

INAUGURAL
TEPAV MC AWARD
2011

AGRICULTURAL PRODUCTIVITY **AND GROWTH IN TURKEY**

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*The views expressed here are solely the opinions of the authors.
All the information in this report can be used with proper citation.*

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PREAMBLE

TEPAV MERİH CELASUN AWARD

Professor Celasun used to stress that Turkey needed to increase the number of platforms to discuss its economic issues. He used to complain about the lack of interest among Turkish economists on economic policy design. I remember our chats in the early 2000s: He associated the absence of a well-coordinated strategy to solve the then-chronic high-inflation problem with the lack of interest in policy design. At TEPAV, we are working to overcome, if not completely eliminate, the problems Professor Celasun underscored. We are aiming to enrich the knowledge content of economic policy discussions in Turkey and arouse researchers' interest on Turkey's economic issues. In this line, we have designed the Merih Celasun Award to commemorate Professor Celasun.

The theme of the 2011 Merih Celasun Award was "Turkey's growth problems". Turkey needs a well-designed growth strategy in order to become one of the top ten economies of the world with a per capita GDP of \$25,000 by 2023. It is important to ensure stable and rapid growth while reducing vulnerability to external shocks. Turkey has eleven years to increase per capita income from today's \$10,000 to targeted \$25,000. Such leap was accomplished in 44 years in the US, in 22 years in Japan and 19 years in South Korea. This reveals that Turkey has to make great efforts to reach its target by 2023. With this perspective, there is an ever pressing need for studies that manifest Turkey's growth problems and guide policy-makers in the design of relevant strategies.

The jury of the 2011 Merih Celasun Award, composed of respected scientists Dani Rodrik, Daron Acemoğlu, Hasan Ersel, Sumru Altuğ, Şevket Pamuk and Ziya Öniş, decided to grant the 2011 Award to the study titled "Agricultural Productivity and Growth in Turkey" by Prof. Ayşe İmrohoroğlu, Prof. Selahattin İmrohoroğlu and Dr. Murat Üngör. The study investigates the relative divergence of Turkish GDP per capita from Spain, Portugal and Greece. It underscores the critical role of the differences in agricultural productivity growth in explaining the differences in per capita income among European countries. The study stresses that if Turkey had inherited Spanish agricultural productivity growth from 1968 to 2005, the growth rate of aggregate GDP per capita would have

been much higher in Turkey. The study remarkably highlights the key importance of raising productivity in agriculture, which still has a high share in total employment in Turkey.

I would like to congratulate the authors for this significant study that addresses the growth problem with a different perspective. Also, I would like to thank to esteemed members of the jury for they accepted to evaluate studies despite their tight schedules. We hope that TEPAV Merih Celasun Award will continue contributing to the solution of Turkey's key economic challenges while commemorating Professor Merih Celasun.

Güven Sak
TEPAV Director



MERİH CELASUN

Merih Celasun was born in Bursa in 1936. He graduated from Bursa Erkek Lisesi in 1954 and went to the USA for his undergraduate studies. He obtained his undergraduate and graduate degrees from Columbia University in New York.

He returned to Turkey in 1965 and started to work at the State Planning Organization.

After serving at various positions in the Organization, he worked as Economic Planning Department Head between 1968 and 1969. He joined the academia in 1970 in Middle East Technical University Department of Operational Research.

In 1974-75 period, he worked as a Senior Economist in World Bank, Washington DC. Then he returned Turkey and joined Middle East Technical University Department of Economics in 1982. He assumed a number of administrative positions and thought many economists until 1999. Between 1999 and 2004, he was the Dean of the Faculty of Economics Administrative and Social Sciences at Bilkent University. His research interests included macroeconomic policy and public finance, human development and income distribution, and trade and industrialization.

He passed away on August 25, 2004 leaving behind a devoted family, loving friends and students, numerous research and publications, unforgettable talks and memories and advices and observations that guided the lives on many.

