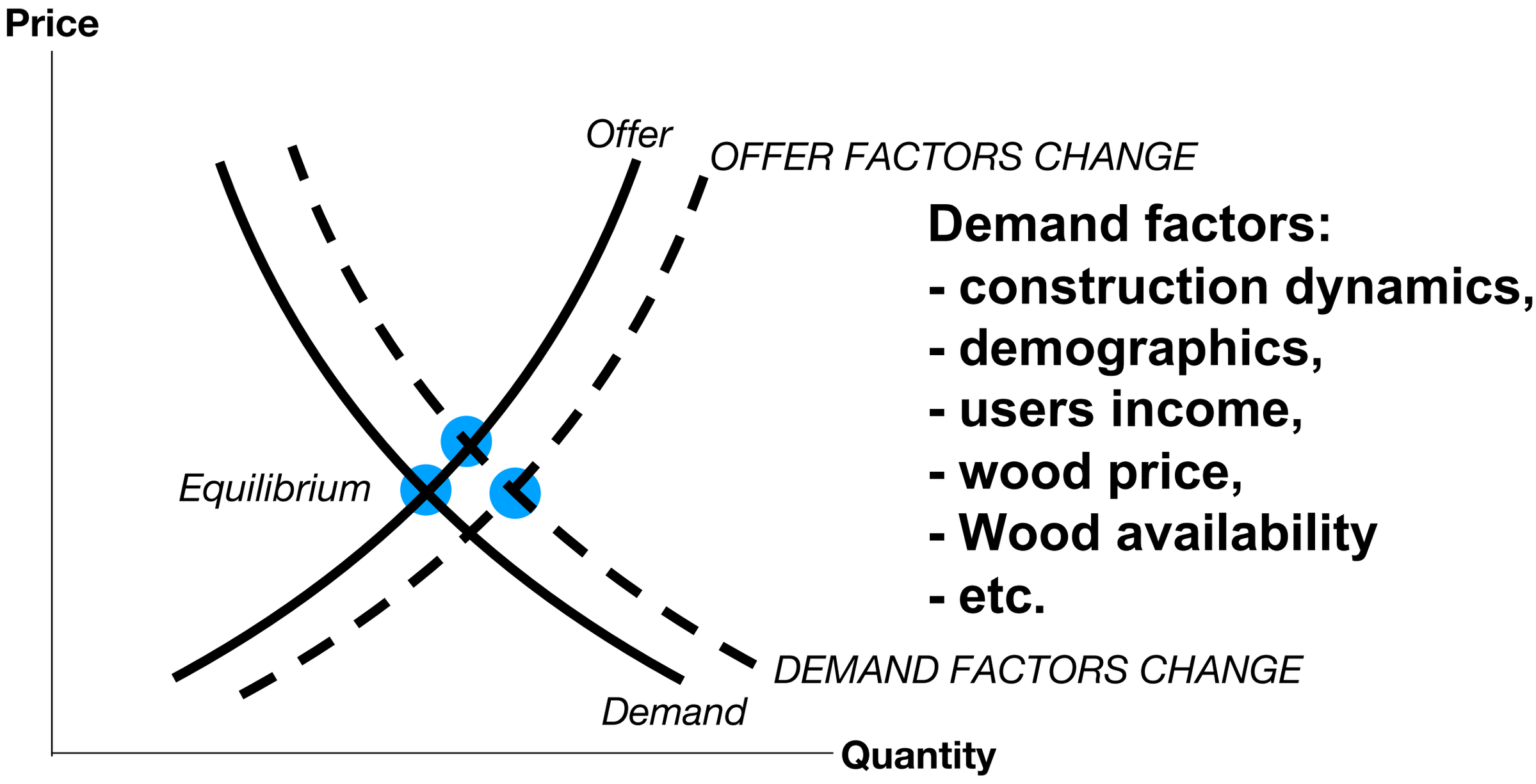
- **Econometric models**
  - a tea spoon of theory, and a tablespoon of blackbox
  => precise description, exploration of factors,
  limited forecasts



- **Phenomenological models**
  - Observation of phenomena, deconstruction of theories, understanding of domains of validity/extrapolation
  => unprecise description, identification of critical factors, robust but imprecise forecasts

$$F = G\frac{m_1 m_2}{r^2}$$

Theoretical model

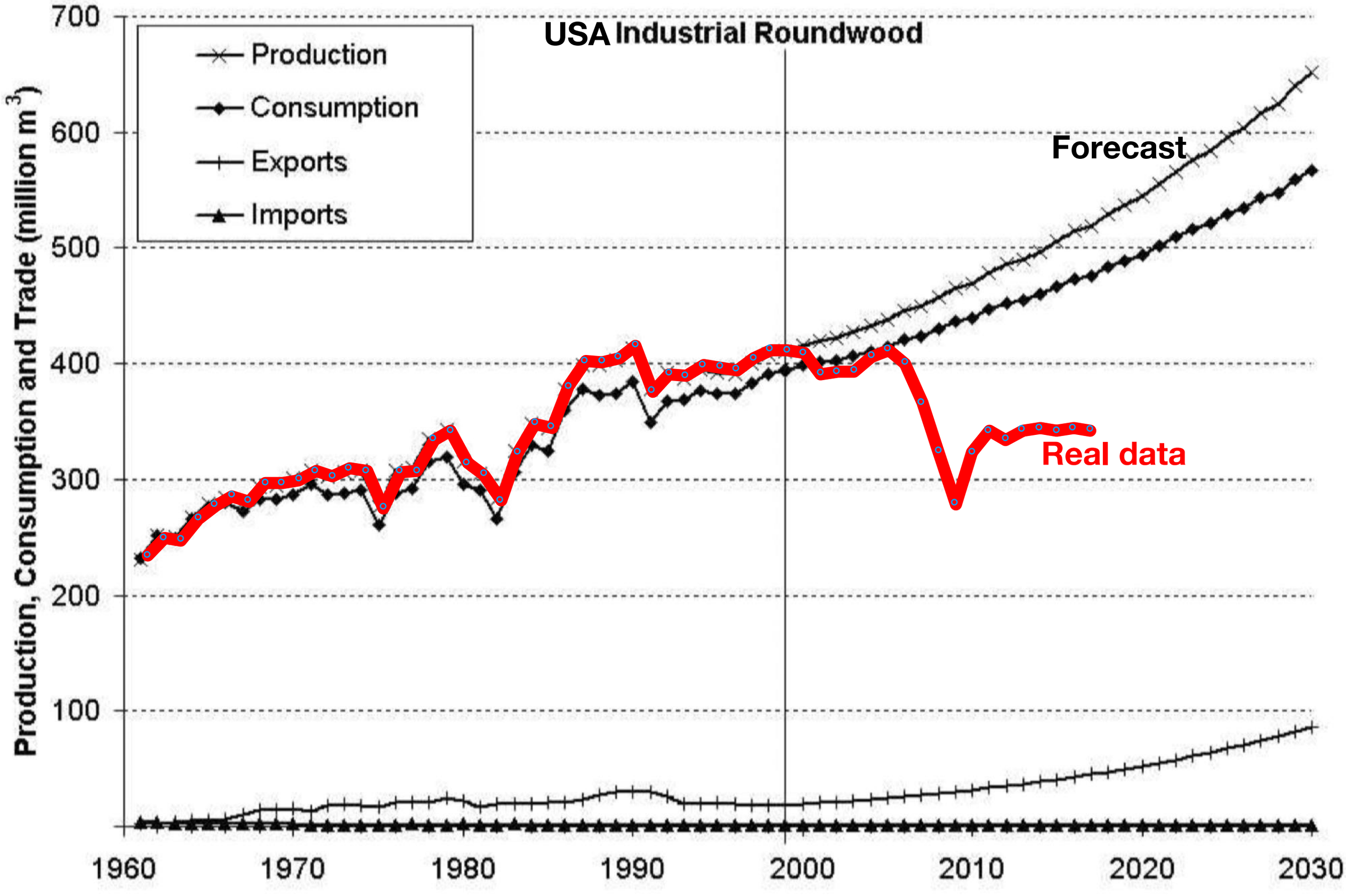


Demand factors:
- **construction dynamics,**
- **demographics,**
- **users income,**
- **wood price,**
- **Wood availability**
- **etc.**

$$\ln Q_t = \beta_0 + \beta_1 \ln P_t + \beta_2 \ln(P.O)_t + \beta_3 \ln(A)_t + \beta_4 \ln(S/A)_t + \beta_5 \ln(Y/N)_t + \varepsilon_t$$

