Some Observations on the Convergence Experience of Turkey

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What is this paper about?

- The most important questions…
  - Why are some countries rich and others poor?
  - Why do income levels differ among countries?
  - Why do growth rates differ?
  - Why does per capita income increase over time?

- In the last decade, these questions have become subjects of the public and policy-related discussions in Turkey, since the country has shown high growth rates.

- In fact, Turkey's GDP growth rate in 2010 averaged about 9% ranking it in first place in Europe and it accelerated to 11% in the first quarter of 2011 outpacing China's growth rate.

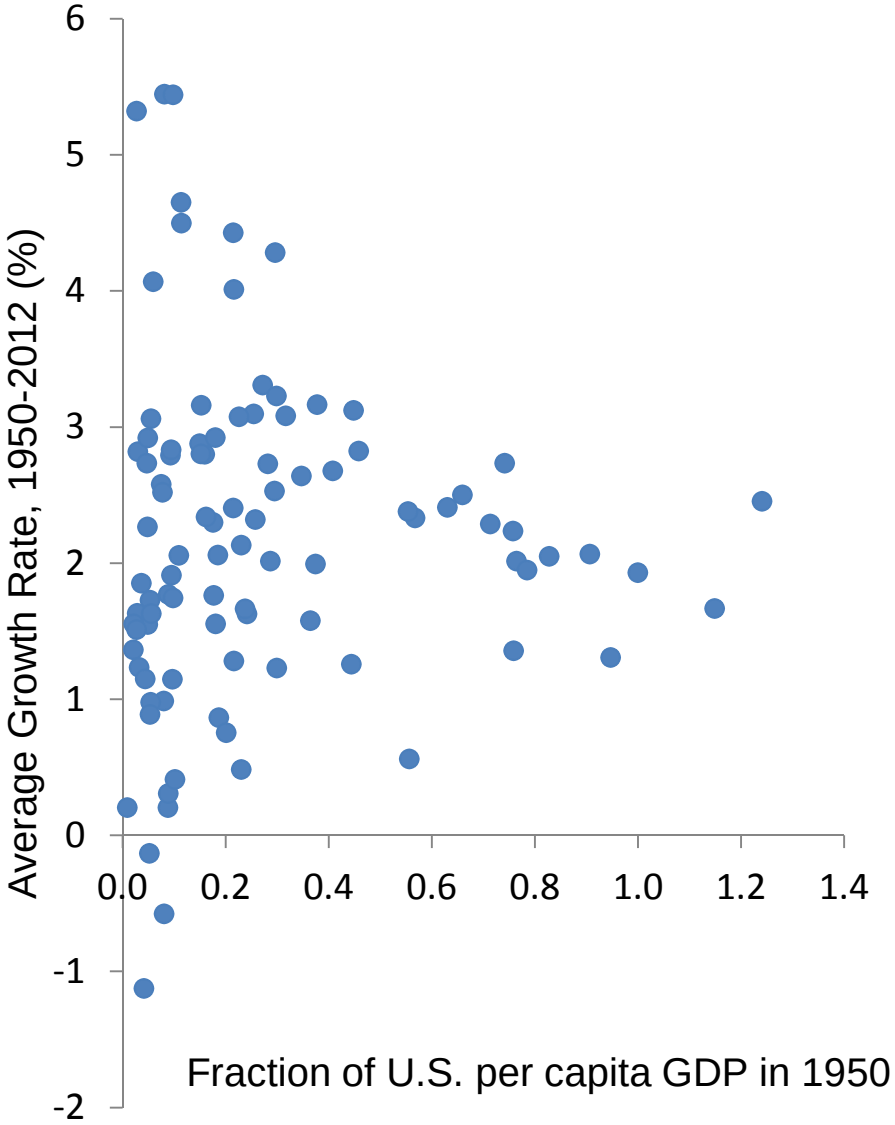
Outline

- Convergence Experience of Turkey
  - On the historical convergence experience of Turkey presenting some international comparisons
- A Peer Country of Turkey: Brazil or Korea?
  - On the development experiences of Brazil and Turkey in comparison with Korea
- A Glimpse on the Sources of Growth
  - Decomposing changes in output per worker into different components
- The Dynamics of GDP per Capita
  - Is Turkey's per capita income going to be $25,000 by 2023?