Professor Merih Celasun was an intellectual both with his profound passion about economics which he specialized in and with his knowledge in many disciplines. He is still at the heart of his acquaintances with his modesty and good humor.

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Resume 2012

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POSITIONS

Professor of Finance and Business Economics, Marshall School of Business, University of Southern California, April 2000-present.

Department Chair, Finance and Business Economics, Marshall School of Business, University of Southern California, 2004-2007.

Professor of Economics, Department of Economics, University of Southern California, 2001-present.

Associate Professor of Finance and Business Economics, Marshall School of Business, University of Southern California, 1994-2000.

Visiting Associate Professor, Department of Economics, Koc University, Istanbul, Turkey, August 1996 to June 1997.

Assistant Professor of Finance and Business Economics, University of Southern California, September 1989 to June 1994.

EDUCATION

University of Minnesota. Ph.D., Economics, July 1988.

Middle East Technical University, Turkey. B.S., Economics, June 1980.

Ph.D. Dissertation: Aggregate Implications of Liquidity Constraints

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COURSES TAUGHT

National and International Economics (GSBA 526)

International Trade (FBE 563, Econ 321)

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Macroeconomics (BUAD 350)

Graduate Macroeconomics (Econ 505)

PUBLICATIONS

“A Field Study of Matching with Network Externalities”, (co-authors: Mariagiovanna Baccara, Leeat Yariv and Alistar Wilson). Forthcoming, **American Economic Review**.

“Government Programs Can Improve Local Labor Markets: Evidence from State Enterprise Zones, Federal Empowerment Zones and Federal Enterprise Communities”, (co-author: John Ham, Chuck Swenson, Heonjae Song). Forthcoming, **Journal of Public Economics**.

“A Quantitative Assessment of the Decline in the U.S. Current Account, **Journal of Monetary Economics**, Vol. 56, Issue 8, 1135-1147, 2009.

“Altruism, incomplete markets, and tax reform”, (co-authors: Luisa Fuster and Selahattin İmrohoroğlu), **Journal of Monetary Economics**, Vol. 55, Issue 1, January 2008.

“Personal Security Accounts and Mandatory Annuitization in a Dynastic Framework”, (with Luisa Fuster and Selahattin İmrohoroglu), in Fenge, R., de Menil, G. and Pestieau, P., eds., *Pension Strategies in Europe and the United States*, MIT Press, April 2008.

“Welfare Costs of Business Cycles”, *The New Palgrave Dictionary of Economics*. Second Edition. Eds. Steven N. Durlauf and Lawrence E. Blume. Palgrave Macmillan, 2008.

“Consequences of demographic change for rates of returns to capital, and the distribution of wealth and welfare: A comment”, **Journal of Monetary Economics** Vol. 54, Issue 1, January 2007

“The Japanese Saving Rate between 1960-2000: Productivity, Policy Changes, and Demographics”, (co-authors: Kaiji Chen and Selahattin İmrohoroglu), **Economic Theory** Vol. 32, Number 1, July 2007.

“Elimination of Social Security in a Dynastic Framework”, (co-authors: Luisa Fuster and Selahattin İmrohoroglu), **Review of Economic Studies** Vol. 74, Number 1, January 2007.

“The Japanese Saving Rate”, co-authors: Kaiji Chen and Selahattin İmrohoroglu, **American Economic Review** Vol. 96 Number 5, December 2006.

“Understanding the Determinants of Crime”, (co-authors: Antonio Merlo and Peter Rupert), **Journal of Economics and Finance** Vol. 30, Number 2, June 2006.

“What Accounts for the Decline in Crime?” (co-authors: Antonio Merlo and Peter Rupert). **International Economic Review**, Volume 45, issue 3, 707-730, August 2004.

“Intermediation Costs and Capital Flows”, (co-author: Krishna Kumar), **Review of Economic Dynamics**, Volume 7, Number 3, July 2004.