Price Ownership Area Density Income

Theoretical model

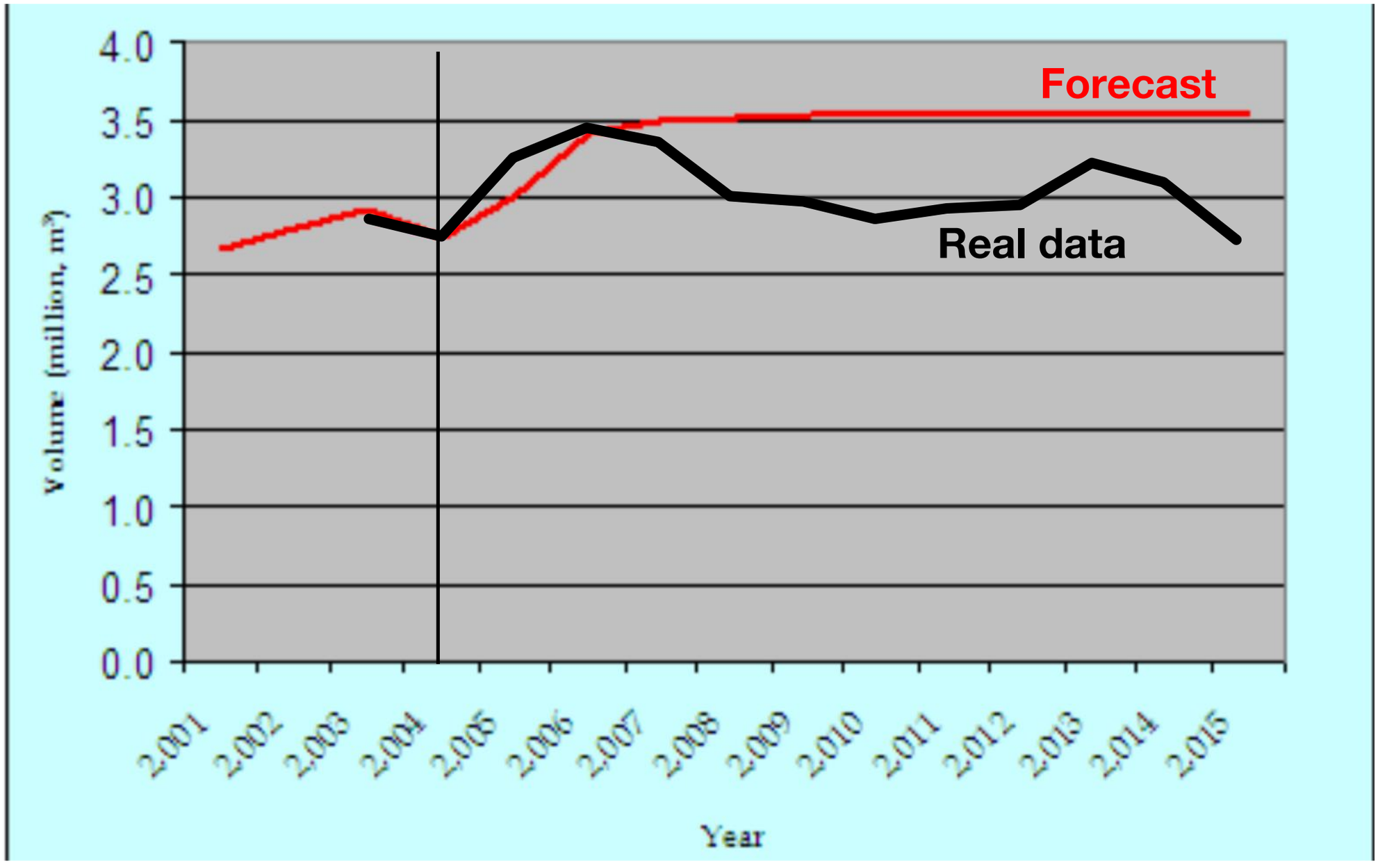


Econometric model

$$\ln Q_t = \beta_0 + \beta_1 \ln P_t + \beta_2 \ln(A)_t + \beta_3 \ln(Q)_{t-1} + \beta_4 \ln(Y)_t + \varepsilon_t$$

Price Area Previous Q Year

Malaysia Sawntimber demand forecast

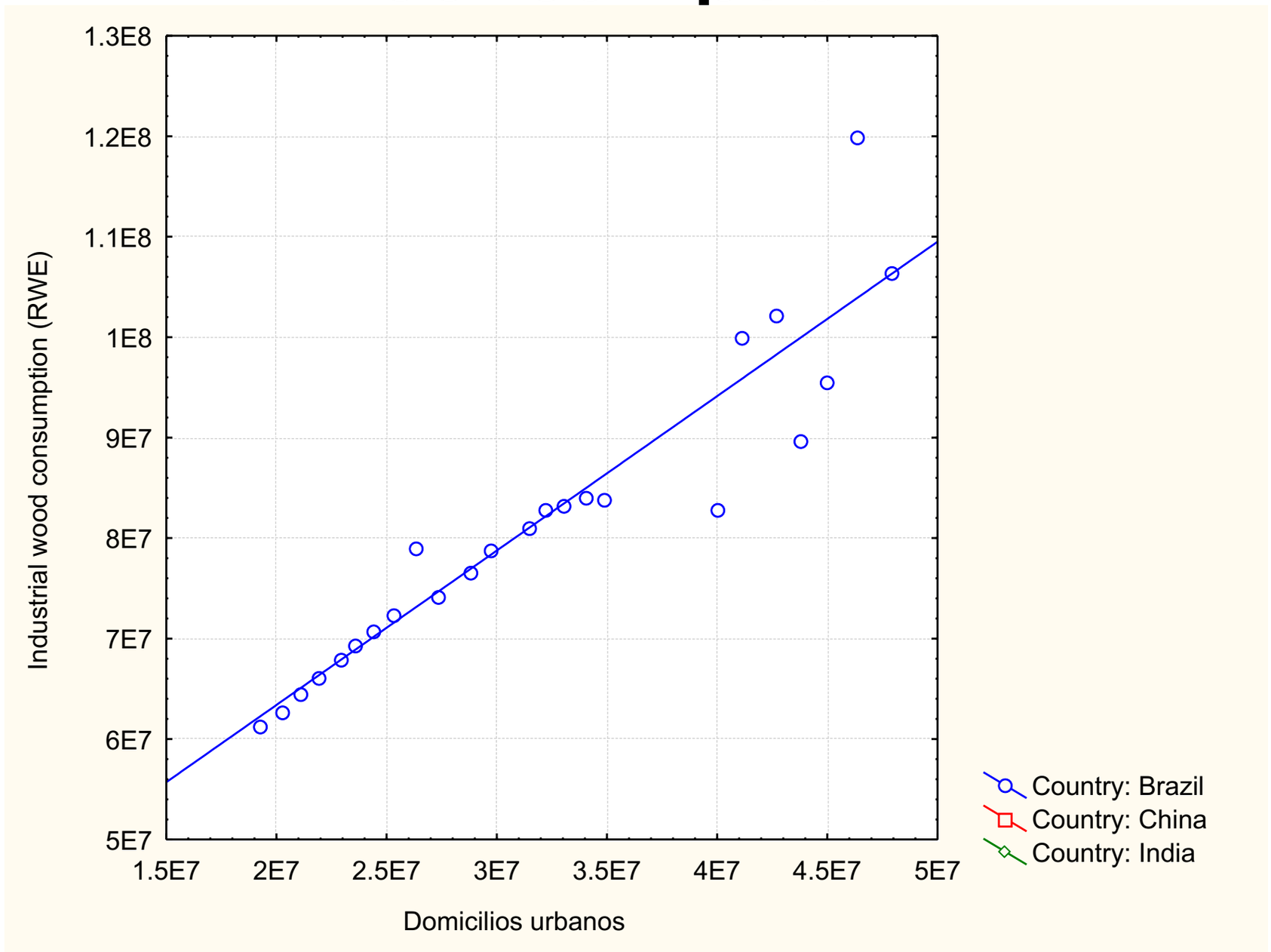


Phenomenological model

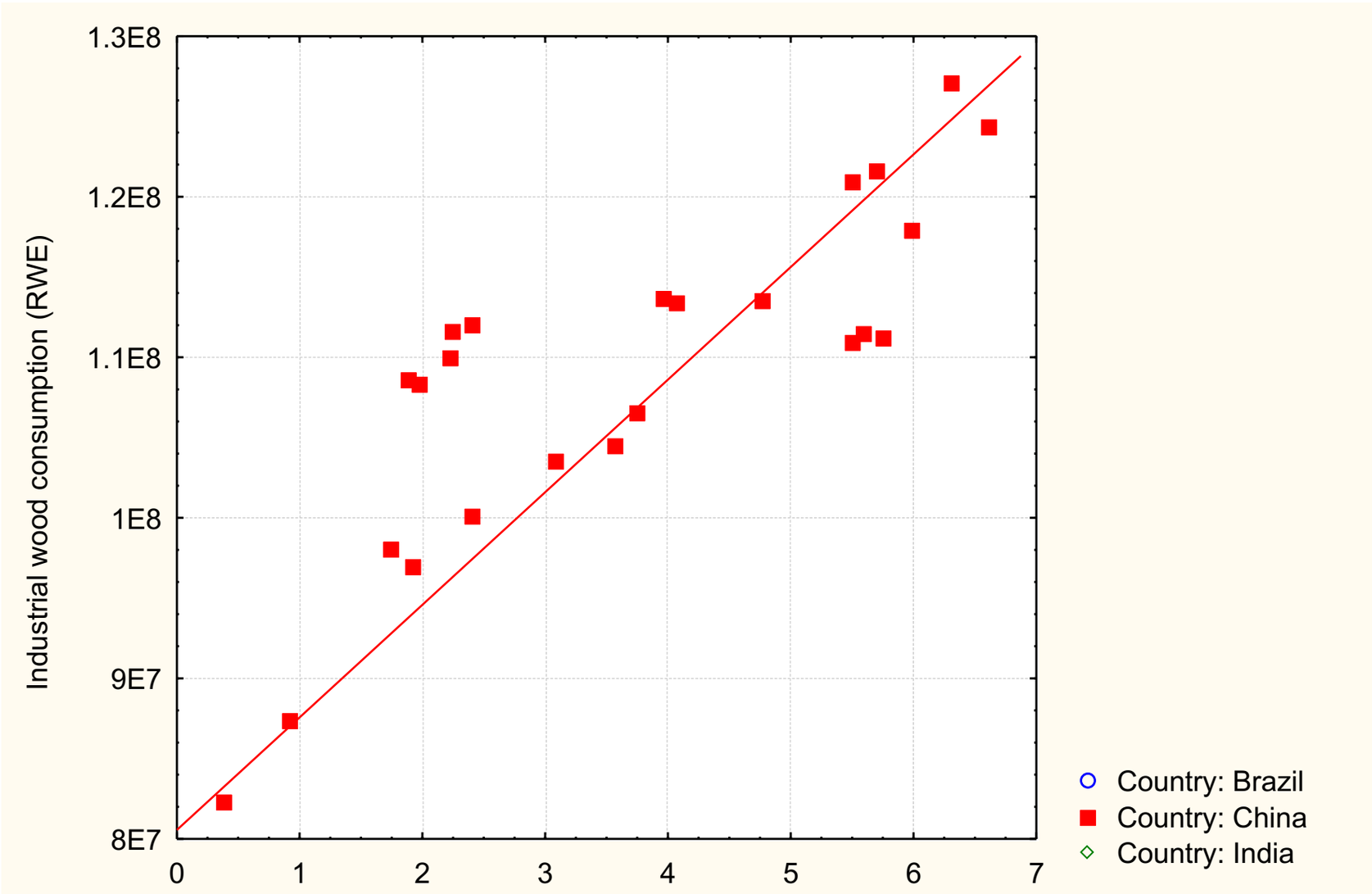
=> starting from observations

Urbanization = construction (formworks, structure, joinery, furniture)

