Chapter 2: Fundamental determinants of development

Development Economics
FESP - Panthéon Sorbonne Master in Development Economics

Rémi Bazillier ¹

¹ Remi.Bazillier@univ-paris1.fr
http://remi.bazillier.free.fr
Université Paris 1 Panthéon-Sorbonne
Ecole d’Economie de la Sorbonne
Introduction

▶ An abundant literature on fundamental determinants of development (mainly empirical)

▶ Years 2000: Debate on the respective contribution of geography, institutions and trade
  ▶ Acemoglu, Johnson and Robison (AER 2001 ; QJE 2002)
  ▶ Rodrik, Subramanian and Trebbi (JEG, 2002)
  ▶ Dollar and Kray (JME, 2003)

▶ Years 2010: Historical explanations of development and underdevelopment
  ▶ Algan et Cahuc (AER, 2010), role of trust
  ▶ Nunn et Wantchekon (AER, 2011), role of slaves trade
  ▶ Ashraf et Galor (AER, 2013), Hypothesis “Out of Africa”
  ▶ Spolaore et Wacziarg (JEL, 2013), “How Deep are the Roots of Economic Development?”
Why income per habitant is higher in some countries?

► Traditional analyses: role of factors of production and productivity

\[ y = ak^\alpha (hl)^{1-\alpha} \]

\[ \hat{y} - \hat{l} = \alpha(\hat{k} - \hat{l}) + (1 - \alpha)\hat{h} + \hat{\alpha} \]

per-capita = capital + human capital + productivity

GDP growth = deepening + accumulation + growth

*Figure 1.2. How economists think of income determination*

Traditional factors

- Factors accumulation:
  - Differences of physical capital accumulation: poor countries do not invest enough in physical capital
  - Differences of human capital: poor countries do not invest enough in education and knowledge

- Productivity:
  - Technological differences: poor countries do not invest enough in Research and Development and do not organize their production in an efficient way

→ But these differences are likely to be explained by more fundamental causes
Traditional factors (I)

Figure: The relationship between average growth of GDP per capita and average growth of investments to GDP ratio, 1960-2000.
Traditional factors (II)
Fundamental determinants of development

- Potential fundamental determinants:
  - Geography: exogeneous differences in the environment
  - Economic integration: market size and international trade
  - Institutions

*Figure 1.3. All of growth economics on one page* Rodrik (2003)
Role of history

- These fundamental determinants are likely to be influenced by history
  - Only geography can be considered as an exogeneous factor
  - Institutions and Trade are explained by historical factors
    - Impact of colonization (and their characteristics)
    - Slavery
    - Older factors
Outline

Fundamental determinants of development
- Geography
- Economic Integration
- Institutions

The Primacy of Institutions?
Fundamental determinants of development

Geography
Economic Integration
Institutions

The Primacy of Institutions?
An abundant literature about the correlation between current level of GDP per cap and geographical variables:

- Impact of climate and temperatures (Myrdal, 1968; Kamarck 1976; Masters & McMillan 2001; Sachs 2001)
- Impact of climate-related diseases liées au climat (Sachs, Melligner et Gallup 2001; Sachs et Malaney 2002)
- Impact of natural resources (Sachs et Warner 2001)
  - Resource curse
- But problems of Identification of the causal link
## TABLE 1