“A Welfare Analysis of Social Security in a Dynastic Framework”, (co-author: Luisa Fuster and Selahattin İmrohoroglu), **International Economic Review**, Vol. 44, No. 4, November 2003.

“Time Inconsistent Preferences and Social Security”, (co-author: Selahattin İmrohoroglu and Douglas Joines), **Quarterly Journal of Economics**, Volume 118, issue 2, May 2003.

“On The Political Economy of Income Distribution and Crime”, (co-authors: Antonio Merlo and Peter Rupert), **International Economic Review**, Volume 41(1):1-25, February 2000.

“Social Security in an Overlapping Generations Model with Land”, (co-authors: Selahattin İmrohoroglu and Douglas Joines), **Review of Economic Dynamics**, Volume 2, Number 3, 638-665, July 1999.

“Computing Models of Social Security”, (co-authors: Selahattin İmrohoroglu and Douglas Joines) in R. Marimon and A. Scott, eds., *Computational Methods for the Study of Dynamic Economies*, Oxford University Press, 1999, 221-237.

“Computational Models of Social Security: A Survey”, (co-authors: Selahattin İmrohoroglu and Douglas Joines), **Cuadernos Economicos**, 1998, 64:75-108.

“The Effect of Tax-Favored Retirement Accounts on Capital Accumulation”, (co-authors: Selahattin İmrohoroglu and Douglas Joines), **American Economic Review**, 1998, Volume 88, No.4, 749-768.

“A Note on the Welfare Cost of Business Cycles and Growth in Turkey”, (co-author: Selahattin İmrohoroglu), **Yapi Kredi Economic Review**, December 1997, Volume 8, No.2, 25-34.

“Fiscal Policy and the Distribution of Wealth”, (co-author: Selahattin İmrohoroglu), **Cuadernos Economicos**, 1995, Vol. 61, No.3, 109-125.

“A Life Cycle Analysis of Social Security”, (co-authors: Selahattin İmrohoroglu and Douglas Joines), **Economic Theory**, 1995, Volume 6, 83-114.

“A Numerical Algorithm for Solving Models with Incomplete Markets”, (co-authors: Selahattin İmrohoroglu and Douglas Joines). **International Journal of Supercomputer Applications**, Fall 1993, Volume 7, No. 3, 212-229.

“The Role of Unemployment Insurance in an Economy with Liquidity Constraints and Moral Hazard”, (co-author: Gary Hansen), **Journal of Political Economy**, February 1992, vol. 100, no.1, 118-142.

“The Welfare Cost of Inflation Under Imperfect Insurance”, **Journal of Economic Dynamics and Control**, 1992, Vol.16, No.1, 79-91.

“Evaluating the Welfare Effects of Alternative Monetary Arrangements”, (co-author: Edward Prescott), **Quarterly Review**, Federal Reserve Bank of Minneapolis, Summer 1991, 3-10.

“Seigniorage as a Tax: A Quantitative Evaluation”, (co-author: Edward Prescott), **Journal of Money Credit and Banking**, 1991, Vol. 23, No.3, Pt.2, 462-475.

“Cost of Business Cycles with Indivisibilities and Liquidity Constraints”, **Journal of Political Economy**, 1989, vol.97, no. 6, 1364-1383.

WORK IN PROGRESS

“Agricultural Productivity and Growth”, (co-author: Selahattin İmrohoroğlu, Murat Ungor).

“Firm Level Productivity, Risk and Return”, (co-author: Selale Tuzel)

“Debt and the U.S. Economy”, (co-author: Kaiji Chen)

PROPOSALS AND GRANTS

“A Life Cycle Analysis of Social Security”, joint with Selahattin İmrohoroğlu and Douglas Joines, is based upon work supported by the National Science Foundation under Grant # SES-9210291. The grant covered the period 9/1/1992 to 8/31/1993.