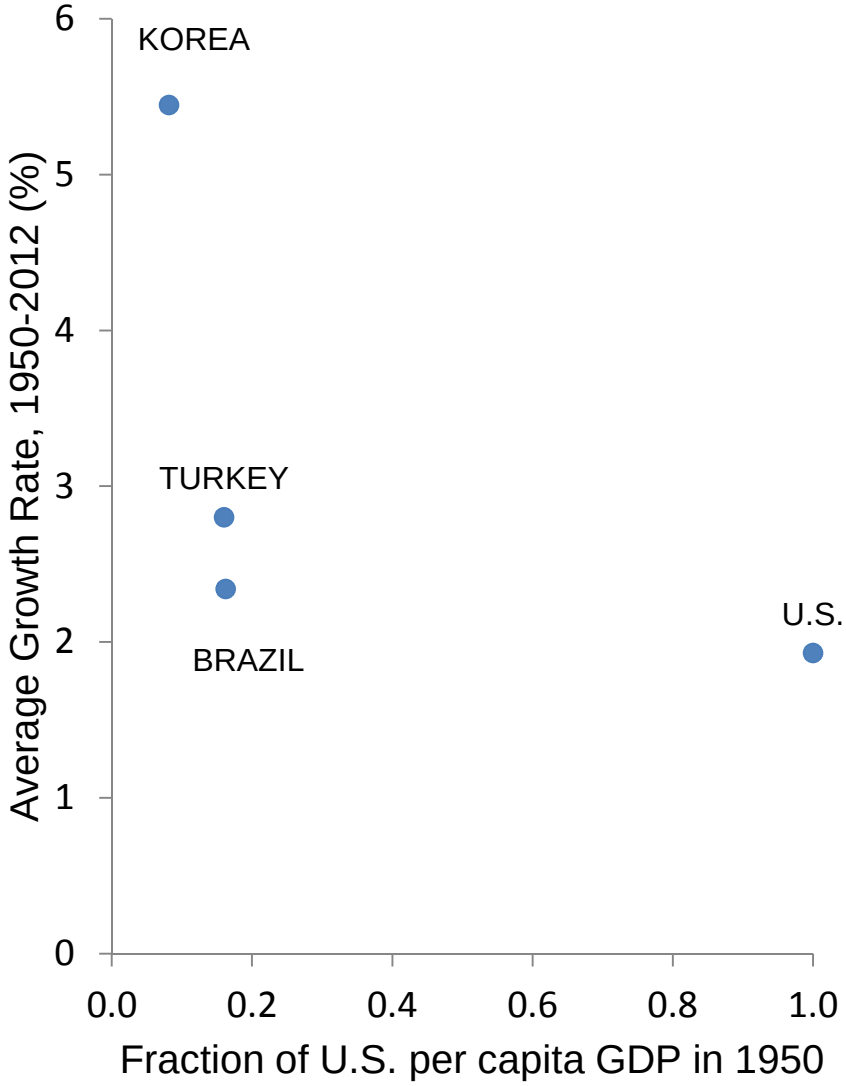
CONVERGENCE EXPERIENCE OF TURKEY

An international comparison of growth rates (%), 1950-2012

(a): Growth rates for 96 countries

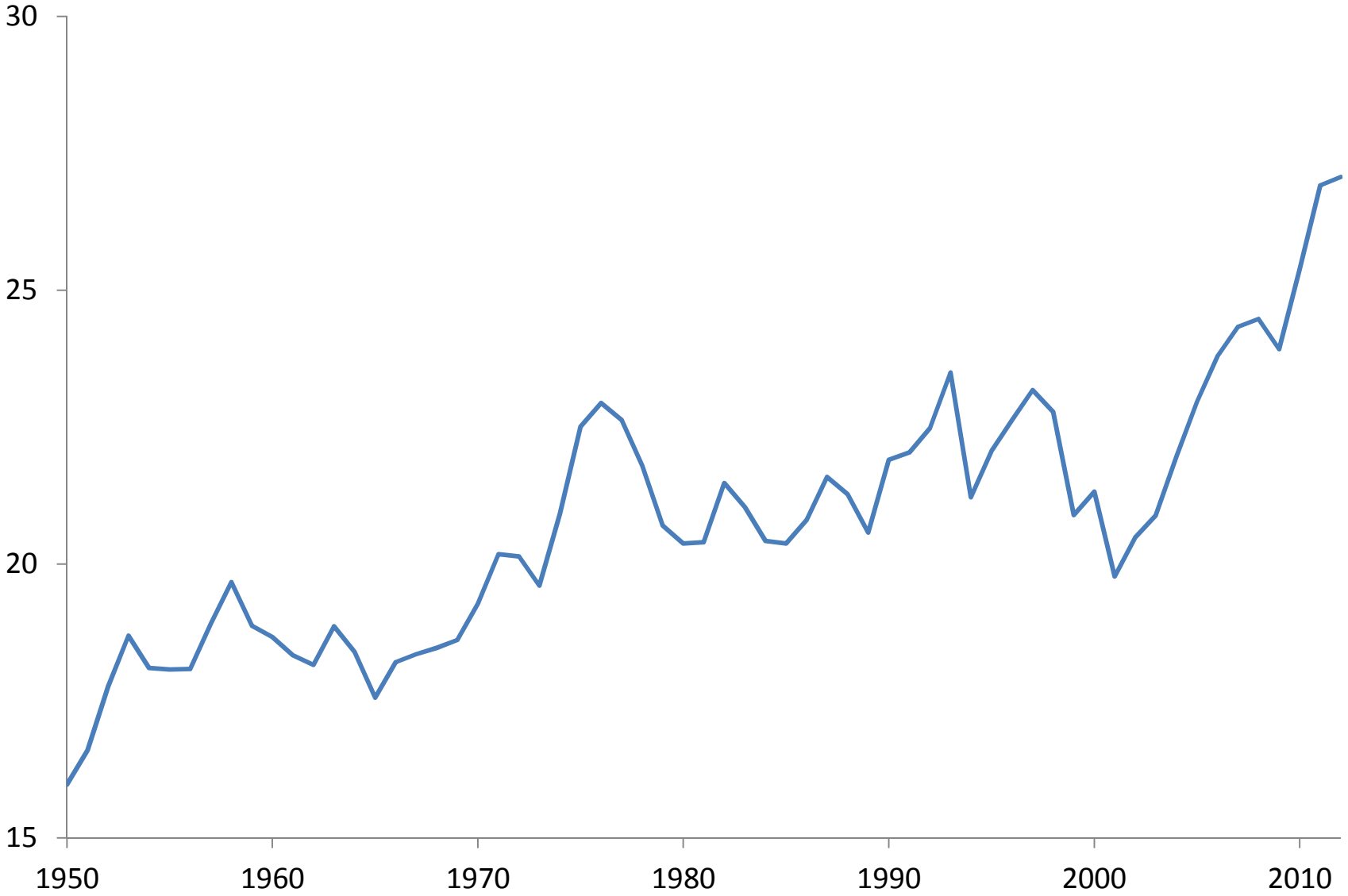


(b): A comparison



Source: The Conference Board Total Economy Database, January 2013.

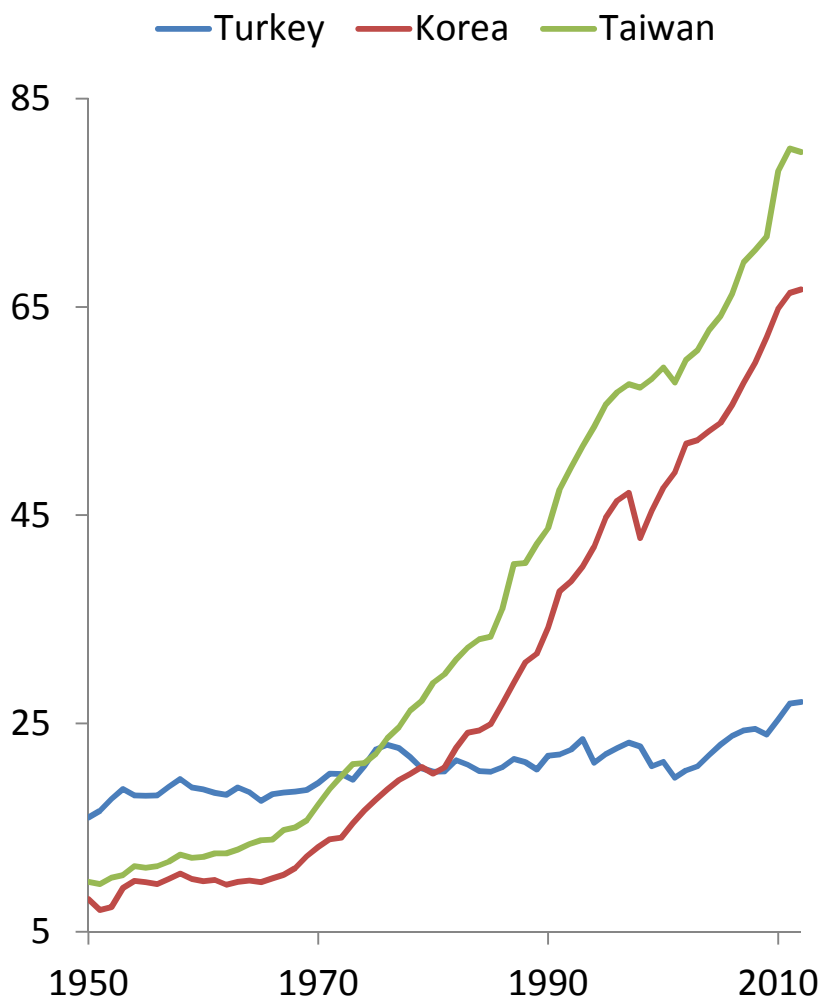
Turkey: GDP per capita relative to the U.S. (%), 1950-2012