**Geography and Contemporary Development**

*(Dependent variable: log per capita income, 2005; estimator: OLS)*

<table>
<thead>
<tr>
<th>Sample:</th>
<th>Whole World</th>
<th>Olsson–Hibbs sample(^a)</th>
<th>Olsson–Hibbs sample(^a)</th>
<th>Olsson–Hibbs sample(^a)</th>
<th>Olsson–Hibbs sample(^a)</th>
<th>Old World only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute latitude</td>
<td>0.044</td>
<td>0.052</td>
<td><em>(6.645)</em>**</td>
<td><em>(7.524)</em>**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent land area in the tropics</td>
<td>-0.049</td>
<td>0.209</td>
<td>-0.410</td>
<td>-0.650</td>
<td>-0.421</td>
<td>-0.448</td>
</tr>
<tr>
<td></td>
<td>(0.154)</td>
<td>*(0.660)</td>
<td>*(1.595)</td>
<td><em>(2.252)</em>*</td>
<td>*(1.641)</td>
<td>*(1.646)</td>
</tr>
<tr>
<td>Landlocked dummy</td>
<td>-0.742</td>
<td>-0.518</td>
<td>-0.499</td>
<td>-0.572</td>
<td>-0.505</td>
<td>-0.226</td>
</tr>
<tr>
<td>Island dummy</td>
<td>0.643</td>
<td>0.306</td>
<td>0.920</td>
<td>0.560</td>
<td>0.952</td>
<td>1.306</td>
</tr>
<tr>
<td>Geographic conditions (Olsson–Hibbs)(^b)</td>
<td>0.706</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>(6.931)</em>**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological conditions (Olsson–Hibbs)(^c)</td>
<td>0.585</td>
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<td>0.086</td>
</tr>
<tr>
<td></td>
<td><em>(4.759)</em>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><em>(5.167)</em>**</td>
</tr>
<tr>
<td>Constant</td>
<td>7.703</td>
<td>7.354</td>
<td>8.745</td>
<td>8.958</td>
<td>8.741</td>
<td>8.438</td>
</tr>
<tr>
<td></td>
<td><em>(25.377)</em>**</td>
<td><em>(25.360)</em>**</td>
<td><em>(61.561)</em>**</td>
<td><em>(58.200)</em>**</td>
<td><em>(61.352)</em>**</td>
<td><em>(60.049)</em>**</td>
</tr>
<tr>
<td>Observations</td>
<td>155</td>
<td>102</td>
<td>102</td>
<td>102</td>
<td>102</td>
<td>83</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.440</td>
<td>0.546</td>
<td>0.521</td>
<td>0.449</td>
<td>0.516</td>
<td>0.641</td>
</tr>
</tbody>
</table>

**Notes:**

\(^a\)The Olsson and Hibbs sample excludes the neo-European countries (Australia, Canada, New Zealand, and the United States) and countries whose current income is based primarily on extractive wealth (Olsson and Hibbs 2005).

\(^b\)First principal component of number of annual or perennial wild grasses and number of domesticable big mammals (all variables from Olsson and Hibbs 2005).

\(^c\)First principal component of absolute latitude; climate suitability to agriculture; rate of East–West orientation; size of landmass in millions of sq km (all variables from Olsson and Hibbs 2005).

Robust $t$ statistics in parentheses.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.
Role of geography

- Spolaore and Wacziarg (JEL, 2013)
  - 44% of GDP/cap differential are explained by geographical factors
  - Strongest effects: Distance to equator

- But which causality?
  - Direct effects vs indirect effects
A direct impact on productivity and development?

- Myrdal (1968), Kamarck (1976), Sachs et al.
- Sachs (2001, “Tropical Underdevelopment”)
  - Under-development in Tropics is explained by the current impact of their localization on productivity
    - Impact on agricultural productivity
    - Vulnerability to diseases (insects, bacteria) → Health and Human Capital
- In this literature, effects of geography are contemporaneous, immediate
An indirect impact through historical conditions

- Geography may have an indirect impact on development today
  - Geography $\rightarrow$ Prehistorical geography and biologic conditions
    - $\rightarrow$ Development of agriculture and domestication (Diamond 1997)
    - $\rightarrow$ Effects of harvest and virus on European colonisation after 1500 (Engerman & Sokoloff 1997; Acemoglu, Johnson & Robinson 2001, 2002; Easterly & Levine 2003)

- Main determinant of development:
  - Positive environmental conditions in Eurasia at the time of transition from fishing/hunting economy to an agricultural economy (10000 bc)
    - Large size of the Eurasian continent
    - Initial biological conditions: biologic and vegetal diversity
    - East/West orientation contributing to the diffusion of agricultural innovations
    - Demographic boom et acceleration of technological progress
  - Main determinants of European success (“Guns, germs and steel”) would be explained by these favorable initial conditions (prehistoricial period)
Olsson & Hibbs (EER, 2005), Biogeography and Long-Run Economic Development

- Empirical analysis of the relation btw “biogeographical” initial conditions and contemporaneous development level
  - Several geographical and biologic variables:
    - Size of continents, east-west orientation, climatic factors, initial biological conditions (number of animal and vegetal species adapted to domestication and agriculture 120000 years ago)
    - To neutralize the effects of population movements after 1500: exclusion of “neo-european” countries (New Zealand, Australia, United States) and countries with current income is coming from natural resources
  - Development differential explained by geography: 55-65%
### TABLE 1