Brazil : “domicilios” vs wood consumption



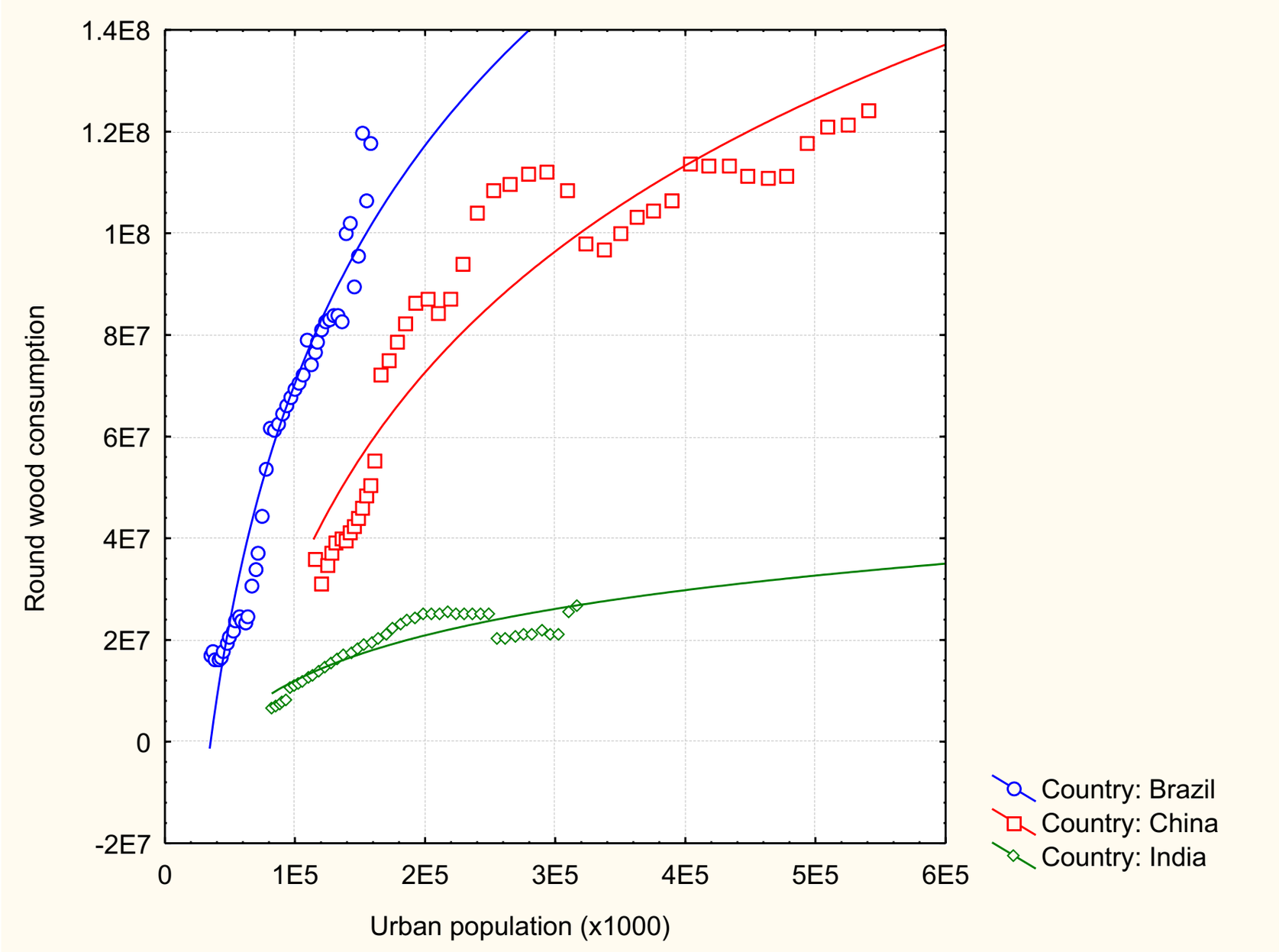
China : “Floor space” vs wood consumption



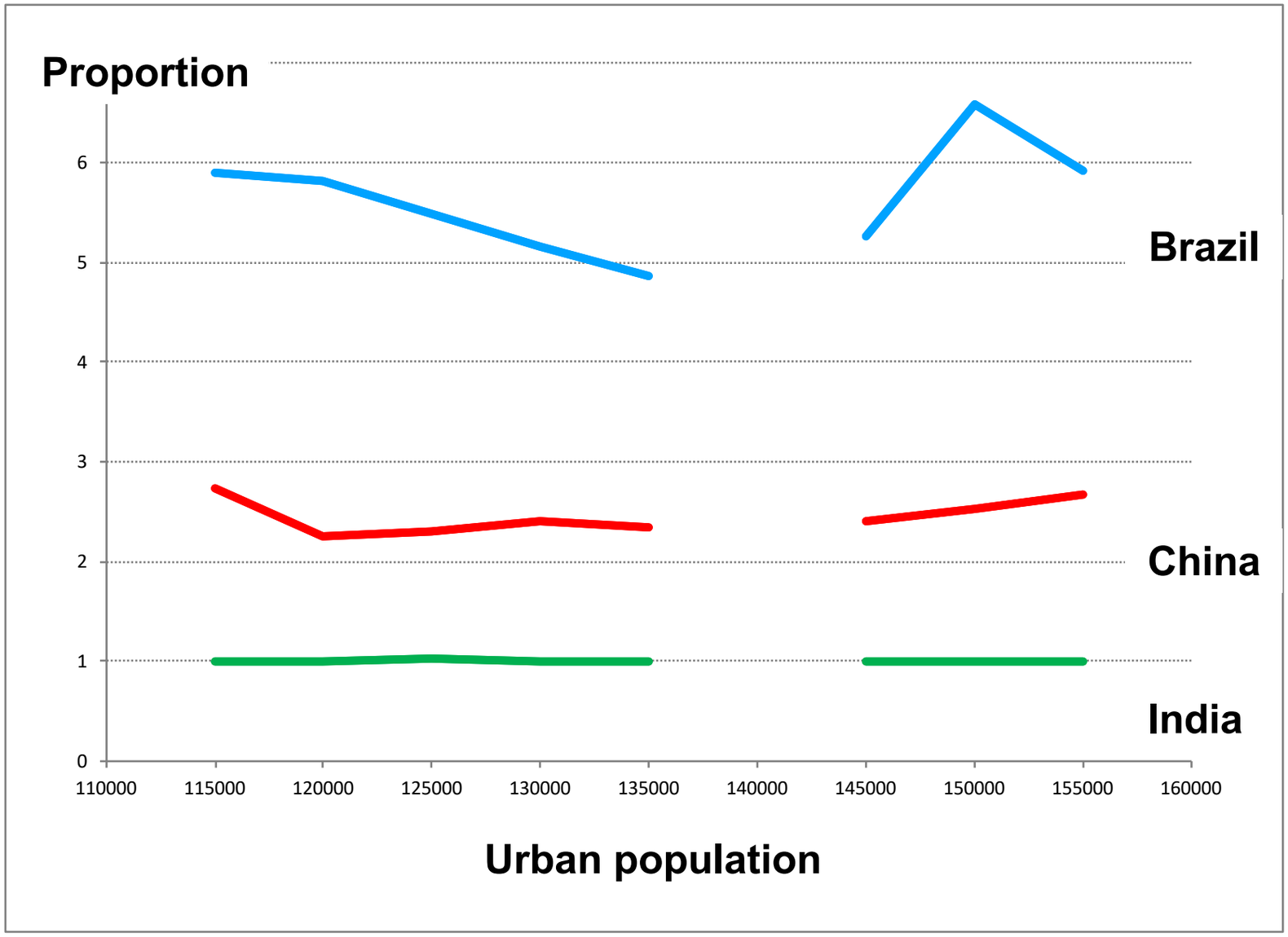
??Floor Space of Newly Built Residential Buildings in Urban Areas (100 million sq.m)

China Floor Space of Newly Built Residential Buildings in Urban Areas (100 million sq.m)