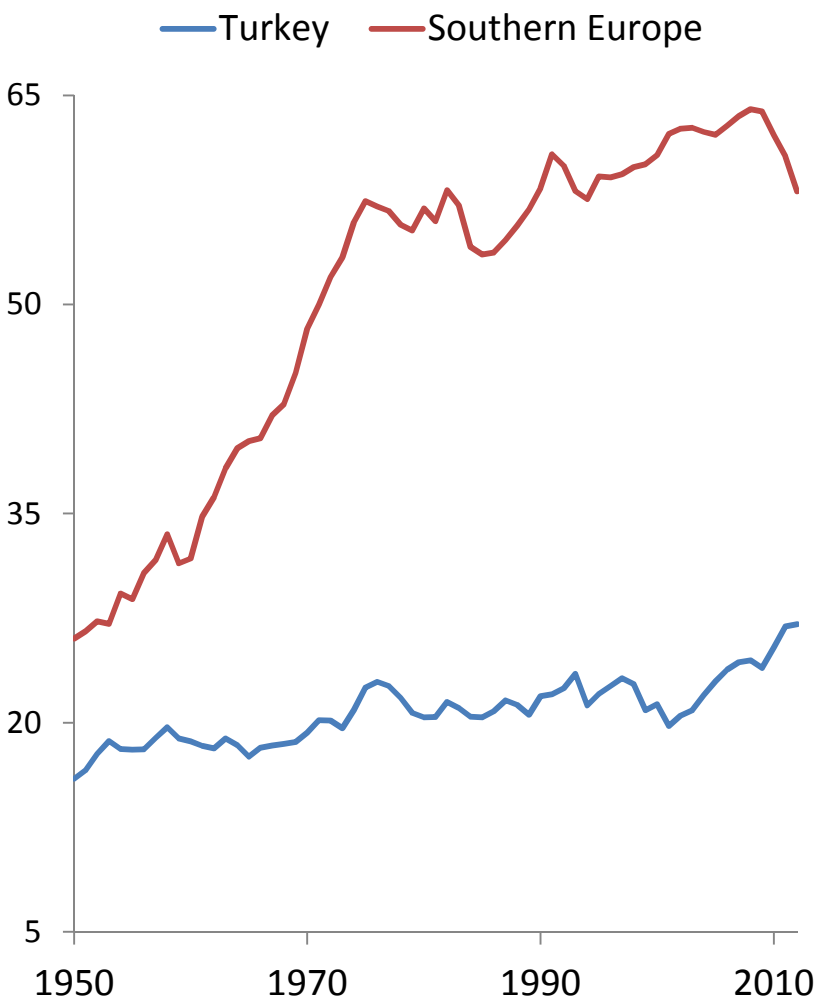
Source: The Conference Board Total Economy Database, January 2013.