**Geography and Contemporary Development**  
(Independent variable: log per capita income, 2005; estimator: OLS)

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<tr>
<td></td>
<td>(4.375)**</td>
<td>(2.687)**</td>
<td>(2.487)**</td>
<td>(2.622)**</td>
<td>(2.523)**</td>
<td>(1.160)</td>
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<td>0.952</td>
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<tr>
<td></td>
<td>(2.496)**</td>
<td>(1.033)</td>
<td>(3.479)**</td>
<td>(1.996)**</td>
<td>(3.425)**</td>
<td>(4.504)**</td>
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<td>Geographic conditions (Olsson–Hibbs)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.706</td>
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<td>102</td>
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<td>102</td>
<td>202</td>
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<tr>
<td>Adjusted R²</td>
<td>0.440</td>
<td>0.546</td>
<td>0.521</td>
<td>0.449</td>
<td>0.516</td>
<td>0.641</td>
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Robust t statistics in parentheses.

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**Significant at the 5 percent level.

*Significant at the 10 percent level.
Fundamental determinants of development

Geography

Economic Integration

Institutions

The Primacy of Institutions?
Role of integration and trade

- Abundant literature on trade and growth
    - Controversial results (Rodrik & Rodriguez, 1999)
    - Frankel & Romer (1999)
    - Dollar & Kray (2003)

- *Integration view*: Market integration plays a major role in convergence between poor and rich regions

- *Endogeneity* issue: economic performance has an impact on trade openness
Endogeneity problem in the trade-growth relationship

- Instrumental variable (IV) approach

\[ y = \beta_0 + \beta_1 x + \beta_2 z_1 + u \]  
\[ x = \phi_0 + \phi_1 z_1 + \phi_2 z_2 + \phi_3 z_3 + v \]

With \( E(v) = (z_1, v) + (z_2, v) + (z_2, v) \)

- First step (OLS)

\[ \hat{x} = \hat{\phi}_0 + \hat{\phi}_1 z_1 + \hat{\phi}_2 z_2 + \hat{\phi}_3 z_3 \]  

- Second step (OLS)

\[ y = \beta_0 + \beta_1 \hat{x} + \beta_2 z_1 + u \]
Frankel and Romer (1999, AER) “Does Trade Cause Growth?”

- Use Trade policy rather than trade flows does not solve endogeneity issues
  - Endogeneity of trade policy (other simultaneous policies and inverse causality)
  - Instrumentation of trade by geographical characteristics
    - Importance of distance
    - Argument: geographical characteristics are not impacted by economic performances
- Trade differential explained by geographical characteristics: Natural experiment that should allow the identification of causal effects of trade
\[ \ln Y_i = \alpha + \beta T_i + \gamma W_i + \epsilon_i \] (5)

with \( Y_i \) income per cap., \( T_i \) international trade, \( W_i \) within country trade, \( \epsilon_i \) other factors impacting income

\[ T_i = \psi + \sigma P_i + \delta_i \] (6)

Trade is a function of distance between countries \( P_i \) and other factors

\[ W_i = \eta + \lambda S_i + \nu_i \] (7)

With \( S_i \) size of the country
## Table 1—The Bilateral Trade Equation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Interaction</th>
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<tr>
<td>Constant</td>
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</tr>
<tr>
<td>Ln distance</td>
<td>0.15</td>
</tr>
<tr>
<td>Ln population</td>
<td>-0.29</td>
</tr>
<tr>
<td>(country i)</td>
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</tr>
<tr>
<td>Ln area</td>
<td>-0.06</td>
</tr>
<tr>
<td>(country i)</td>
<td></td>
</tr>
<tr>
<td>Ln population</td>
<td>-0.14</td>
</tr>
<tr>
<td>(country j)</td>
<td></td>
</tr>
<tr>
<td>Ln area</td>
<td>-0.07</td>
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<tr>
<td>(country j)</td>
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</tr>
<tr>
<td>Landlocked</td>
<td>0.33</td>
</tr>
</tbody>
</table>

Sample size 3220
$R^2 \quad 0.36$
SE of regression 1.64

*Notes:* The dependent variable is $\ln(\tau_{ij}/GDP_i)$. The first column reports the coefficient on the variable listed, and the second column reports the coefficient on the variable’s interaction with the common-border dummy. Standard errors are in parentheses.
## Table 3—Trade and Income