An index of construction : urban population

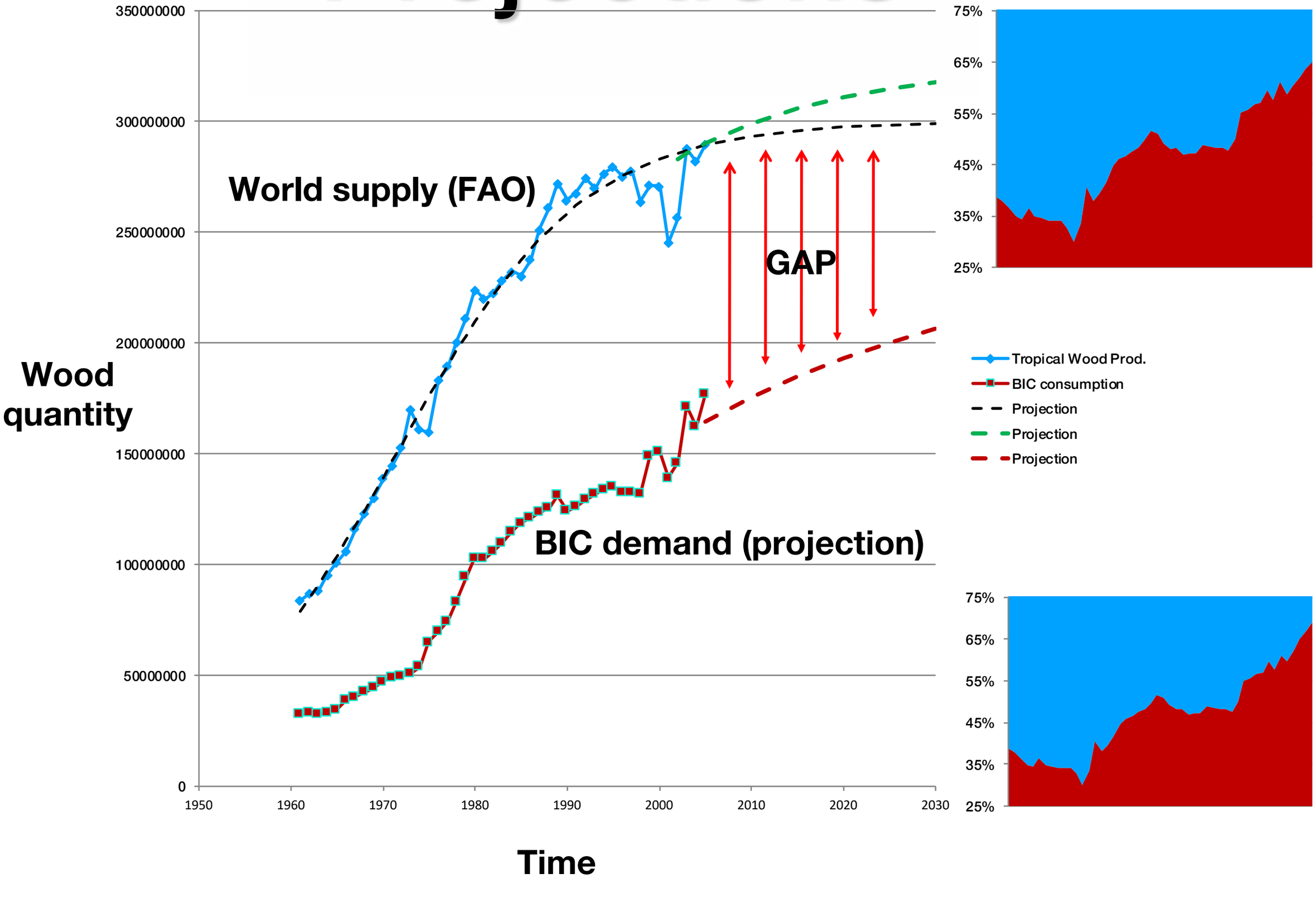


Surprisingly consistent proportions



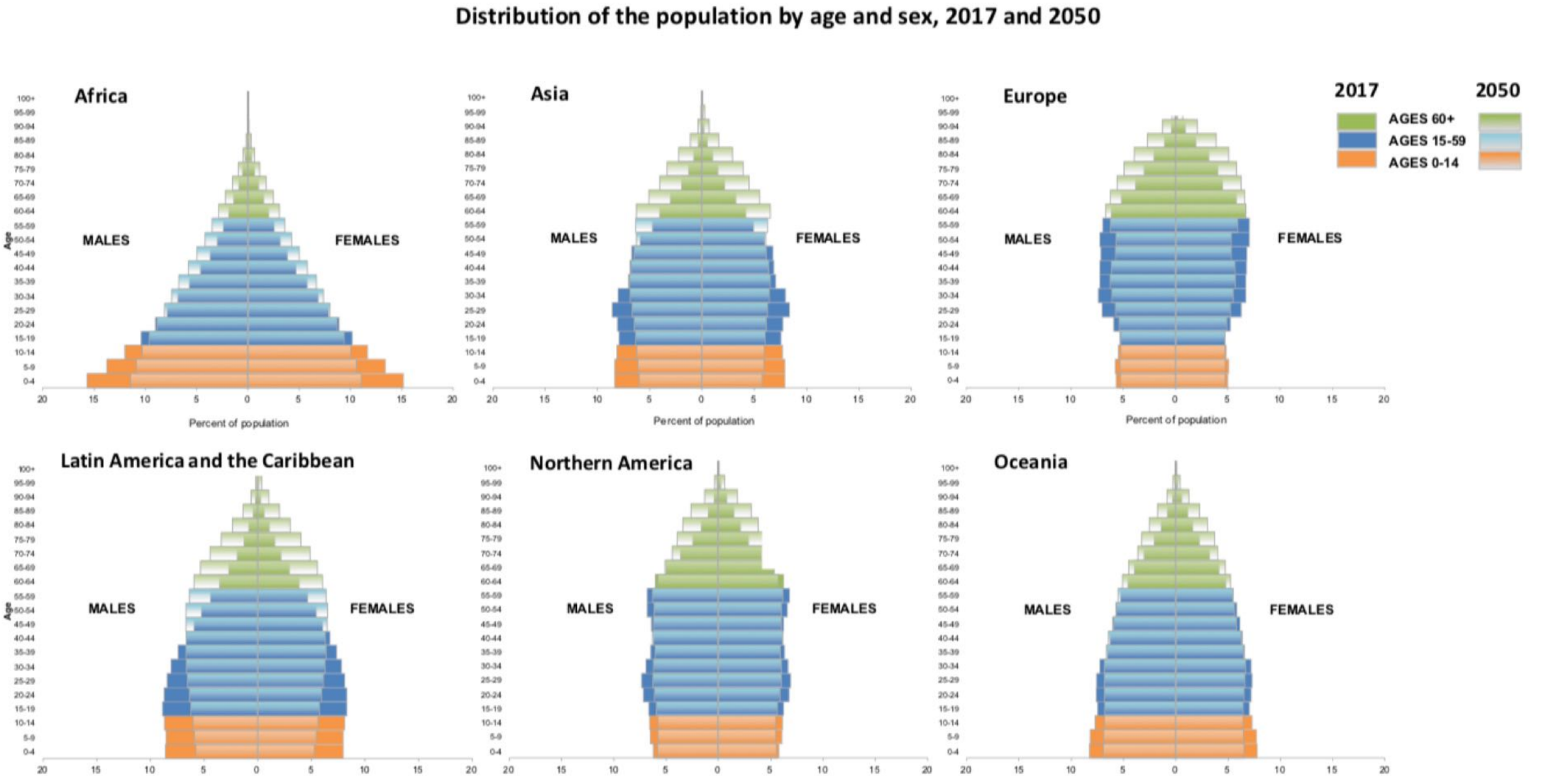
$$\text{Ln(Demand)}_t = \beta_0 + E.\text{ln(Demography)}_t + \varepsilon_t$$

Projections



Phenomenological model

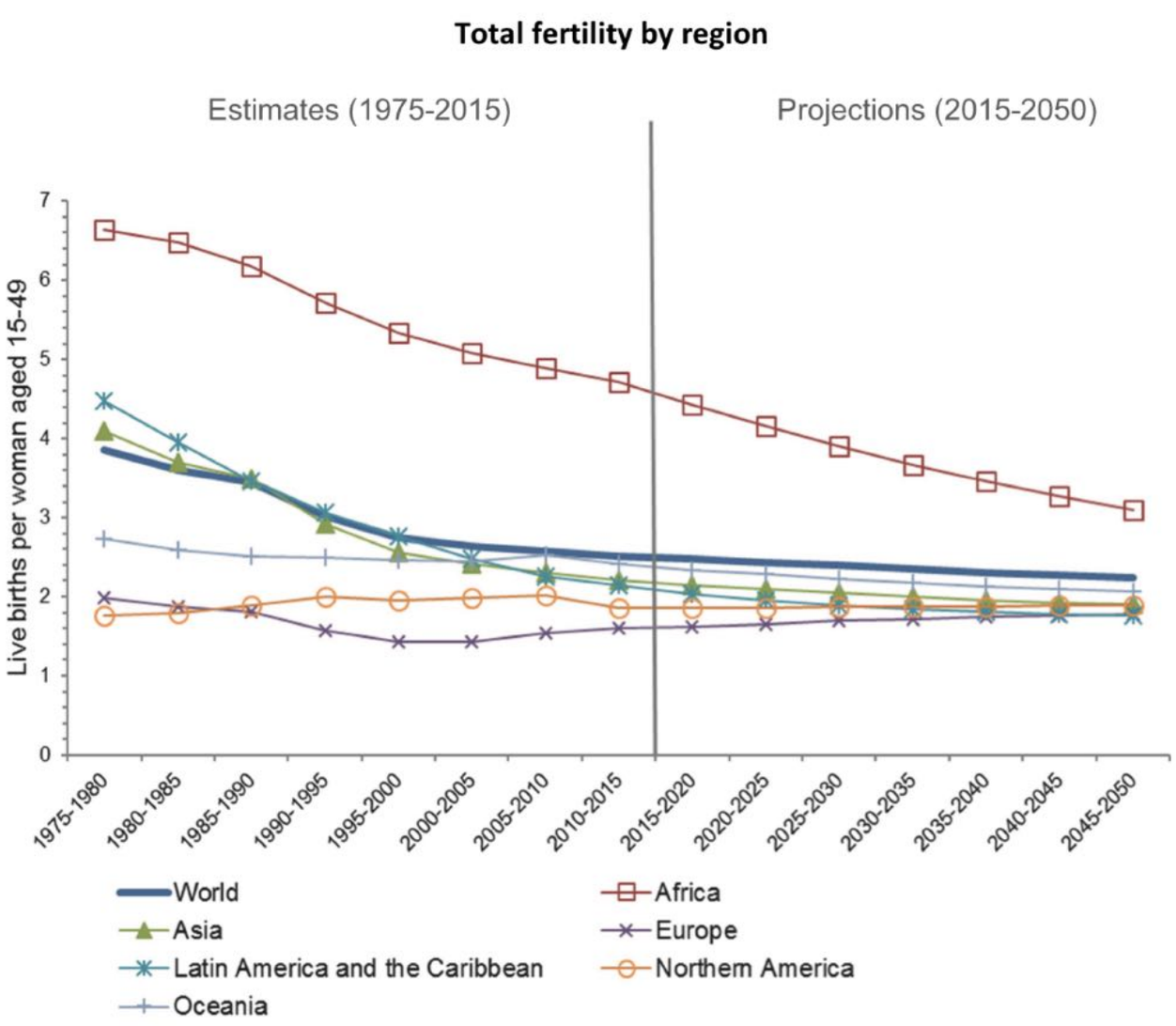
Demography predictions are very reliable

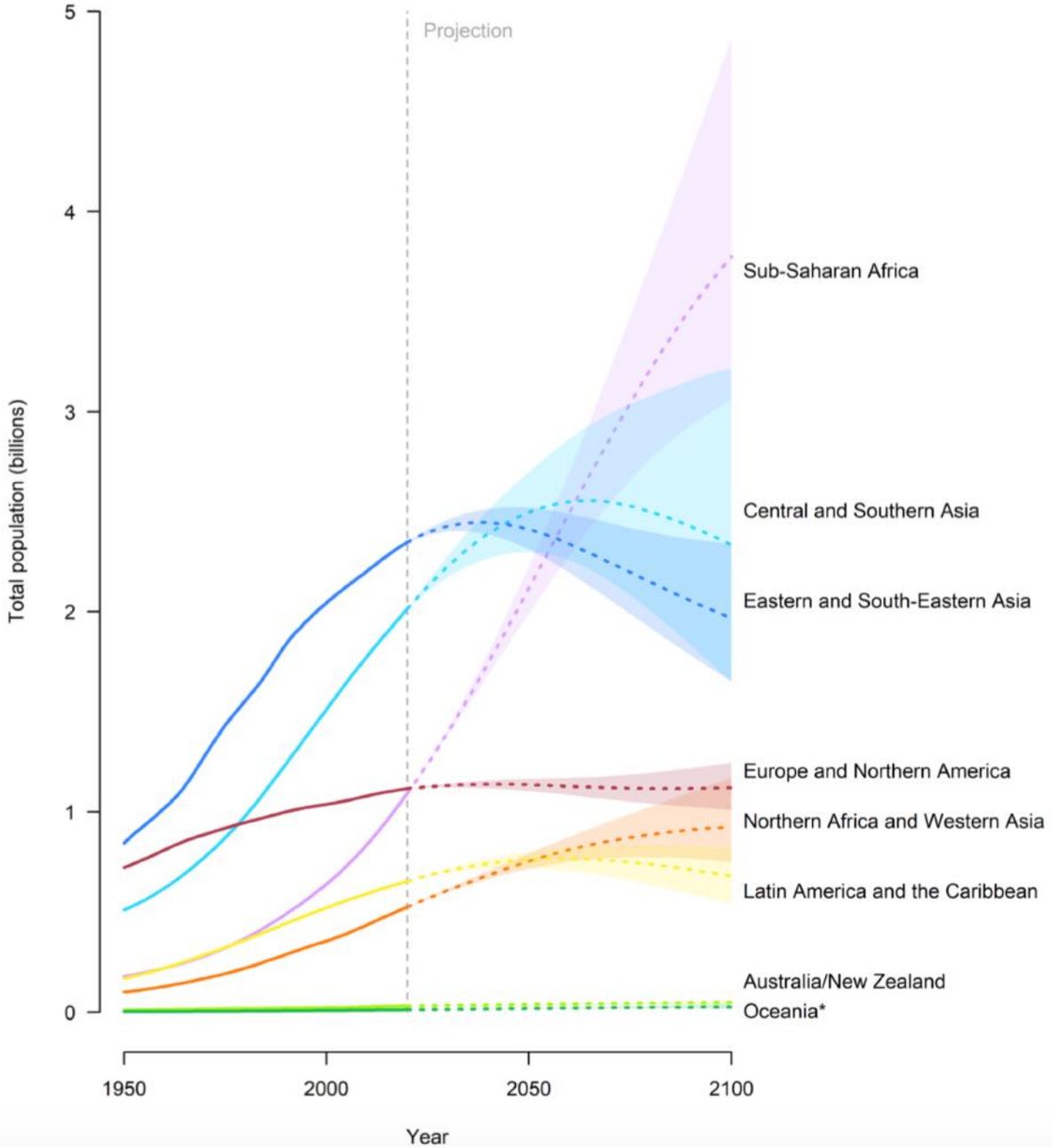


United Nations demographic models are extremely robusts, and have been proved as very reliable