REFEREING AND PROFESSIONAL MEMBERSHIPS _____

Editor, European Economic Review 2012

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Dissertation: Two Essays on Inflation

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Experience:

- Professor, University of Southern California , Marshall School of Business, Department of Finance and Business Economics, and Department of Economics, April 2000 to Present
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- Visiting Scholar, Federal Reserve Bank of New York, September 2010.
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- Visiting Scholar, Institute for Empirical Macroeconomics, Federal Reserve Bank of Minneapolis, August 1994

Publications: _____

1. "Testing for Sunspot Equilibria in the German Hyperinflation," **Journal of Economic Dynamics and Control**, 1993, 17(Jan./March): 289-317.
2. "A Numerical Algorithm for Solving Models with Incomplete Markets" (with Ayşe İmrohoroğlu and Douglas Joines), **International Journal of Supercomputer Applications**, 1993, 7(Fall): 212-230.
3. "A Recursive Forward Simulation Method for Solving Nonlinear Rational Expectations Models," **Journal of Economic Dynamics and Control**, 1994, 18(November): 1051-1068.
4. "GMM Estimates of Currency Substitution between the Canadian Dollar and the U.S. Dollar," **Journal of Money, Credit, and Banking**, 1994, 26(November): 792-807.
5. "A Life Cycle Analysis of Social Security" (with Ayşe İmrohoroğlu and Douglas Joines), **Economic Theory**, 1995, 6: 83-114.
6. "A Markov Switching Model for the Hungarian Stabilization Plan of 1924," **Journal of Macroeconomics**, 1995, 17(Spring): 347-355.

7. "Fiscal Policy and the Distribution of Wealth," (with Ayşe İmrohoroglu), **Cuadernos Economicos**, 995, 61(3): 109-125.
8. "International Currency Substitution and Seigniorage in a Simple Model of Money," **Economic Inquiry**, 1996, Vol. XXXIV (July): 568-578.
9. "Two Computations to Fund Social Security," (with He Huang and Thomas J. Sargent), 1997, **Macroeconomic Dynamics**, Vol. 1(1): 7-44.
10. "Stock Returns and Volatility in Emerging Financial Markets," (with Giorgio De Santis), 1997, **Journal of International Money and Finance**, Vol. 16: 561-579.
11. "A Quantitative Analysis of Capital Income Taxation," **International Economic Review**, Vol. 39(2): May 1998, pp. 307-28.
12. "The Effect of Tax-Favored Retirement Accounts on Capital Accumulation," (with Ayşe İmrohoroglu and Douglas Joines), **American Economic Review**, September 1998, Vol. 88(4), pp. 749-768.
13. "A Note on the Welfare Cost of Business Cycles and Growth in Turkey," (with Ayşe İmrohoroglu), **Yapı Kredi Economic Review**, December 1997, Vol. 8(2), pp. 25-34.
14. "Projected U.S. Demographics and Social Security" (with Mariacristina De Nardi and Thomas J. Sargent), **Review of Economic Dynamics**, Vol. 2, No. 3 (July) 1999, 575-615.
15. "Social Security in an Overlapping Generations Model with Land" (with Ayşe İmrohoroglu and Douglas Joines), **Review of Economic Dynamics**, Vol. 2, No. 3 (July) 1999, 638-665.
16. "The Risk Sharing Implications of Alternative Social Security Arrangements: A Comment", **Carnegie-Rochester Conference Series on Public Policy**, Vol. 50, (June) 1999, 261-269.
17. "Computational Models of Social Security: A Survey", (with Ayşe İmrohoroglu and Douglas Joines), forthcoming in **Cuadernos Economicos**, 1999.