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
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<td>Estimation</td>
<td>OLS</td>
<td>IV</td>
<td>OLS</td>
<td>IV</td>
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<td>Constant</td>
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<td></td>
<td>(0.66)</td>
<td>(2.20)</td>
<td>(1.12)</td>
<td>(3.85)</td>
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<tr>
<td>Trade share</td>
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<td>1.97</td>
<td>0.82</td>
<td>2.96</td>
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<td>(0.25)</td>
<td>(0.99)</td>
<td>(0.32)</td>
<td>(1.49)</td>
</tr>
<tr>
<td>Ln population</td>
<td>0.12</td>
<td>0.19</td>
<td>0.21</td>
<td>0.35</td>
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<tr>
<td></td>
<td>(0.06)</td>
<td>(0.09)</td>
<td>(0.10)</td>
<td>(0.15)</td>
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<tr>
<td>Ln area</td>
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<td>0.09</td>
<td>-0.05</td>
<td>0.20</td>
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<td>(0.06)</td>
<td>(0.10)</td>
<td>(0.08)</td>
<td>(0.19)</td>
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<tr>
<td>Sample size</td>
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<td>150</td>
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<td>98</td>
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<tr>
<td>$R^2$</td>
<td>0.09</td>
<td>0.09</td>
<td>0.11</td>
<td>0.09</td>
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<tr>
<td>SE of regression</td>
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<td>1.06</td>
<td>1.04</td>
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<td>First-stage $F$ on excluded instrument</td>
<td>13.13</td>
<td>8.45</td>
<td></td>
<td></td>
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</tbody>
</table>

*Notes: The dependent variable is log income per person in 1985. The 150-country sample includes all countries for which the data are available; the 98-country sample includes only the countries considered by Mankiw et al. (1992). Standard errors are in parentheses.*
Frankel & Romer (1999)

- An increase of 1% in trade leads to a 0.5% increase in GDP/cap
- Impact on human capital, physical capital and increase in productivity

- Results are criticized
Trade endogeneity

- Rodrik, Subramanian et Trebbi (2005, JEG)
  - Non-significant impact after instrumentation
    - Use of the predicted value of trade proposed by Frankel and Romer (1999)
Without taking into account endogeneity bias
Chapitre 2: Fundamental determinants

Rémi Bazillier

After instrumentation
Here, the analysis is taking into account other fundamental determinants of development

... And notably the role of institutions
Role of institutions

- Institutions.
  - Formal or informal rules of functioning of a society in politics, economics, and social interactions
- Main contribution: Douglas North (1990) and Daron Acemoglu
- North (1990, p.3)
  - "Institutions are the rules of the games in society or, more formally, are the humanly devised constraints that shape human interactions. (...) They structure incentives in human exchanges, whether political, social, or economic"
Which institutions?

- Distinctions between formal and informal institutions (North 1991) and institutions aiming at improving coordination / aiming at regulating conflicts (Vatn 2006)

<table>
<thead>
<tr>
<th>Coordination device</th>
<th>Regulation of Conflicts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal</td>
<td>language, metric system, time convention</td>
</tr>
<tr>
<td>Informal</td>
<td>rules of politeness, behavioral conventions</td>
</tr>
</tbody>
</table>

Source: Baudassé, Bazillier et Issifou (2016)

- Distinctions btw political, social and economic institutions

<table>
<thead>
<tr>
<th>Political Institutions</th>
<th>Social Institutions</th>
<th>Economic Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal</td>
<td>Constitution</td>
<td>Social Protection</td>
</tr>
<tr>
<td></td>
<td>Civil Rights</td>
<td>Income redistribution</td>
</tr>
<tr>
<td></td>
<td>Tolerance</td>
<td>Informal solidarity</td>
</tr>
<tr>
<td></td>
<td>Political participation</td>
<td>Volunteering</td>
</tr>
<tr>
<td>Informal</td>
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</table>

Source: Baudassé, Bazillier et Issifou (2016)
# Measurement of political institutions

Table 3: Type and different measures of institutions used in the migration-institutions literature.