Phenomenological model

Demography predictions are very reliable

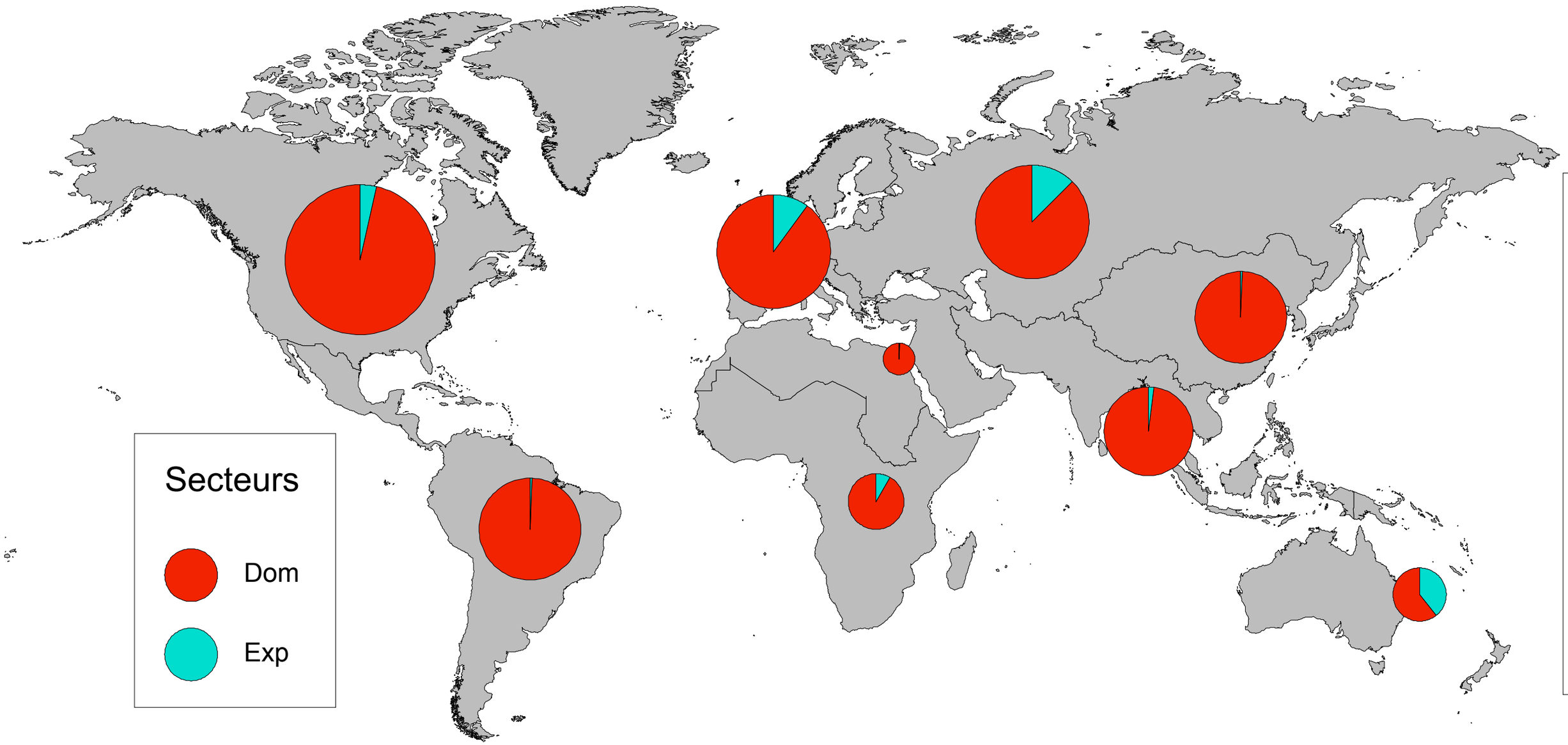


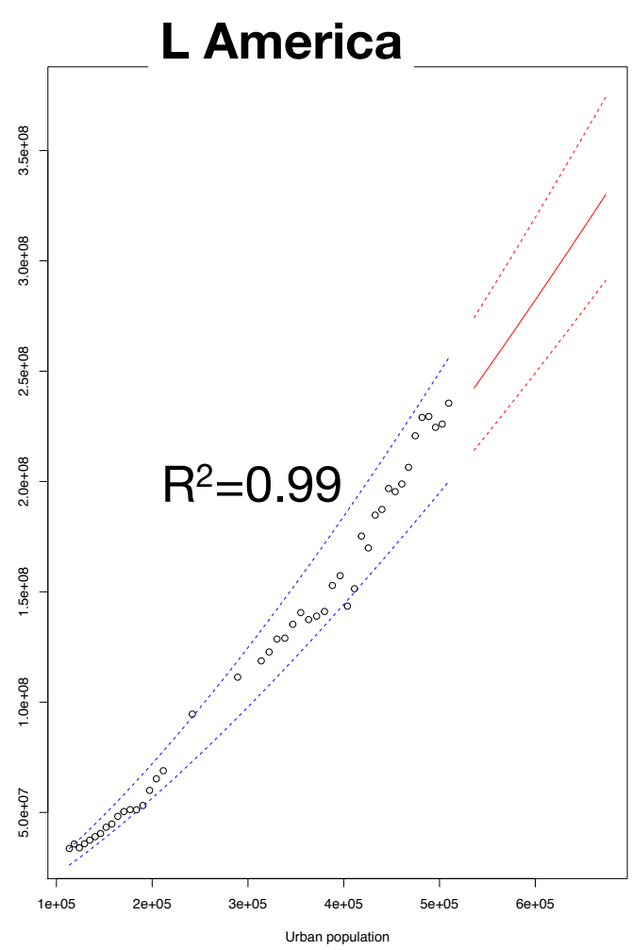


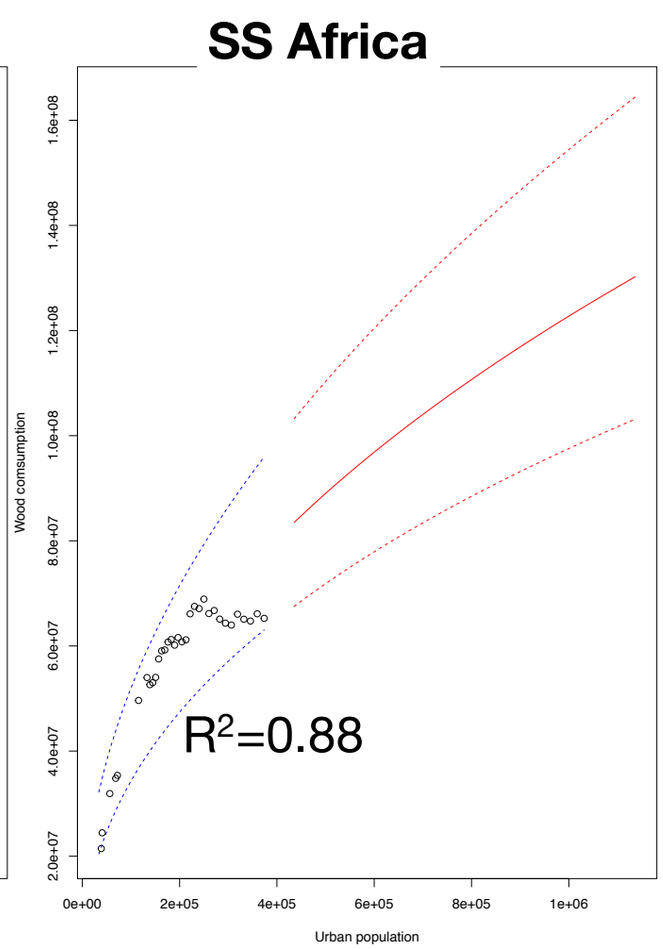
Phenomenological model

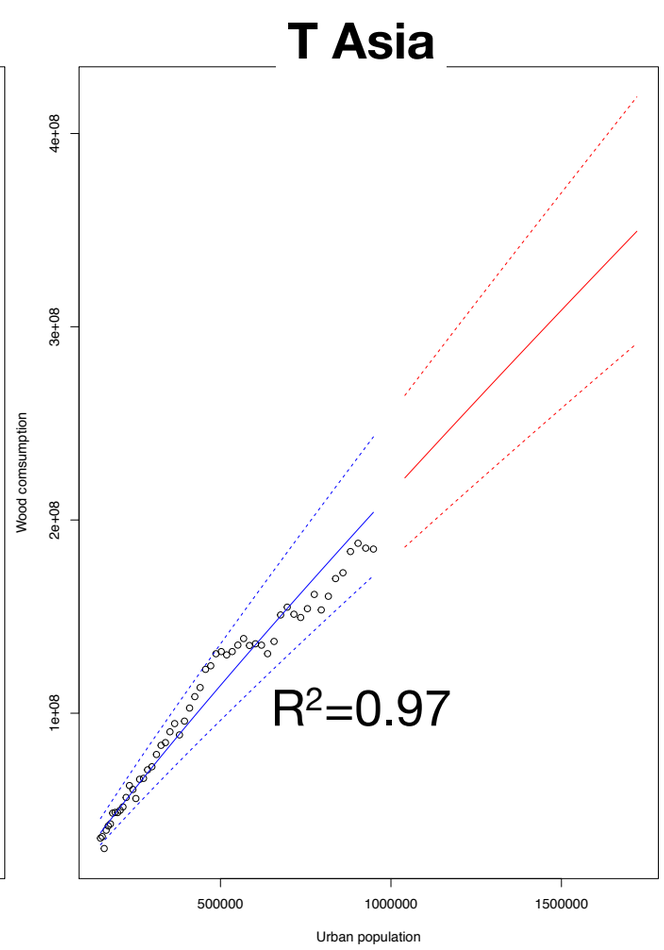
International wood trade is small compared to domestic demand :