18. "Computing Models of Social Security" (with Ayşe İmrohoroğlu and Douglas Joines), in R. Marimon and A. Scott eds., **Computational Methods for the Study of Dynamic Economies**, Oxford University Press, 1999. 221-237.
19. "Saving and Pension Reform in General Equilibrium Models", (with Mariacristina De Nardi and Thomas J. Sargent), **Oxford Papers on Economic Policy**, Vol. 17, No. 1, Spring 2001.
20. "Time Inconsistent Preferences and Social Security," (with Ayşe İmrohoroğlu and Douglas Joines), **Quarterly Journal of Economics**, Vol. 118, issue 2, May 2003, 745-784.
21. "A Welfare Analysis of Social Security in a Dynastic Framework," (with Luisa Fuster and Ayşe İmrohoroğlu), **International Economic Review**, Vol. 44, No. 4, November 2003, 1247-1274.
22. "Growth and Welfare Analysis of Tax Progressivity in a Heterogenous-Agent Model," (with Betsy Caucutt and Krishna Kumar), **Review of Economic Dynamics**, Vol. 6, 2003, 546-577.
23. "Does the Progressivity of Taxes Matter for Economic Growth?", (with Betsy Caucutt and Krishna Kumar), **Journal of Public Economic Theory**, Vol 8 (1), 2006, 95-118. .
24. "The Japanese Saving Rate", (with Kaiji Chen and Ayşe İmrohoroğlu), **American Economic Review**, Vol. 96 (5), 2006, 1850-1858.
25. "Elimination of Social Security in a Dynastic Framework", (with Luisa Fuster and Ayşe İmrohoroğlu), **Review of Economic Studies**, Vol 74 (1), 2007, 113-145.
26. "The Japanese Saving Rate Between 1960-2000: Productivity, Policy Changes, and Demographics", (with Kaiji Chen and Ayşe İmrohoroğlu), **Economic Theory**, Vol. 32, 2007, 87-104.
27. "Altruism, Incomplete Markets, and Tax Reform", (with Luisa Fuster and Ayşe İmrohoroğlu), **Journal of Monetary Economics**, Vol. 55, No. 1, January 2008, 65-90.

28. "Personal Security Accounts and Mandatory Annuitization in a Dynastic Framework", (with Luisa Fuster and Ayşe İmrohoroğlu), in Fenge, R., de Menil, G. and Pestieau, P., eds., **Strategies for Pension Reform**, 2008, Cambridge: MIT Press.
29. "Social Security in the United States," **The New Palgrave Dictionary of Economics**, 2nd Edition, edited by Steven N. Durlauf and Lawrence E. Blume, 2008, Palgrave Macmillan.
30. "Consumption and Hours Over the Life Cycle: The Role of Annuities", (with Gary Hansen), **Review of Economic Dynamics**, Volume 11, No. 3, 2008, 566-583.
31. "Hours Volatility over the Life Cycle: The Role of On-the-Job Skill Accumulation", (with Gary Hansen), **Journal of Economic Theory**, Volume 144, Issue 6, November 2009, Pages 2293-2309.
32. "Labor Supply Elasticity and Social Security Reform", (with Sagiri Kitao), **Journal of Public Economics**, Volume 93, Issues 7-8, 867-878, August 2009.
33. "A Quantitative Assessment of the Decline in the U.S. Current Account", (with Kaiji Chen and Ayşe İmrohoroğlu), **Journal of Monetary Economics**, Volume 56, Issue 8, November 2009, Pages 1135-1147.
34. "Productivity and Fiscal Policy in Japan: Short Term Forecasts from the Standard Growth Model", (with Nao Sudo), forthcoming in **Monetary and Economic Studies**, Institute for Monetary and Economic Studies, Bank of Japan, December 2010.
35. "Will a Growth Miracle Reduce Debt in Japan?", (with Nao Sudo), forthcoming in **The Economic Review** (Keizai Kenkyuu), Institute of Economic Research, Hitotsubashi University, December 2010.
36. "Discussion of Erosa, Fuster, and Kambourov", forthcoming in **Journal of Monetary Economics**, 2012.
37. "Social Security Reforms: Benefit Claiming, Labor Force Participation and Long-run Sustainability", (with Sagiri Kitao), forthcoming in **American Economic Journal: Macroeconomics**, 2012.