<table>
<thead>
<tr>
<th>Division level 1</th>
<th>Division level 2</th>
<th>Variables</th>
<th>Measures</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political</td>
<td>Formal</td>
<td>Political Constitution, Civil</td>
<td>Indexes of governance including government effectiveness, regulatory</td>
<td>Bergh et al. (2015)</td>
</tr>
<tr>
<td>institutions</td>
<td></td>
<td>Rights</td>
<td>quality... (Worldwide Governance Indicators; Polity variable from</td>
<td>Bertocchi and Strozzi</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Polity IV; Freedom House Index)</td>
<td>(2008)</td>
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<td></td>
<td>Solimano (2005)</td>
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<td>Karemera et al. (2000)</td>
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<td>Vogler and Rotte (2000)</td>
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<td></td>
<td>Rowlands (1999)</td>
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<td></td>
<td>Narayan and Smyth (2005)</td>
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<td></td>
<td>Spilimbergo (2009)</td>
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<td>Docquier et al. (2016)</td>
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<td></td>
<td></td>
<td>Blattman and Miguel (2010)</td>
</tr>
</tbody>
</table>

Source: Baudassé, Bazillier et Issifou (2016)
### Measurement of social institutions

|---------------------|--------|-------------------------------------------------|-----------------------------------|---------------------------------------------------------------------------------|
### Measurement of economic institutions

|-----------------------|--------|----------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------|

Source: Baudassé, Bazillier et Issifou (2016)
Hall et Jones (1999, QJE), “Why Do Some Countries Produce So Much Output Per Worker than Others”

- Hypothesis of the paper: income differentials are explained by differences in social infrastructures
  - Social infrastructures: institutions and public policies determining the environment in which individuals accumulate knowledge and in which firms accumulate capital
  - Cross-country study: 127 countries. Determinants of income per cap. (and not growth)

Output per Worker ← (Inputs, Productivity) ← Social Infrastructure.
Hall et Jones (1999, QJE)

Model:

\[ Y_i = K_i^\alpha (A_i H_i)^{1-\alpha} \] \hspace{1cm} (8)

Labour is homogeneous and each unit of labour benefits from \( E_i \) years of schooling. Labour augmented by human capital is therefore:

\[ H_i = e^{\phi(E_i)} L_i \] \hspace{1cm} (9)

\[ y_i = \left( \frac{K_i}{Y_i} \right)^{\alpha/(1-\alpha)} h_i A_i \] \hspace{1cm} (10)

With \( h = H/L \), \( \alpha = 1/3 \)
Step 1: Productivity calculation

Figure 1: Productivity and Output per Worker

- Coeff = 0.600
- StdErr = 0.028
- R² = 0.79
### Table 1: Productivity Calculations: Ratios to U.S. Values

<table>
<thead>
<tr>
<th>Country</th>
<th>$Y/L$</th>
<th>$(K/Y)^{a/(1-a)}$</th>
<th>$H/L$</th>
<th>$A$</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Canada</td>
<td>0.941</td>
<td>1.002</td>
<td>0.908</td>
<td>1.034</td>
</tr>
<tr>
<td>Italy</td>
<td>0.834</td>
<td>1.063</td>
<td>0.650</td>
<td>1.207</td>
</tr>
<tr>
<td>West Germany</td>
<td>0.818</td>
<td>1.118</td>
<td>0.802</td>
<td>0.912</td>
</tr>
<tr>
<td>France</td>
<td>0.818</td>
<td>1.091</td>
<td>0.666</td>
<td>1.126</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0.727</td>
<td>0.891</td>
<td>0.808</td>
<td>1.011</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>0.608</td>
<td>0.741</td>
<td>0.735</td>
<td>1.115</td>
</tr>
<tr>
<td>Singapore</td>
<td>0.606</td>
<td>1.031</td>
<td>0.545</td>
<td>1.078</td>
</tr>
<tr>
<td>Japan</td>
<td>0.587</td>
<td>1.119</td>
<td>0.797</td>
<td>0.658</td>
</tr>
<tr>
<td>Mexico</td>
<td>0.433</td>
<td>0.868</td>
<td>0.538</td>
<td>0.926</td>
</tr>
<tr>
<td>Argentina</td>
<td>0.418</td>
<td>0.953</td>
<td>0.676</td>
<td>0.648</td>
</tr>
<tr>
<td>U.S.S.R.</td>
<td>0.417</td>
<td>1.231</td>
<td>0.724</td>
<td>0.468</td>
</tr>
<tr>
<td>India</td>
<td>0.086</td>
<td>0.709</td>
<td>0.454</td>
<td>0.267</td>
</tr>
<tr>
<td>China</td>
<td>0.060</td>
<td>0.891</td>
<td>0.632</td>
<td>0.106</td>
</tr>
<tr>
<td>Kenya</td>
<td>0.056</td>
<td>0.747</td>
<td>0.457</td>
<td>0.165</td>
</tr>
<tr>
<td>Zaire</td>
<td>0.033</td>
<td>0.499</td>
<td>0.408</td>
<td>0.160</td>
</tr>
<tr>
<td>Average, 127 Countries:</td>
<td>0.296</td>
<td>0.853</td>
<td>0.565</td>
<td>0.516</td>
</tr>
<tr>
<td>Standard Deviation:</td>
<td>0.268</td>
<td>0.234</td>
<td>0.168</td>
<td>0.325</td>
</tr>
<tr>
<td>Correlation w/ $Y/L$ (logs)</td>
<td>1.000</td>
<td>0.624</td>
<td>0.798</td>
<td>0.889</td>
</tr>
<tr>
<td>Correlation w/ $A$ (logs)</td>
<td>0.889</td>
<td>0.248</td>
<td>0.522</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Note: The elements of this table are the empirical counterparts to the components of equation (3), all measured as ratios to the U.S. values. That is, the first column of data is the product of the other three columns.
Measuring the effect of social infrastructures