GDP per capita relative to the U.S. (%), 1950-2012

(a): Turkey vs. Asian Dragons

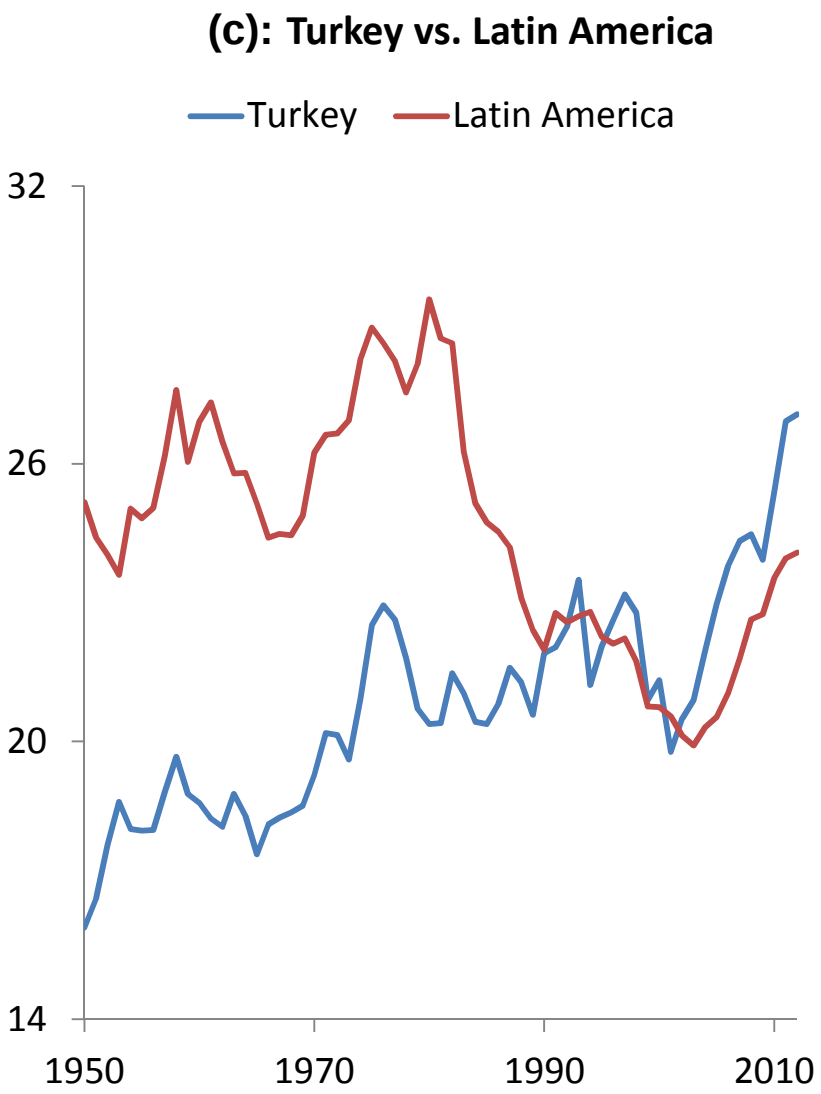


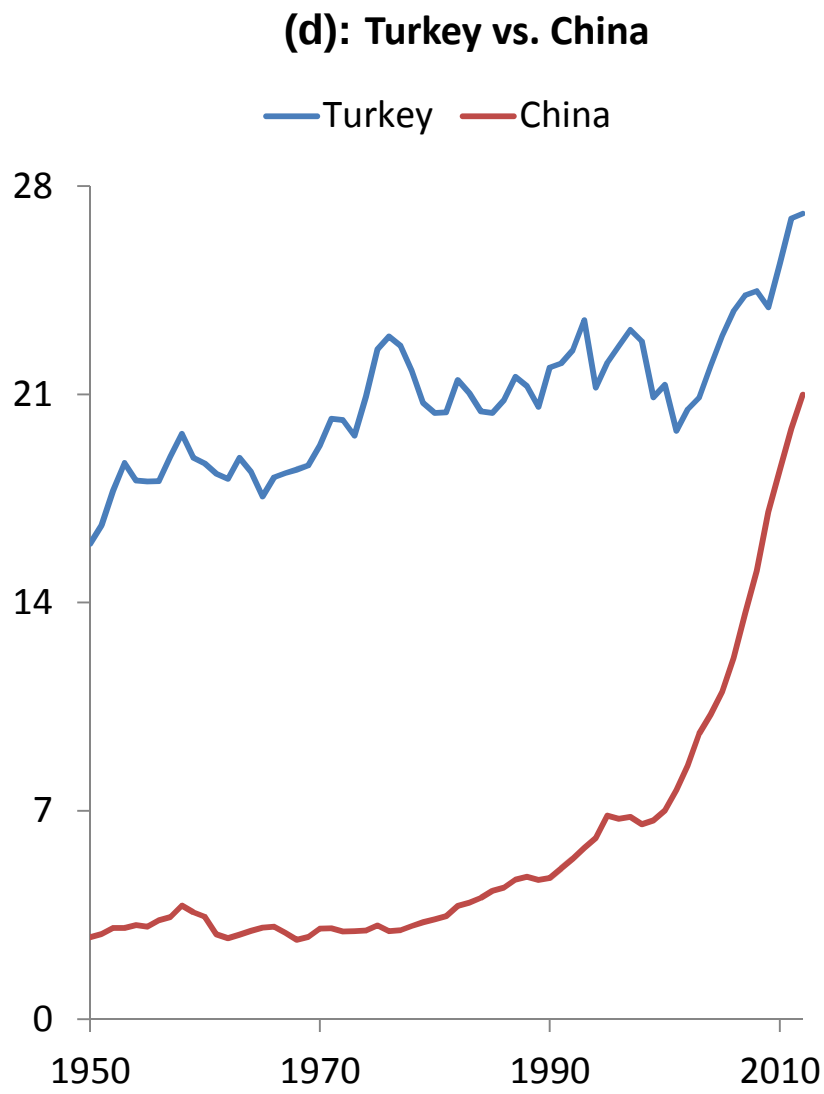
(b): Turkey vs. Southern Europe



Source: The Conference Board Total Economy Database, January 2013.

GDP per capita relative to the U.S. (%), 1950-2012

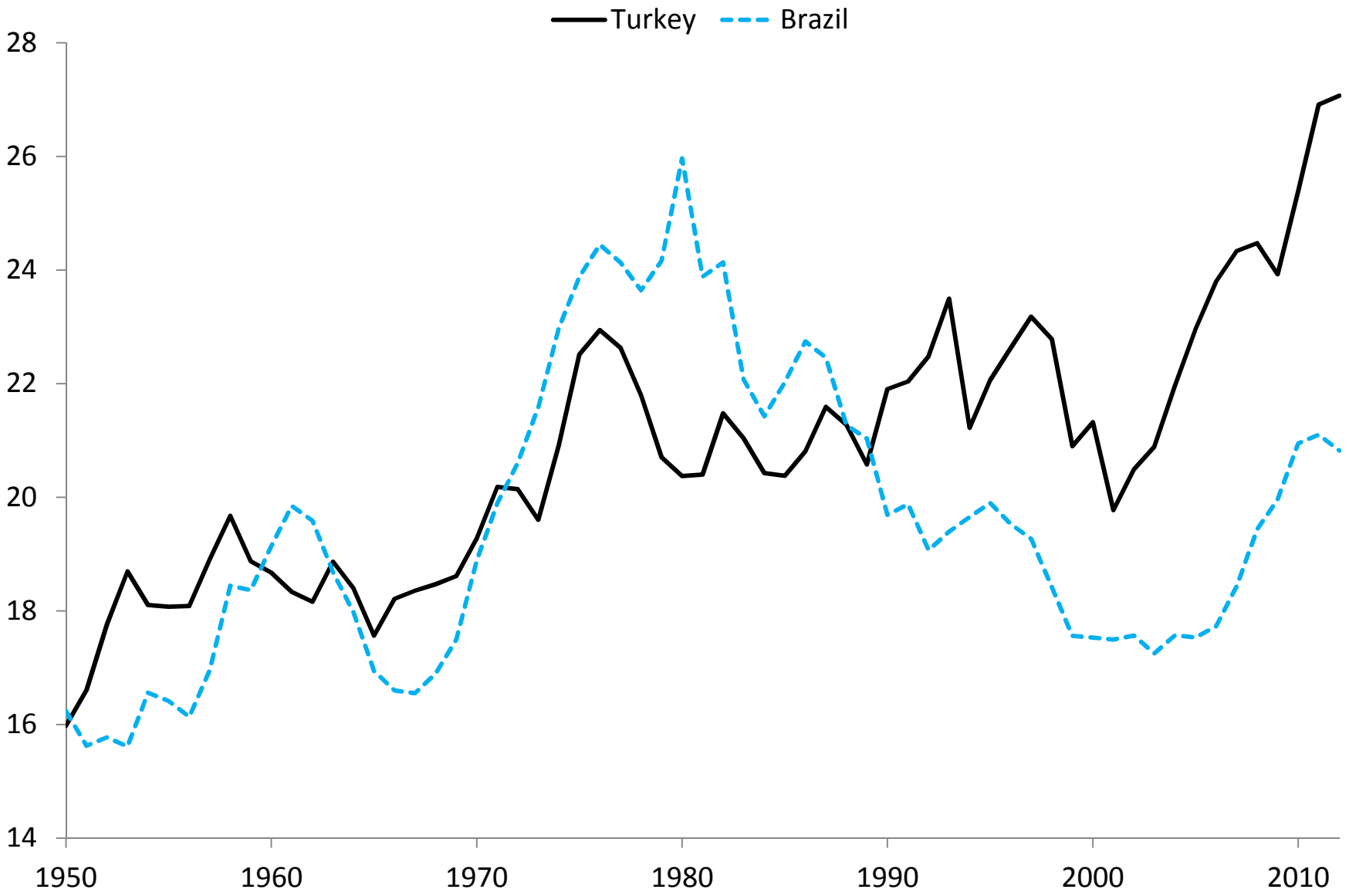




Source: The Conference Board Total Economy Database, January 2013.

A PEER COUNTRY OF TURKEY: BRAZIL OR KOREA?