Current Research Projects

1. “Adjusted Data and the Equity Premium Puzzle”.
2. “Tax Reform and the Japanese Economy”, (with Nao Sudo).
3. “Fiscal Reform and Government Debt in Japan: A Neoclassical Perspective”, (with Gary Hansen).
4. “Sustaining Fiscal Balance in Japan”, (with Sagiri Kitao).
5. “Agricultural Productivity and Growth in Turkey”, (with Ayşe İmrohoroğlu and Murat Üngör).
6. “Fiscal Policy and Living Standards in an Aging Japan: A Modeling Framework”, (with Gary Hansen).
7. “Fiscal Policy and Living Standards in an Aging Japan: Some Steady State Results”, (with Gary Hansen).
8. “Business Cycle Facts in Turkey”(with Ayşe İmrohoroğlu).
9. “A Historical Example from the Ottoman Empire of Some Unpleasant Monetarist Arithmetic.”
10. “Some Historical Evidence from Turkey on the Backing View of Money.”

Professional Activities

- Associate Editor, The Journal of Economic Dynamics and Control.
- Referee for Journal of Political Economy, American Economic Review, Review of Economic Studies, Econometrica, Journal of Economic Theory, Review of Economic Dynamics, Journal of Public Economics, Journal of Economic Dynamics and Control, Journal of Money, Credit and Finance, National Tax Journal, International Economic Review, Journal of International Money and Finance, Economic Inquiry, Economic Journal, Economica, Journal of Macroeconomics, Journal of Monetary Economics, European Economic Review, National Science Foundation.

- Coordinator of the USC Macroeconomics and International Finance Workshop, 1992-1998.
- Coordinator of the USC Finance and Business Economics In-House Workshop, 1991-1994.
- Professional Memberships in American Economic Association, Econometric Society, Society for Economic Dynamics.
- Grants:
 - USC Advancing Scholarship in the Humanities and Social Sciences, 2008.
 - National Science Foundation Grant #SES-9210291 for the paper "A Life Cycle Analysis of Social Security" (with Ayşe Imrohoroglu and Douglas Joines).

Recent Paper Presentations

- "Elimination of Social Security in a Dynastic Framework"
 - University of California, Irvine, September 2003.
 - Conference on Improving Social Insurance Programs, University of Maryland, September 2003.
 - University of California, Los Angeles, October 2003.
 - The Wharton School, University of Pennsylvania, November 2003.
 - The Leonard Stern School of Business, New York University, November 2003.
 - The University of Amsterdam, The Netherlands, October 2004.
 - Conference on Social Insurance, Munich, Germany, November 2004.
 - CEPREMAP, Paris, France, November 2005.
 - Kyoto University, Japan, November 2005.
- "A Note on McGrattan and Prescott (2003) Adjustments and the Equity Premium Puzzle"

- Sabancı University, İstanbul, Turkey, November 2003.
- Koç University, İstanbul, Turkey, November 2003.
- “The Japanese Saving Rate”
 - Bilkent University, Ankara, Turkey, July 2004.
 - University of California, Riverside, October 2004.
 - Sabancı University, İstanbul, Turkey, November 2004.
 - University of Tokyo, November 2004.
 - Frankfurt University, Germany, October 2005.
- “Personal Security Accounts and Mandatory Annuitization in a Dynastic Framework”
 - University of Groningen, The Netherlands, October 2005
 - Tilburg University, The Netherlands, October 2005
- “Consumption over the Life Cycle: The Role of Annuities”
 - UC Riverside, September 2004
 - Annual Meetings of the Society for Economic Dynamics, Budapest, Hungary, June 2005
 - University of Tokyo, Japan, November 2005
- “A Quantitative Assessment of the Decline in the U.S. Saving Rate”
 - Federal Reserve Bank of Chicago, November 2006.
 - Purdue University, September 2007.
 - Indiana University, September 2007.
 - CERGE-EI Prague, Czech Republic, November 2007.
 - University of Hawaii, December 2007.
- “Altruism, Incomplete Markets, and Tax Reform”
 - University of California, San Diego, April 2007.
 - Annual Meetings of the Society of Economic Dynamics, Prague, June 2007.
- “Hours Volatility over the Life Cycle: The Role of On-the-Job Skill Accumulation”
 - University of Paris, October 2007.