- First-best proxy: spread between private and social returns of productive activities
- Here:
  1. Political risk index (International Country Risk Guide)
  2. Trade openness (Sachs et Warner)
- Identification:

\[ \log \frac{Y}{L} = \alpha + \beta S + \epsilon \]  \hspace{1cm} (11)

\[ S = \lambda + \delta \log \frac{Y}{L} + X \theta + \mu \]  \hspace{1cm} (12)
Instrumentation

- Social infrastructures are endogeneous
  - Instrumentation by geographical and linguistic characteristics
    - Distance from equator
    - Share of english-speaking individuals
    - Predicted value of trade by Frankel and Romer (1999)
### Table 2: Basic Results for Output per Worker

\[
\log Y/L = \alpha + \beta S + \epsilon
\]

<table>
<thead>
<tr>
<th>Specification</th>
<th>Social Infrastructure</th>
<th>OverID Test p-value</th>
<th>Coeff Test p-value</th>
<th>( \hat{\sigma}_\epsilon )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Main Specification</td>
<td>5.142 (.508)</td>
<td>.256 Accept</td>
<td>.812 Accept</td>
<td>.840</td>
</tr>
<tr>
<td>2. Instruments:</td>
<td>4.998 (.567)</td>
<td>.208 Accept</td>
<td>.155 Accept</td>
<td>.821</td>
</tr>
<tr>
<td>Distance, Frankel-Romer</td>
<td>5.323 (.607)</td>
<td>.243 Accept</td>
<td>.905 Accept</td>
<td>.889</td>
</tr>
<tr>
<td>3. No Imputed Data:</td>
<td>79 Countries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. OLS</td>
<td>3.289 (.212)</td>
<td>—</td>
<td>.002 Reject</td>
<td>.700</td>
</tr>
</tbody>
</table>

*Alternative Specifications to Check Robustness*

The coefficient on Social Infrastructure reflects the change in log output per worker associated with a one unit increase in measured social infrastructure. For example, the coefficient of 5.14 means that a difference of .01 in our measure of social infrastructure is associated with a 5.14 percent difference in output per worker. Standard errors are computed using a bootstrap method, as described in the text. The “Main Specification” uses distance from the equator, the Frankel-Romer instrument, the fraction of the population speaking English at birth, and the fraction of the population speaking a Western European language at birth as instruments. The “OverID Test” column reports the result of testing the overidentifying restrictions and the “Coeff Test” reports the result of testing for the equality of the coefficients on the \( GADP \) policy index variable and the openness variable. The standard deviation of \( \log Y/L \) is 1.078.
Potential issues

- Geographical characteristics: exogeneous with income?
  - In contradiction with the literature showing a direct effect of geography on economic performances (diseases, productivity...)

- Spoken languages are also likely to have a direct effect on economic performances
  - Network effects, international trade integration (see. Melitz, Melitz & Toubal)

- Predicted value of trade by Frankel and Romer (1999)
  - Built from geographical variables also

→ Today, we tend to consider that geographical variables are not valid instruments...