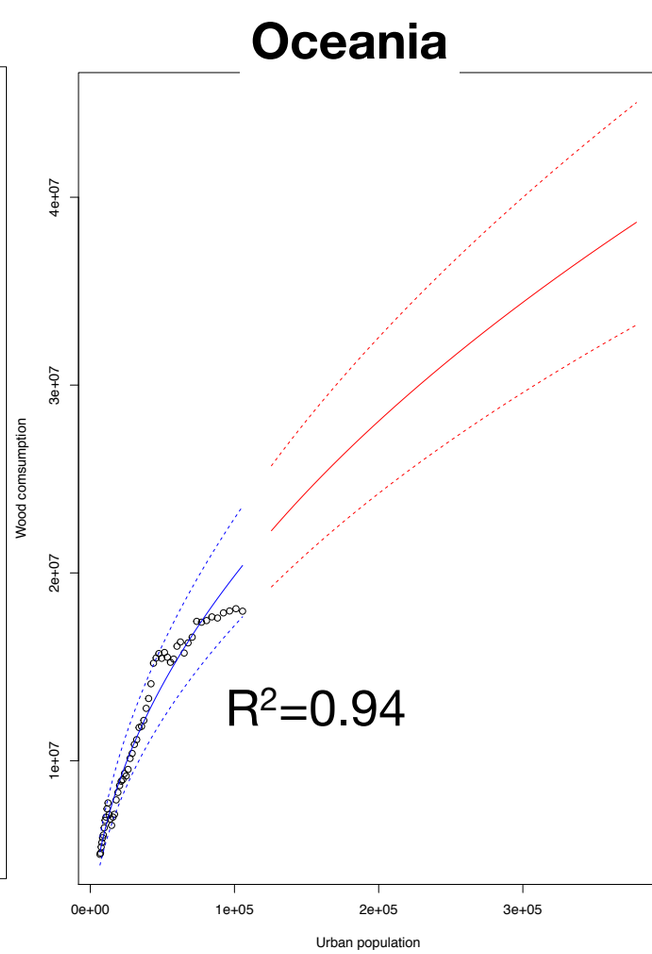
$$\ln(\text{Demand})_t = \beta_0 + E.\ln(\text{Demography})_t + \varepsilon_t$$