- “A Quantitative Assessment of the Decline in the U.S. Saving Rate and Current Account Balance”
 - CERGE-EI, Charles University, Prague, Czech Republic, November 2007.
 - University of Hawaii, Oahu, HI, December 6, 2007.
 - Federal Reserve Bank of Atlanta, March 2008.
- “Labor Supply Elasticity and Social Security Reform”
 - Graduate Institute for Policy Studies, Tokyo, Japan, September 20, 2008.
 - Federal Reserve Bank of San Francisco, October 8, 2008.
 - University of Hawaii, Oahu, HI, March 20, 2009.
- “Fiscal Policy and Living Standards in an Aging Japan: A Modeling Framework”
 - Institute of Monetary and Economic Studies, Bank of Japan, December 2009.
- “Fiscal Policy and Living Standards in an Aging Japan: Some Steady State Results”
 - Institute of Monetary and Economic Studies, Bank of Japan, December 2009.
- Social Security, Benefit Claiming, and Labor Force Participation: A Quantitative General Equilibrium Approach”
 - Stern School of Business, New York University, October 1, 2009.
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 - International Conference on Economic Growth, Dynamics, and Policies, National Graduate Institute for Policy Studies, Tokyo, Japan, November 2009.
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 - University of California, San Diego, February 25, 2010.
 - Conference on Macroeconomic Theory and Policy, Canon Institute for Global Studies, Tokyo, Japan, May 29, 2010.

- Recent Developments in Macroeconomics, Yonsei University, Seoul, South Korea, June 2, 2010.
- Frictions in Financial and Labor Markets, 35th Annual Economic Policy Conference, Federal Reserve Bank of St. Louis, October 2010.
- University of California, Riverside, December 2010.
- “Productivity and Fiscal Policy in Japan: Short Term Forecasts from the Standard Growth Model”
 - Institute of Monetary and Economic Studies, Bank of Japan, December 2009.
 - Fordham University, New York, September 2010.
- “Will a Growth Miracle Reduce Debt in Japan?”
 - National Graduate Research Institute for Policy Studies, Tokyo, Japan, December 2010.
 - University of Tokyo, Japan, December 2010.
- “Fiscal Reform and Government Debt in Japan: A Neoclassical Perspective”
 - Conference on Macroeconomic Theory and Policy, Canon Institute for Global Studies, Tokyo, Japan, August 2011.
 - Fiscal Policy Under Fiscal Imbalance Conference, Becker Friedman Institute, University of Chicago, November 2011.

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Working Papers

De-industrialization of the Riches and the Rise of China
Some Aspects of the Chinese Industrialization
Productivity Growth and Labor Reallocation: Latin America versus East Asia
Agricultural Productivity and Growth in Turkey
(with Ayşe İmrohoroğlu and Selahattin İmrohoroğlu)

Publications

“Increasing Share of Agriculture in Employment in the Time of Crisis: Puzzle or Not?” *Review of Middle East Economics and Finance*, Vol. 7: No. 3, September 2011, Article 3 (with Gönül Şengül)

Appendix to Robert Dekle and Kyoji Fukao, “The Japan-U.S. Exchange Rate, Productivity, and the Competitiveness of Japanese Industries”, in Koichi Hamada, Anil K. Kashyap, and David Weinstein (eds.), *Japan’s Bubble, Deflation, and Long-term Stagnation*, Cambridge: MIT Press, 2011.