→ look at historical characteristics explaining institutions

- Impact of Institutions on development
- Innovative instrumental strategy
  - Measuring European influence through geographical characteristics is problematic
A “theory of institutional differences between colonized countries by Europeans”

- Different types of colonization lead to very different institutions
  - “Extractivite colonies” (ex. Belgium Congo): no property rights protection / No protection against expropriation risk by the state
  - “Settlement colony”: building of “neo-Europes” (Crosby 1986): settlers tend to duplicate institutions from their origin countries (ec. Australia, New Zealand, US)
An original instrument

- **Settlers mortality**

\[
\begin{align*}
\text{(potential) settler mortality} & \Rightarrow \text{settlements} \\
\Rightarrow \text{early institutions} & \Rightarrow \text{current institutions} \\
\Rightarrow \text{current performance.}
\end{align*}
\]

Source: Acemoglu, Johnson, Robinson 2001
Validity conditions of the instrument

- Settlers mortality 100 years ago should not have any other impact on current income, other than the one transiting through institutional development
  - Problem if settlers mortality is correlated with current probability of diseases (see identification problems of geographical variables)
    - Settlers mortality was mainly due to malaria and yellow fever
    - Today, it is possible to be protected (vaccine for yellow fever, drugs for malaria)
    - Protection of the immune system. Local populare are better protected.
    - Authors argue that there is little probability that it explains under-development today
Mortality and colonization

- Settlers mortality has an impact on colonization

  - Curtin (1964, 1998): French and British newspaper gave regular information on settlers mortality in colonies
  
  - Crosby (1986): “founding fathers” (US) chose to settle in US rather than in Guyana because of the higher mortality rate in Guyana
  
  - Beauchamp Committee (1795): Where to send british prisoners: Australia rather than Lemane island (Gambia river) due to the mortality rate
Chapitre 2: Fundamental determinants

Fundamental determinants of development

Geography
Economic Integration
Institutions

The Primacy of Institutions?
Chapitre 2: Fundamental determinants
Rémi Bazillier

Fundamental determinants of development
Geography
Economic Integration
Institutions
The Primacy of Institutions?

Figure 3. First-stage relationship between settler mortality and expropriation risk
## Table 4—IV Regressions of Log GDP per Capita

<table>
<thead>
<tr>
<th></th>
<th>Base sample (1)</th>
<th>Base sample (2)</th>
<th>Base sample without Neo-Europes (3)</th>
<th>Base sample without Neo-Europes (4)</th>
<th>Base sample without Africa (5)</th>
<th>Base sample without Africa (6)</th>
<th>Base sample with continent dummies (7)</th>
<th>Base sample with continent dummies (8)</th>
<th>Base sample, dependent variable is log output per worker (9)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average protection against expropriation risk 1985–1995</strong></td>
<td>0.94 (0.16)</td>
<td>1.00 (0.22)</td>
<td>1.28 (0.36)</td>
<td>1.21 (0.35)</td>
<td>0.58 (0.10)</td>
<td>0.58 (0.12)</td>
<td>0.98 (0.30)</td>
<td>1.10 (0.46)</td>
<td>0.98 (0.17)</td>
</tr>
<tr>
<td><strong>Latitude</strong></td>
<td>−0.65 (1.34)</td>
<td></td>
<td>0.94 (1.46)</td>
<td></td>
<td>0.04 (0.84)</td>
<td></td>
<td>−0.92 (1.8)</td>
<td>−1.10 (0.40)</td>
<td>0.98 (0.52)</td>
</tr>
<tr>
<td><strong>Asia dummy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>−0.46 (0.36)</td>
<td>−0.44 (0.42)</td>
<td></td>
</tr>
<tr>
<td><strong>Africa dummy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>−0.94 (0.85)</td>
<td>−0.99 (1.0)</td>
<td></td>
</tr>
<tr>
<td><strong>“Other” continent dummy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Results

- Settlers mortality explain more than 25% of institutional gaps between countries
- Important effects on income:
  - If Nigeria had the institutions of Chile:
    - Its income with be multiplied by 7
  - Today: Chile has an income 11 times higher
The Primacy of Institutions?