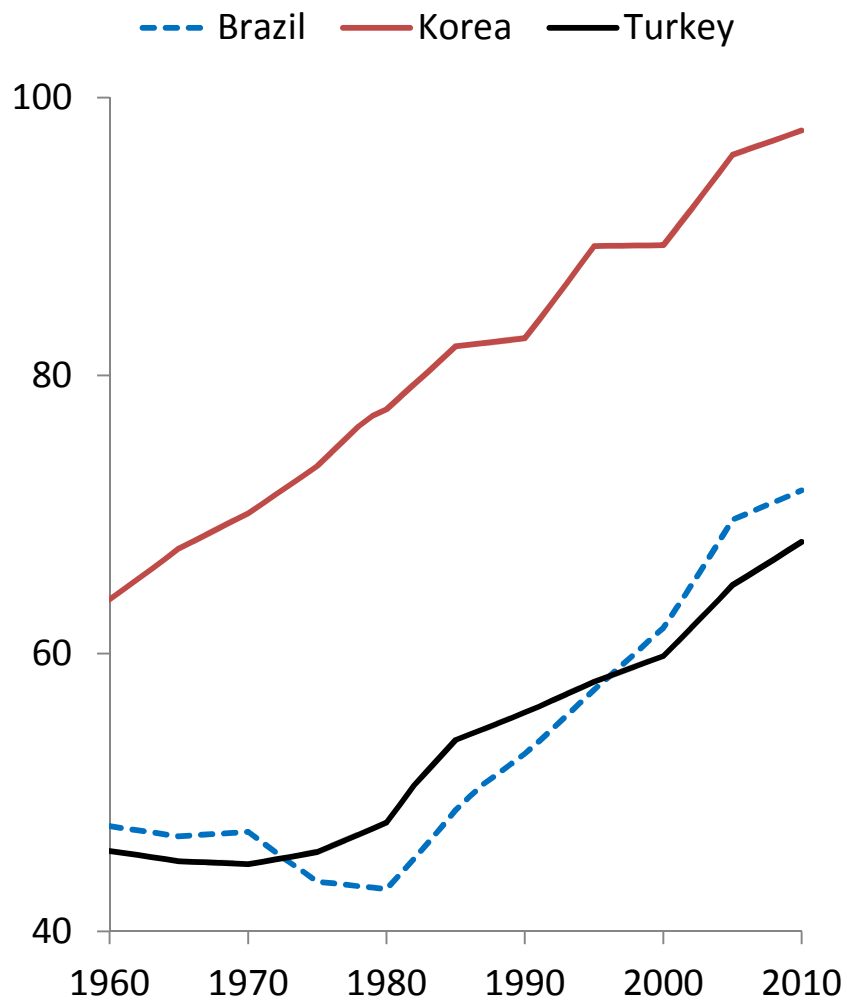
GDP per capita relative to the U.S. (%), 1950-2012



Source: The Conference Board Total Economy Database, January 2013.

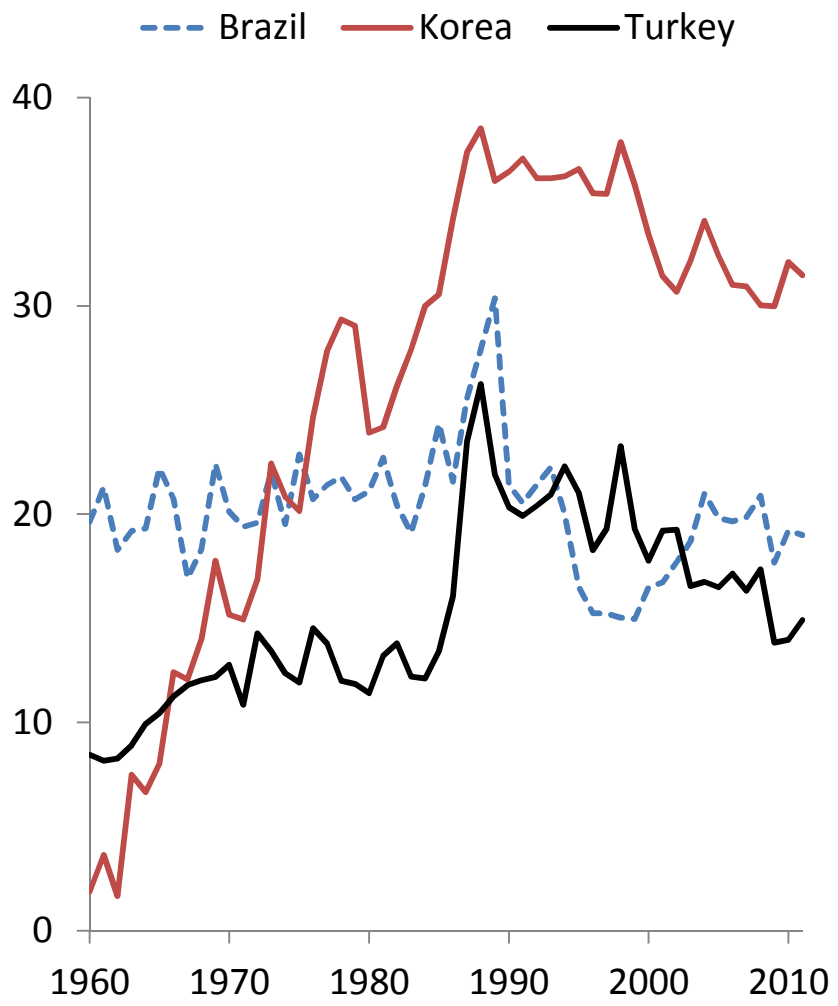
Some more comparisons for Brazil, Korea, and Turkey

(a): Human capital relative to the U.S. (%), 1960-2010



Source: Caselli (2005), Barro and Lee (2010).

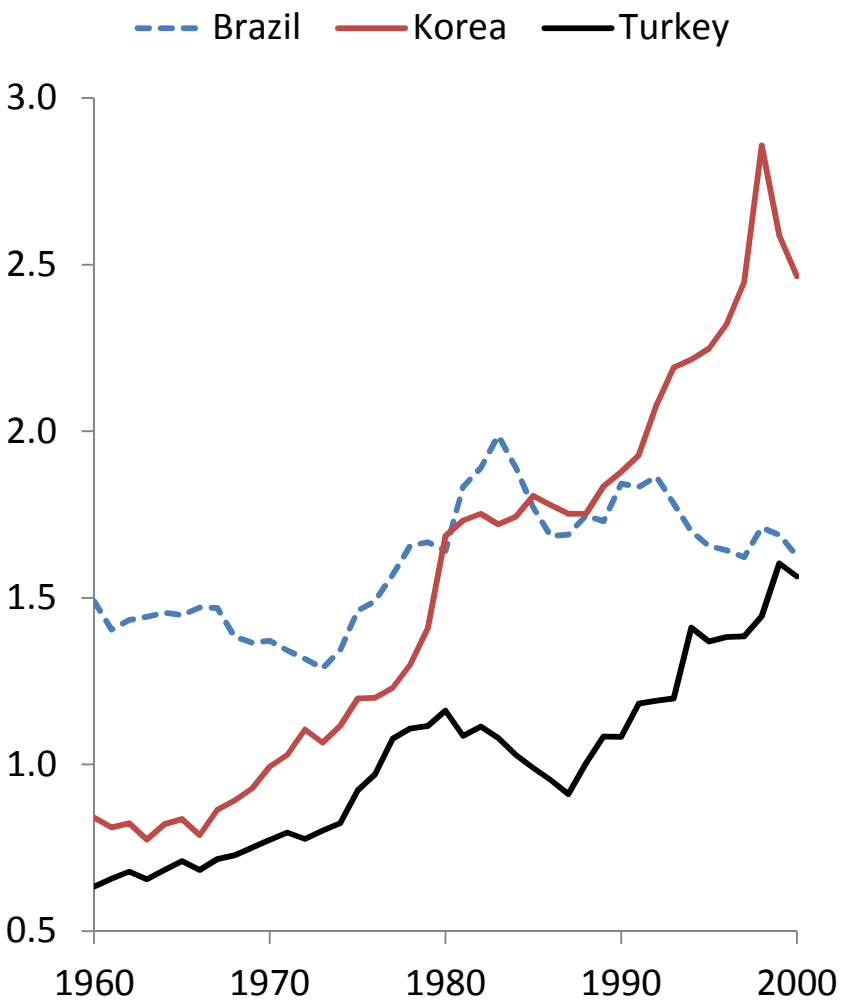
(b): Gross domestic savings (% of GDP), 1960-2011



Source: World Bank, World Development Indicators.