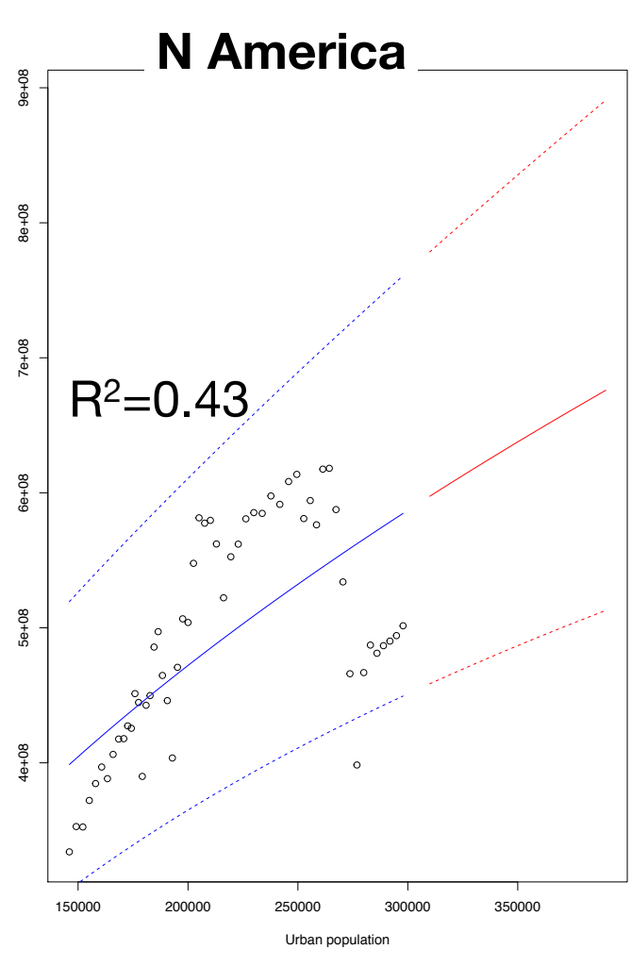


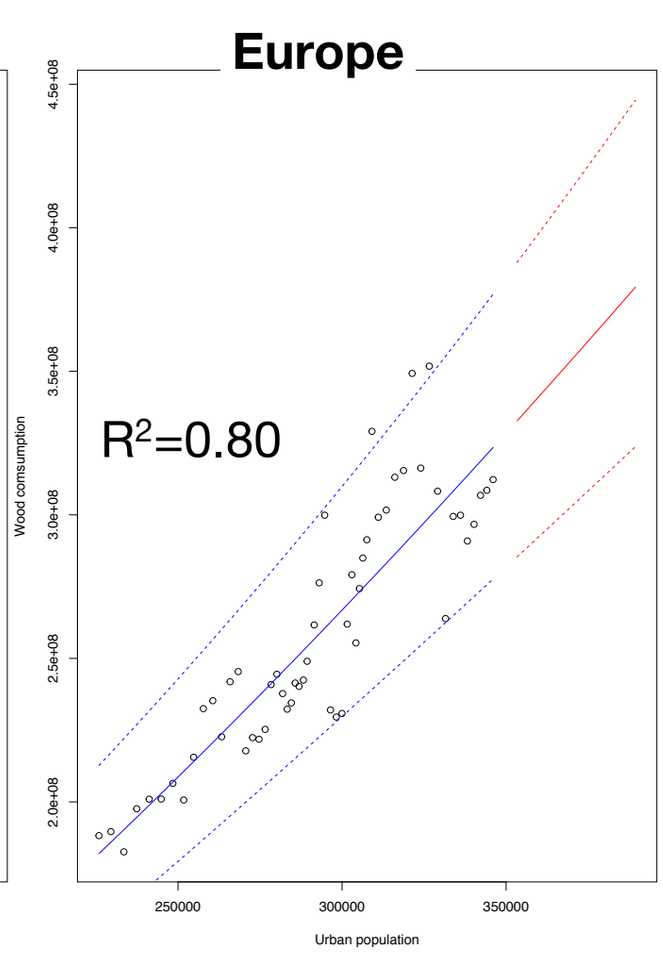

L America
R²=0.99
Wood consumption
Urban population

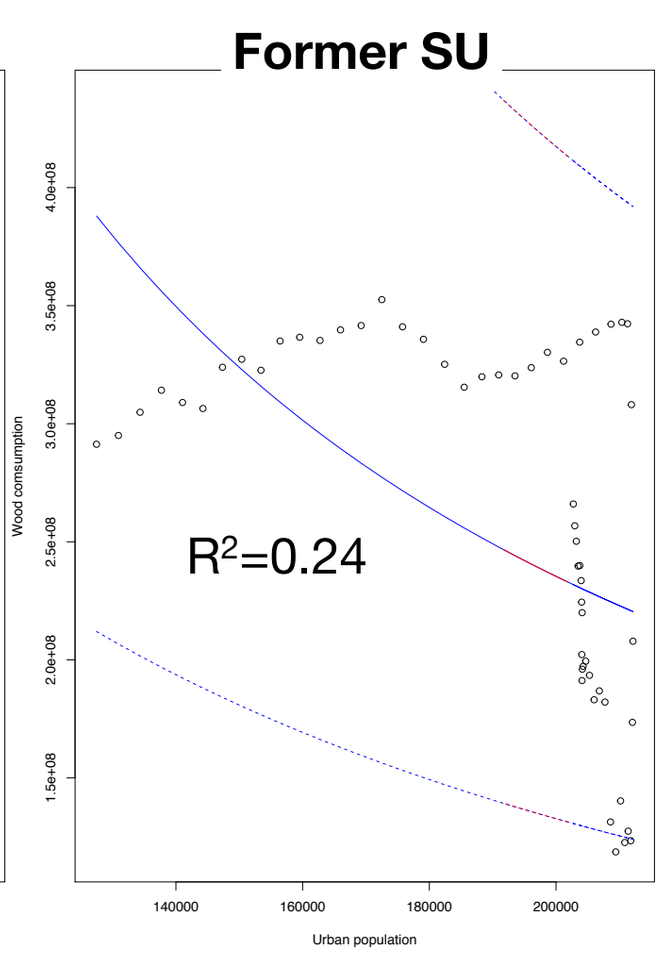

SS Africa
R²=0.88
Wood consumption
Urban population

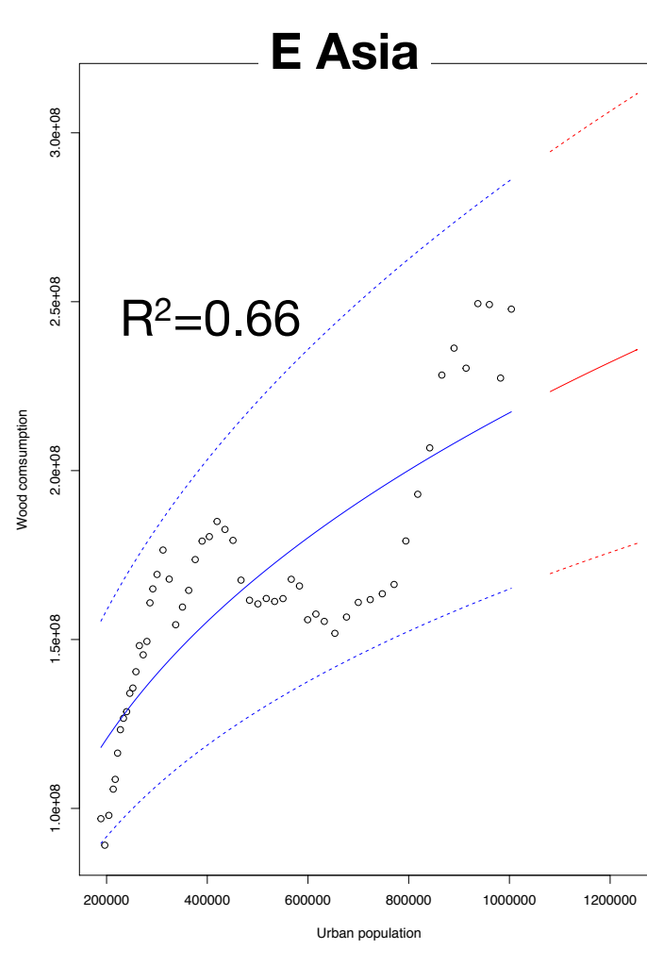

T Asia
R²=0.97
Wood consumption
Urban population

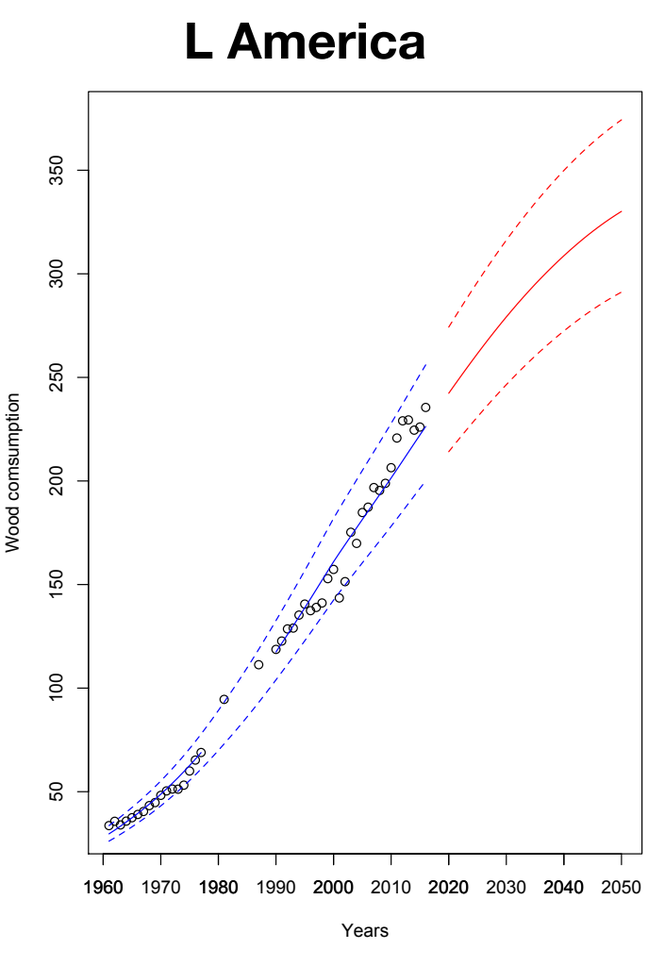

Oceania
R²=0.94
Wood consumption
Urban population

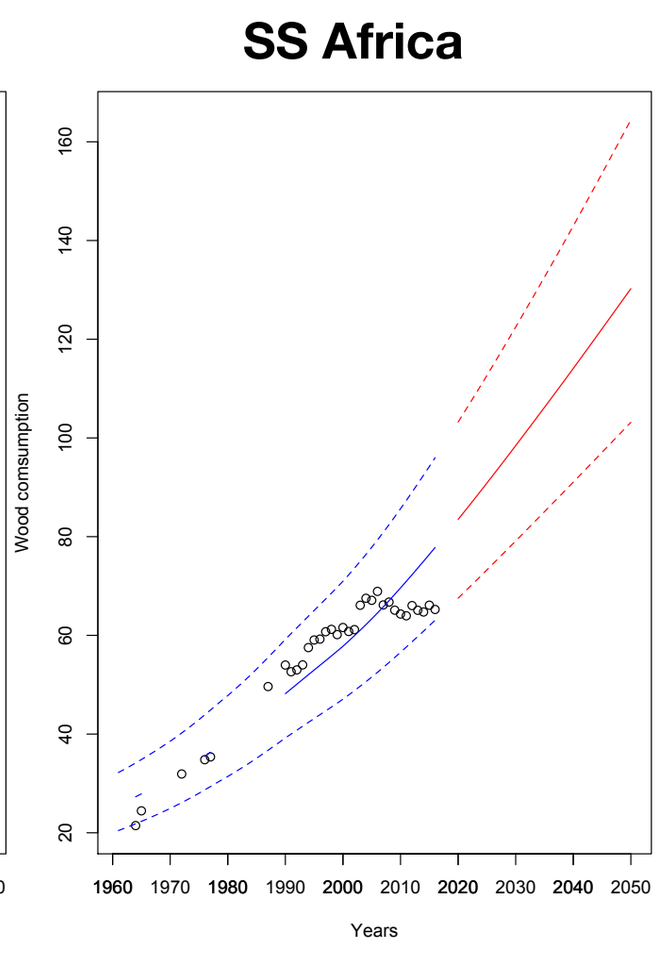

N America
R²=0.43
Wood consumption
Urban population


Europe
R²=0.80
Wood consumption
Urban population


Former SU
R²=0.24
Wood consumption
Urban population


E Asia
R²=0.66
Wood consumption
Urban population


L America
Wood comsumption
50
100
150
200
250
300
350
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
Years


SS Africa
Wood comsumption
20
40
60
80
100
120
140
160
1960
1970
1980
1990
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2020
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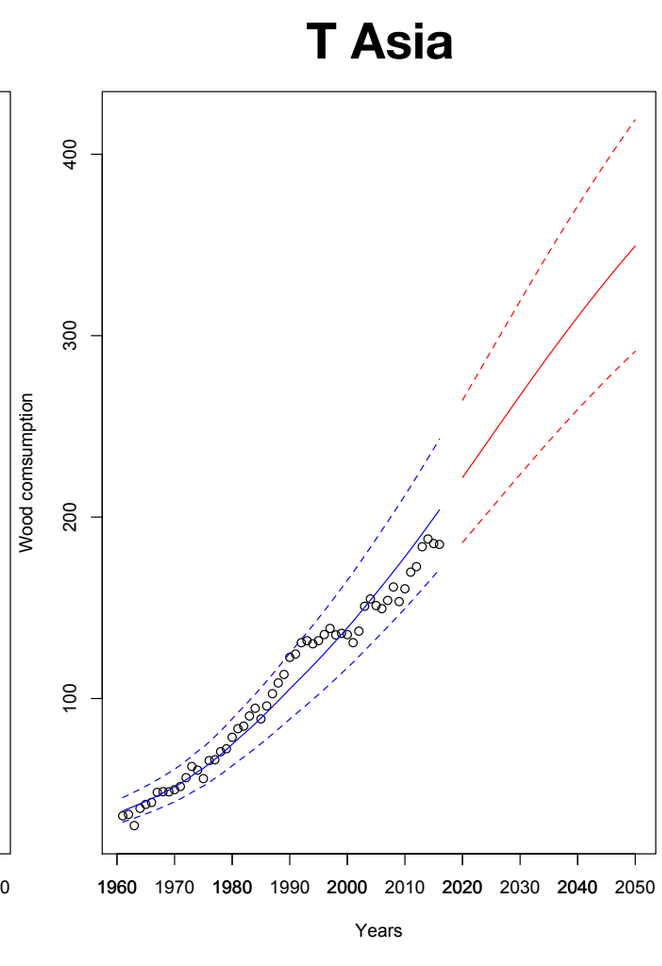
2040
2050
Years


T Asia
Wood comsumption
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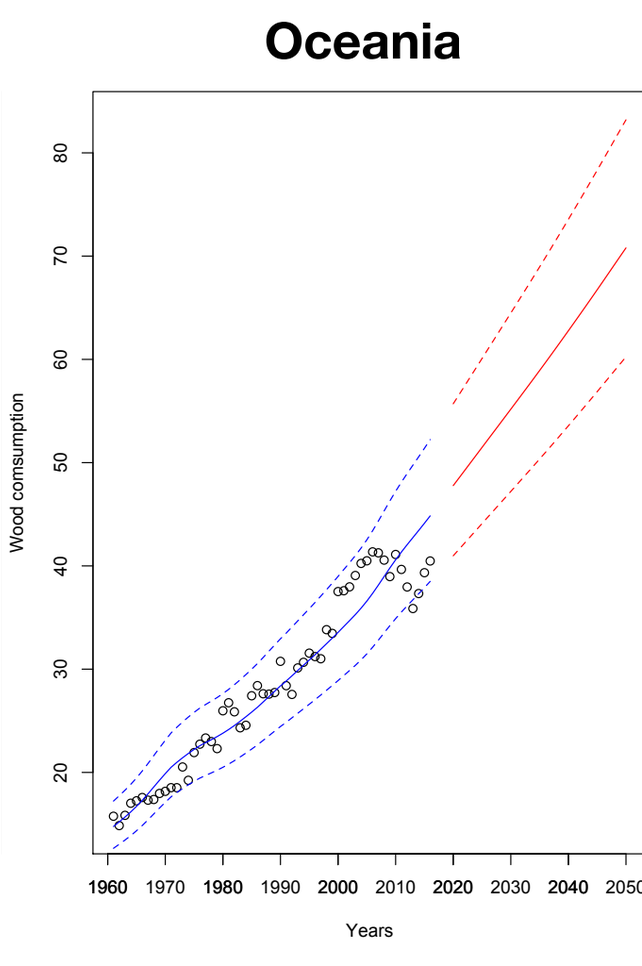
Years


Oceania
Wood comsumption
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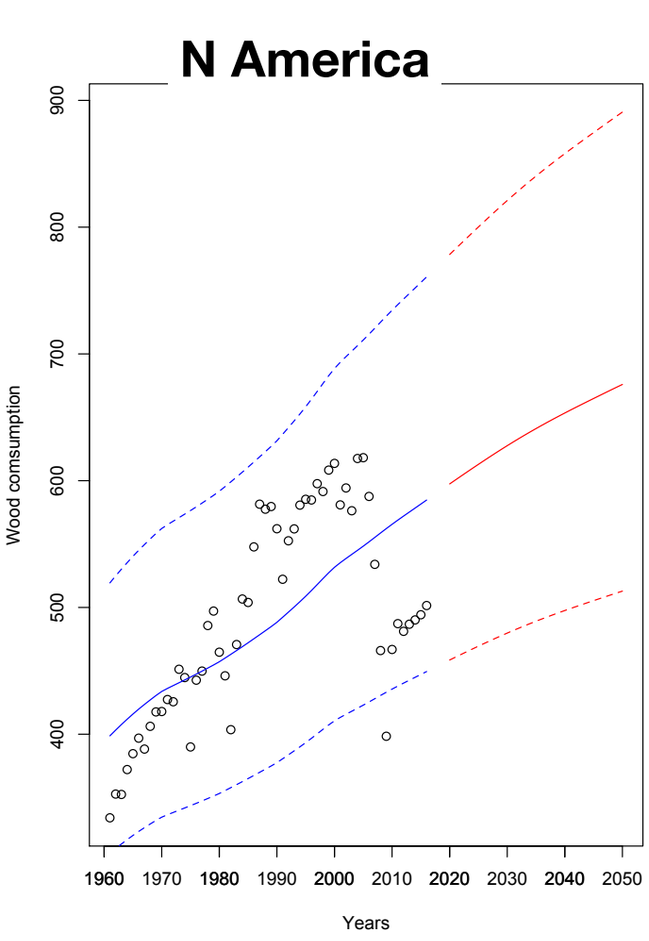
Years