- Goal: measuring simultaneously the effect of three determinants (institutions, geography, integration)

- Instrumental strategy: use of instruments developed in the literature

- Empirical strategy taking into account all causality relations
Figure 1. The “deep” determinants of income.
Chapitre 2: Fundamental determinants of development

Rémi Bazillier

The Primacy of Institutions?

Fundamental determinants
Geography
Economic Integration
Institutions

Log real GDP per capita in 1995—Linear prediction

Rule of law

(a) Log real GDP per capita in 1995
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Geography
Economic Integration
Institutions

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Fundamental determinants 

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Geography 
Economic Integration 
Institutions 

The Primacy of Institutions?
\[
\log y_i = \mu + \alpha INS_i + \beta INT_i + \gamma GEO_i + \epsilon_i \quad (13)
\]

Instrumentation

\[
INS_i = \lambda SM_i + \phi CONST_i + \varphi GEO_i + \epsilon_{INS} \quad (14)
\]

\[
INT_i = \theta + \sigma CONST_i + \eta SM_i + \omega GEO + \epsilon_{INT} \quad (15)
\]
After instrumentation
After instrumentation
After instrumentation
### Panel A. Second-stage: Dependent variable = Log GDP

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geography (DISTEQ)</td>
<td>0.74</td>
<td>-0.42</td>
<td>-0.56</td>
</tr>
<tr>
<td></td>
<td>(4.48)*</td>
<td>(-1.19)</td>
<td>(-1.23)</td>
</tr>
<tr>
<td>Institutions (RULE)</td>
<td>1.68</td>
<td>1.78</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4.29)*</td>
<td>(3.78)*</td>
<td></td>
</tr>
<tr>
<td>Integration (LCOPEN)</td>
<td></td>
<td>-0.18</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4.71)</td>
<td></td>
</tr>
<tr>
<td>No. of observations</td>
<td>64</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>R-square</td>
<td>0.25</td>
<td>0.54</td>
<td>0.56</td>
</tr>
<tr>
<td>Test for over-identifying restrictions (p-value)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

After instrumentation
### Table 5. Determinants of Development: Channels of Influence.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Extended Acemoglu et al. Sample</th>
<th></th>
<th></th>
<th></th>
<th>Larger Sample</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Income per worker (1)</td>
<td>Capital per worker (2)</td>
<td>Human Capital per worker (3)</td>
<td>Total Factor productivity (4)</td>
<td>Income per worker (5)</td>
<td>Capital per worker (6)</td>
<td>Human Capital per worker (7)</td>
<td>Total Factor productivity (8)</td>
</tr>
<tr>
<td>Geography (DISTEQ)</td>
<td>-0.97</td>
<td>-1.72</td>
<td>-0.26</td>
<td>-0.33</td>
<td>-0.25</td>
<td>-0.38</td>
<td>-0.05</td>
<td>-0.13</td>
</tr>
<tr>
<td>Institutions (RULE)</td>
<td>2.21</td>
<td>3.39</td>
<td>0.56</td>
<td>1.06</td>
<td>1.32</td>
<td>1.90</td>
<td>0.34</td>
<td>0.69</td>
</tr>
<tr>
<td>Integration (LCOPEN)</td>
<td>-0.42</td>
<td>-0.70</td>
<td>-0.15</td>
<td>-0.13</td>
<td>-0.30</td>
<td>-0.46</td>
<td>-0.11</td>
<td>-0.11</td>
</tr>
<tr>
<td>R-square</td>
<td>0.60</td>
<td>0.52</td>
<td>0.51</td>
<td>0.44</td>
<td>0.58</td>
<td>0.54</td>
<td>0.58</td>
<td>0.36</td>
</tr>
<tr>
<td>No. of observations</td>
<td>73</td>
<td>73</td>
<td>73</td>
<td>73</td>
<td>119</td>
<td>119</td>
<td>119</td>
<td>119</td>
</tr>
</tbody>
</table>
To sum up

- Empirical literature (2000’) allows a better identification and quantification of fundamental determinants of development.
- Several questions still:
  - Other determinants of institutions
  - Older historical determinants
  - Role of trust and culture
- Literature based on identification through instrumentation
- Other methods:
  - At the macroeconomic level: “quasi-natural experiments”
  - At the microeconomic level: “Randomized experiments”
References: historical development

- “How Deep are the Roots of Economic Development”, Spolaore & Wacziarg (2013)
- “Historical Development”, Nunn (2013)