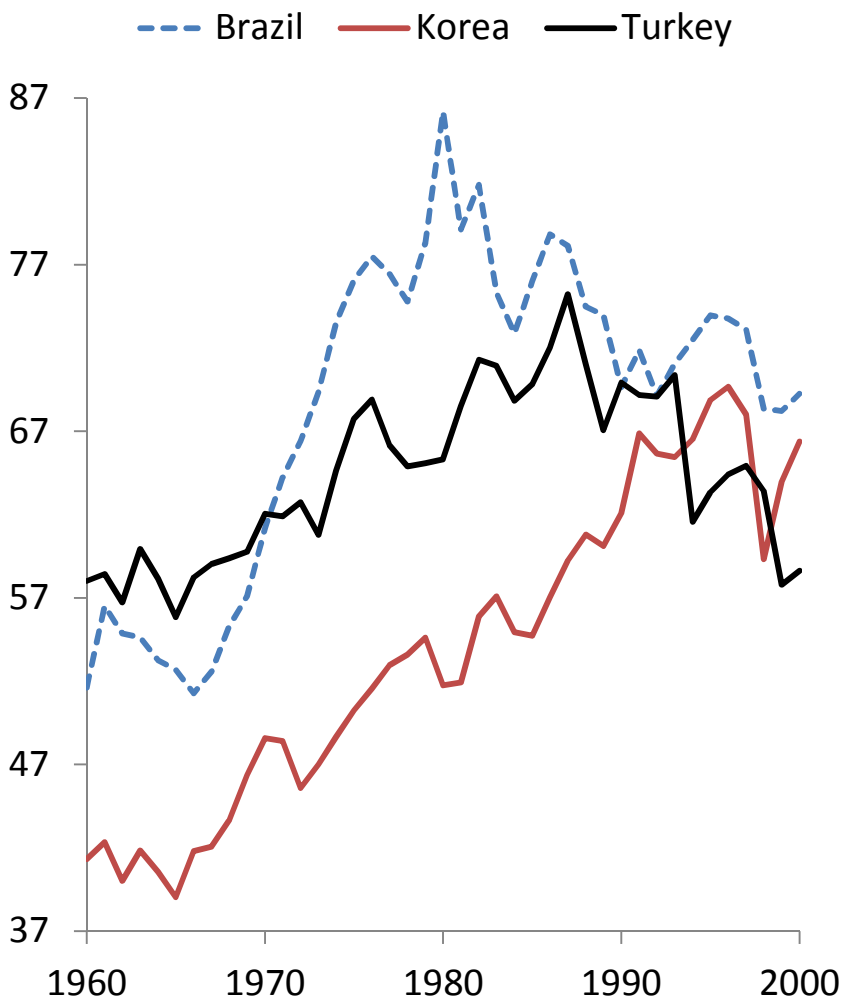
Some more comparisons for Brazil, Korea, and Turkey

(c): PPP capital-output ratio, 1960-2000



Source: Hsieh and Klenow (2010).

(d): TFP levels relative to the U.S. (%), 1960-2000



Source: Hsieh and Klenow (2010).

A GLIMPSE ON THE SOURCES OF GROWTH

Growth Accounting: Methodology

Consider the following aggregate production function:

$$Y = AK^{\alpha}(Lh)^{1-\alpha}$$

In per-worker terms the production function can be rewritten as:

$$y = Ak^{\alpha}h^{1-\alpha}$$

We decompose the average annual growth rate of output per worker over a number of years, z, (from time t to time t+z) as follows:

$$\frac{\log(y_{t+z}) - \log(y_t)}{z} = \frac{\log(A_{t+z}) - \log(A_t)}{z} + \alpha\frac{\log(k_{t+z}) - \log(k_t)}{z} + (1-\alpha)\frac{\log(h_{t+z}) - \log(h_t)}{z}$$

Sources of growth in Turkey (average annual changes, %)

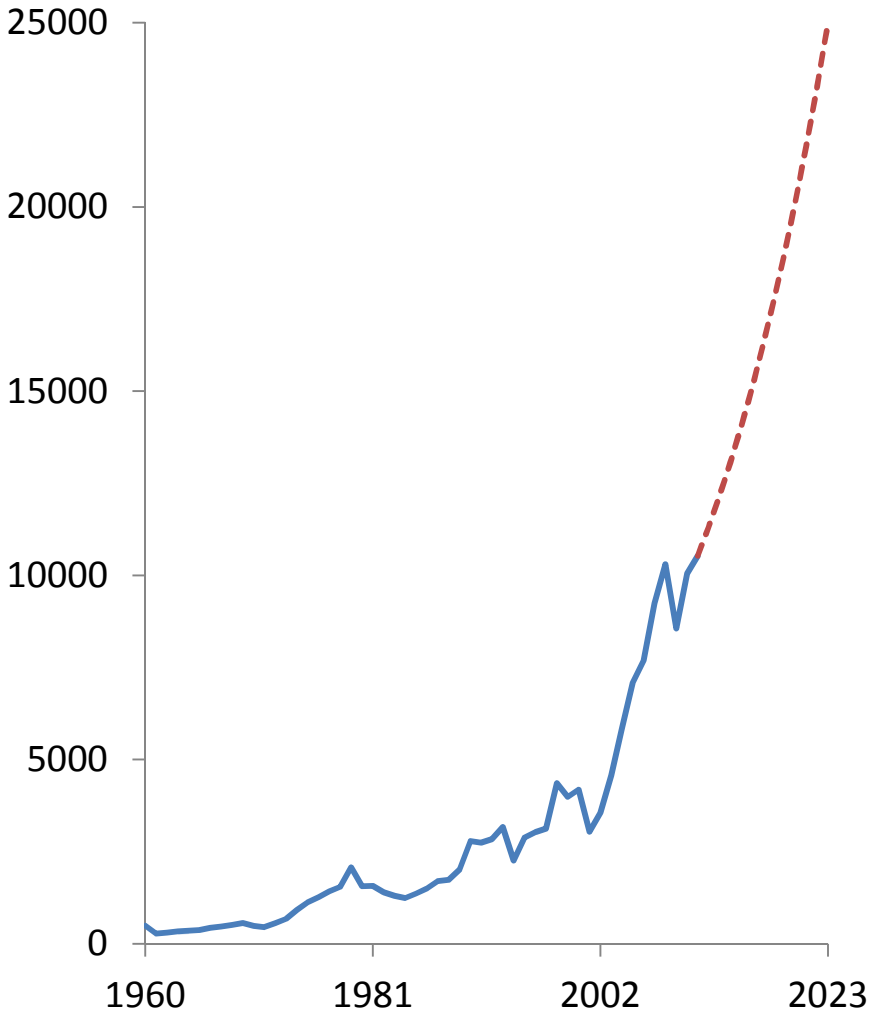
		Contribution to output per worker of		
	Output	Physical capital	Human capital	Total factor
Period	per worker	per worker	per worker	Productivity
1998-1999	-4.7	1.0	0.6	-6.3
1999-2000	8.7	2.8	0.6	5.2
2000-2001	-5.6	0.9	0.4	-6.9
2001-2002	6.8	0.3	0.4	6.0
2002-2003	6.1	1.4	0.4	4.3
2003-2004	6.8	1.7	0.4	4.7
2004-2005	5.9	2.4	0.4	3.1
2005-2006	4.9	3.2	0.5	1.2
2006-2007	3.0	2.8	0.5	-0.3
2007-2008	-1.5	2.0	0.5	-4.0
2008-2009	-5.3	1.0	0.5	-6.9
2009-2010	2.8	-1.3	0.5	3.5
1998-2001	-0.5	1.6	0.6	-2.7
2002-2007	5.3	2.3	0.5	2.6