N America
Wood comsumption
400
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600
700
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900
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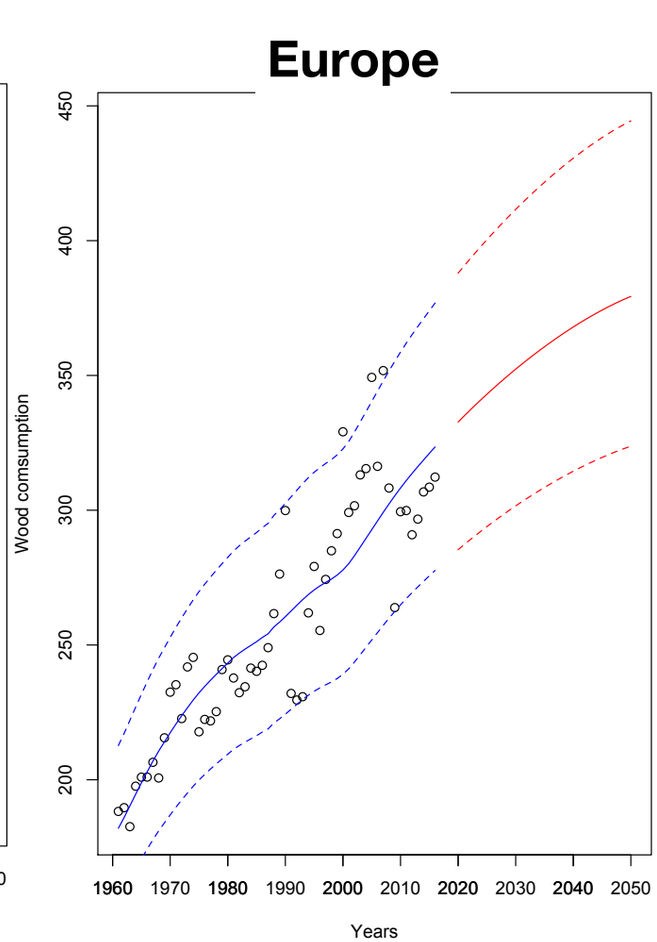
Years


Europe
Wood comsumption
200
250
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450
1960
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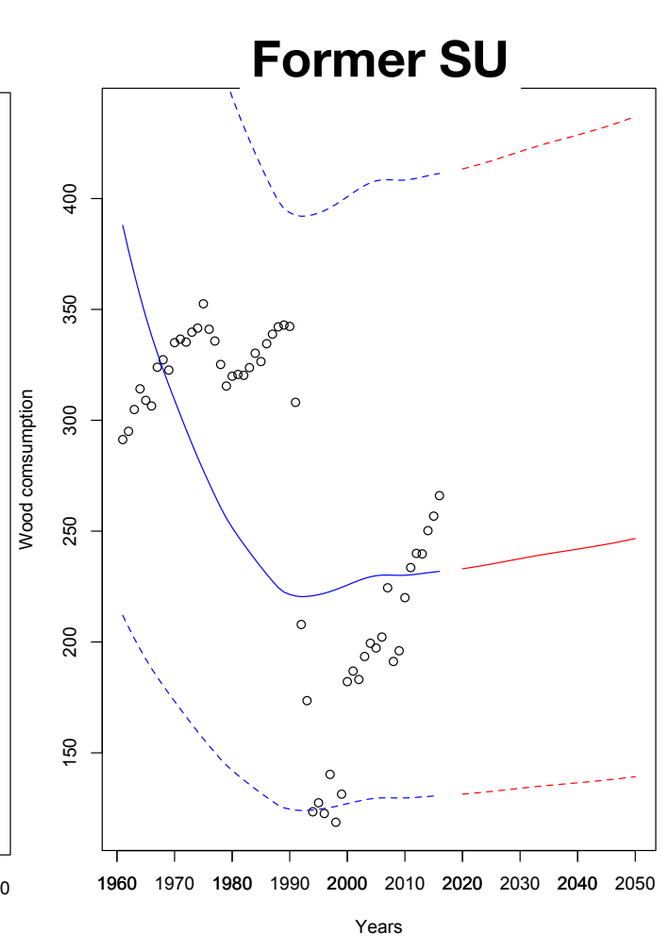
Years


Former SU
Wood comsumption
150
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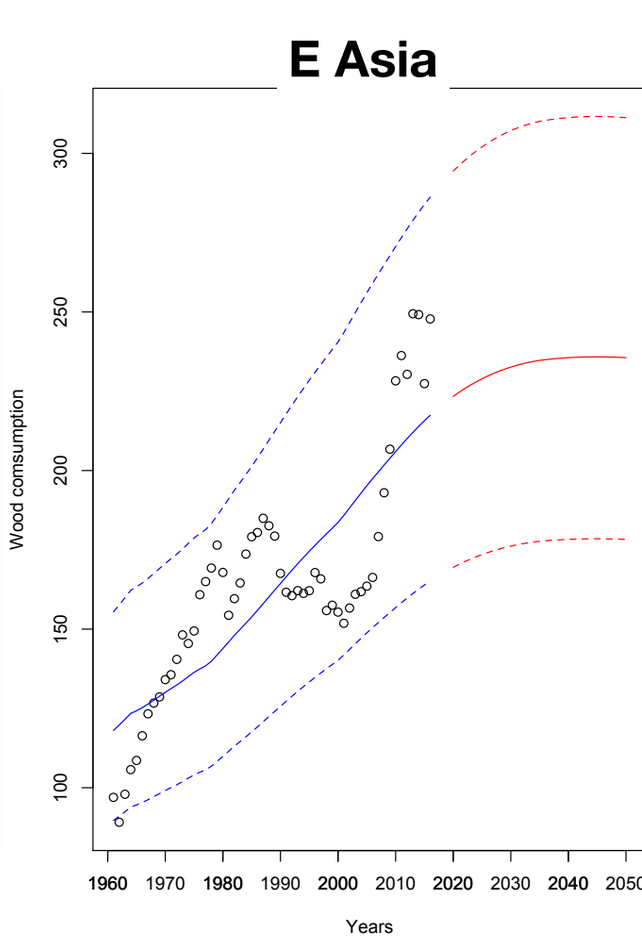
Years


E Asia
Wood comsumption
100
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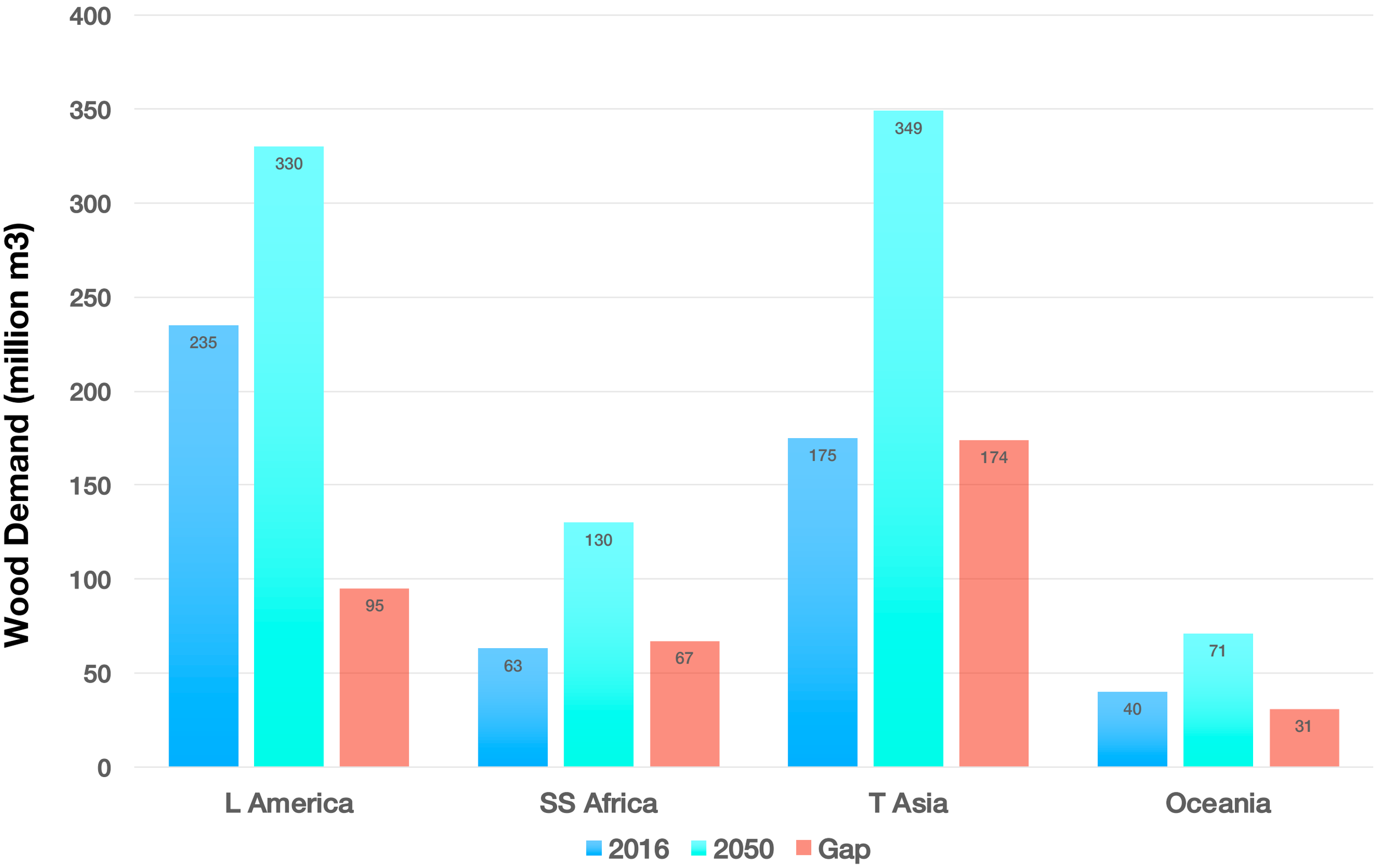
Years

Phenomenological model



With such demand gaps, reforestation and plantations at large scales seem to be compulsory

Conclusion

- **In the next 30 years, the demand of tropical timber by tropical countries will reach unprecedented levels, on domestic markets that are out of the reach of classical market tools suchas certification, REDD, Lacey act, etc,**

- **The pressure on tropical forests will be like never before: it will increase…**
  - by 40% in Latin America
  - by 100% in tropical Africa and tropical Asia
  - by 77% in Oceania

- **If the society want to prevent further degradation of tropical forests, it has become absolutely imperative to design very ambitious plantation programs, and restoration programs.**

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