Source: Barro and Lee (2010), Demiroğlu (2012), TURKSTAT, Ministry of Economy, Author's calculations.

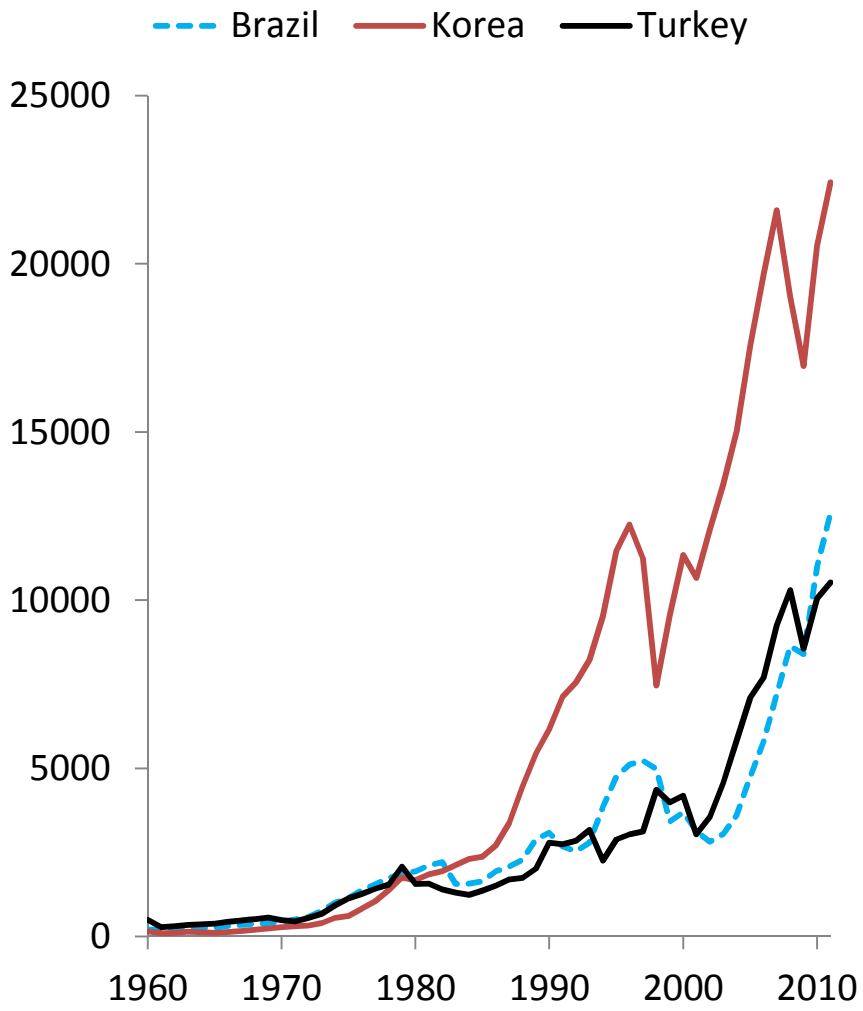
THE DYNAMICS OF GDP PER CAPITA

GDP per capita (current US$): Some comparisons

(a): GDP per capita, Turkey, 1960-2023



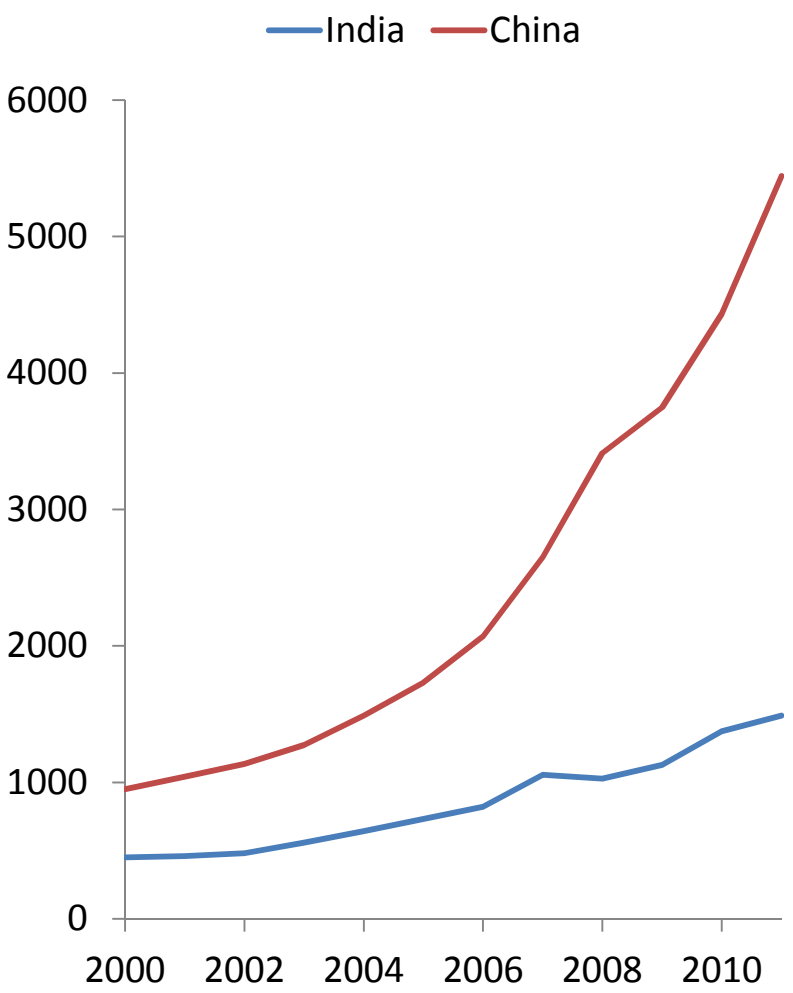
(b): GDP per capita, Brazil, Turkey, Korea, 1960-2011



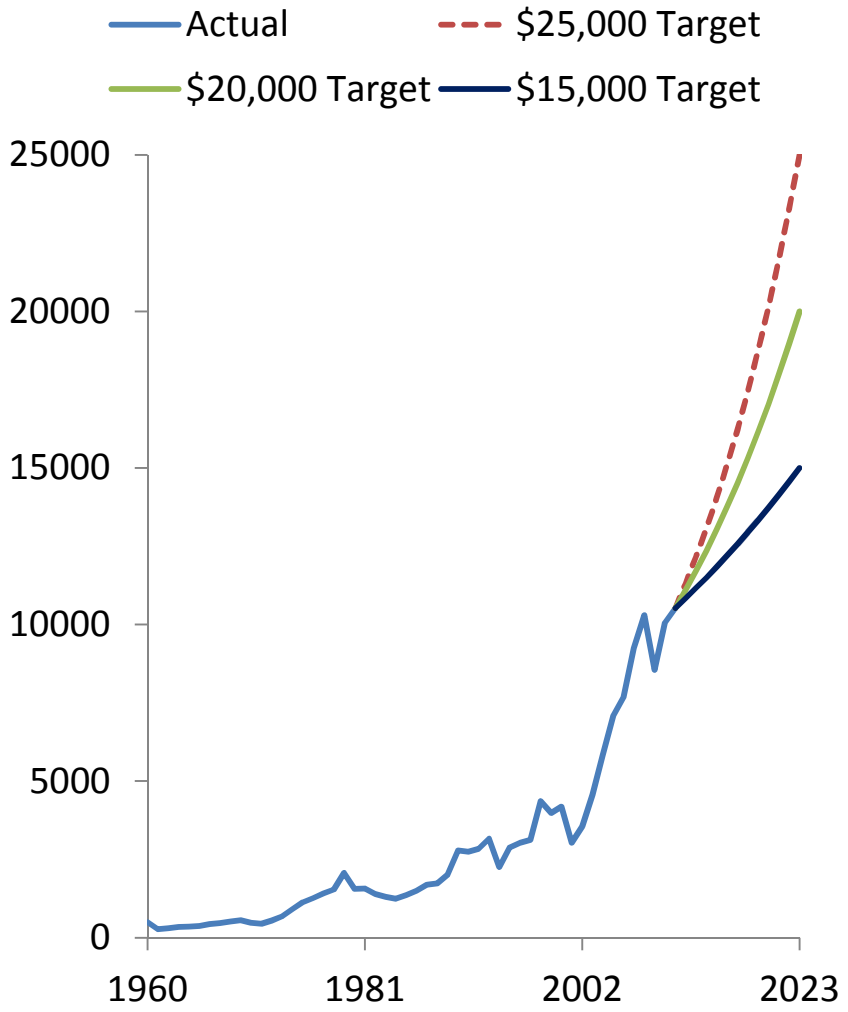
Source: World Bank, World Development Indicators.

GDP per capita (current US$): Some comparisons

(c): GDP per capita, China and India, 2000-2011



(d): Alternative scenarios for GDP per capita in Turkey



Source: World Bank, World Development Indicators.

A Simple Decomposition Analysis

Per capita income (with current US dollars) can be adjusted with the exchange rate:

$$y_t^{TR} = \frac{P_t^{TR} \times Y_t^{TR}}{N_t^{TR}} \times e_t^{US/TL}$$

y_t^{TR} is the nominal GDP per capita (measured in current U.S. dollars) in Turkey at time t

P_t^{TR} is the aggregate price level in Turkey

Y_t^{TR} denotes real GDP (in Turkish Lira) in Turkey

N_t^{TR} is the population in Turkey at time t

Finally, $e_t^{US/TL}$ is the nominal exchange rate between the U.S. dollar and the Turkish Lira

A Simple Decomposition Analysis

The real exchange rate between Turkey and the United States at time t is given by:

$$RER_t^{TR,US} = \frac{P_t^{TR}}{P_t^{US}} \times e_t^{US/TL}$$

where P_t^{US} is the price level in the United States.

Then,

$$y_t^{TR} = \frac{P_t^{TR} \times Y_t^{TR}}{N_t^{TR}} \times e_t^{US/TL} = \frac{P_t^{TR} \times Y_t^{TR}}{N_t^{TR}} \times \frac{P_t^{US}}{P_t^{TR}} \times RER_t^{TR,US} = \frac{Y_t^{TR}}{N_t^{TR}} \times P_t^{US} \times RER_t^{TR,US}$$

$$\underbrace{\log(y_{t+1}^{TR}/y_t^{TR})}_{\text{Growth in nominal per capita GDP}} = \underbrace{\log(Y_{t+1}^{TR}/Y_t^{TR})}_{\text{Growth in real GDP}} \underbrace{- \log(N_{t+1}^{TR}/N_t^{TR})}_{\text{Growth in population}} + \underbrace{\log\left(P_{t+1}^{US}/P_t^{US}\right)}_{\text{Inflation in the U.S.}} + \underbrace{\log\left(RER_{t+1}^{TR,US}/RER_t^{TR,US}\right)}_{\text{Appreciation of the Turkish Lira}}$$

Some Back-of-the-Envelope Calculations

$$\log(y_{t+1}^{TR}/y_t^{TR}) = \log(Y_{t+1}^{TR}/Y_t^{TR}) - \log(N_{t+1}^{TR}/N_t^{TR}) + \log\left(P_{t+1}^{US}/P_t^{US}\right) + \log\left(RER_{t+1}^{TR,US}/RER_t^{TR,US}\right)$$

Growth in nominal per capita GDP		*Growth in real GDP*	*Growth in population*	*Inflation in the U.S.*	*Appreciation of the Turkish Lira*
+7.5%	*=*	*+ 5%*	*-1%*	*+2.5%*	*+1%*

This scenario suggests that (real) output growth in Turkey would be around 5% and population growth would be around 1%

Therefore, real output per capita would grow by 4%

The U.S. inflation would add 2.5% and the appreciation of Turkish Lira would add 1%

These figures sum up to 7.5%, which yields $25,000 per capita income in 2023

CONCLUDING REMARKS

- This study, without providing a complete picture of the country's economic development, aims to bring about a better understanding of the convergence experience of Turkey

- We explore some aspects of the convergence process of Turkey and provide some international comparisons tracking the changes in both nominal and real per capita income figures

- With respect to the per capita income, Turkey is closer to Brazil than to Korea

- From the 1960s until now, Korea is closing the gap in per capita income that separates the country from the richest countries of the world

- On the other hand, Brazil and Turkey lost ground in the last two-three decades of the 20^{th} century

- After the lost decades, Turkey had high growth rates during 2002-2007

- We perform a growth accounting exercise and discuss the importance of productivity growth in Turkey's long-run growth. Lastly, we carry out an exercise, in which we decompose the growth rate of nominal per capita income into the growth rates of real GDP and population in Turkey; the rate of inflation in the U.S.; and the appreciation of the Turkish Lira

- We present several alternative scenarios for the time-path of per capita income in Turkey