“Has Customs Union Agreement Really Benefited Turkey’s Trade?” *Applied Economics*, Vol. 39, Issue 16, September 2007, pp. 2121-2132 (with Bilin Neyaptı and Fatma Taşkın)

Publications in Turkish

“Current Account Deficits and Increasing Foreign Exchange Requirements of the Turkish Economy.” *International Economics and Foreign Trade Policies*, 3(1-2), 2008, pp. 57-84 (with Öner Günçavdı and Suat Küçükçifçi)

“Gümrük Birliği’nin Türkiye’nin Bölgesel Ticaretine Etkileri” in Ali Bilge and Hasan Ersel (eds.), *Gümrük Birliği ve Türkiye Sanayisi Üzerine Etkileri*, Economic Policy Research Foundation of Turkey, Ankara, 2007, pp. 89-102 (with Bilin Neyaptı and Fatma Taşkın)

“The Effects of Customs Union on Turkey’s Regional Trade” in Ercan Uygur and İrfan Cıvır (eds.), *Foreign Trade and Agriculture in the South-*

East Anatolia Project Region, Turkish Economics Association, Ankara, 2004 (with Bilin Neyaptı and Fatma Taşkın)

Policy

Sectoral Sources of Labor Productivity in the 2001-2008 Era, CBT Economic Notes, 11-11.

Sectoral Sources of Price Changes in Foreign Trade in the 2003-2010 Era, CBT Economic Notes, 11-18, (in Turkish) (with Altan Aldan)

Honors and Awards

Merih Celasun 2011 Award (with Ayşe İmrohoroğlu and Selahattin İmrohoroğlu)

Dissertation Research & Writing Award, USC, Summer 2009, 2010

First Place in the 2008 Center for International Studies Essay Competition, USC

Outstanding Teaching Assistant Award, Department of Economics, USC, 2006

Best Second Year Empirical Paper Award, Department of Economics, USC, 2006

College Graduate Merit Award, USC, 2004-2009 (Including 2 years of Fellowship)

The Union of Chambers and Commodity Exchanges of Turkey Research Award, 2003

Fellowship by Department of Economics, Bilkent University, 2002-2004

Research Experience

Visitor, Federal Reserve Bank of Minneapolis, Research Department, October 2009

Teaching Experience

Teaching Assistant, Macroeconomic Theory II (Ph.D.), Spring 2007, 2008, 2010

Teaching Assistant, Macroeconomic Theory I (Ph.D.), Fall 2005, 2006, 2007, 2009

Teaching Assistant, Macroeconomic Analysis and Policy (M.A.), Spring 2008

Teaching Assistant, Intermediate Macroeconomics, Spring 2006

Conference and Seminar

“De-industrialization of the Riches and the Rise of China”

The 2011 European Meeting of the Econometric Society, Oslo, Norway, August 2011

Society for Economic Dynamics, Ghent, Belgium, July 2011

Macroeconomic Policy in Open Economies during Times of Crisis, İstanbul, July 2011

Dynamics, Economic Growth, and International Trade, DEGIT XIV, UCLA, June 2009

Midwest Macroeconomics Meetings, Indiana University in Bloomington, May 2009

Winter Workshop in Economics, Koç University, İstanbul, December 2008

Koç University, Bahçeşehir University, The Central Bank of the Republic of Turkey, TOBB University of Economics and Technology, Middle East Technical University

“Productivity Growth and Labor Reallocation: Latin America versus East Asia”

73rd International Atlantic Economic Conference, İstanbul, Turkey, March 2012

Eurasia Business and Economics Society (EBES), Antalya, Turkey, January 2012

The Congress of the European Economic Association, Oslo, Norway, August 2011

Asian Meeting of the Econometric Society, Seoul, South Korea, August 2011

“Agricultural Productivity and Growth in Turkey”

İstanbul Technical University, Faculty of Management, İstanbul, March 2011

Society for Economic Dynamics, Bahçeşehir University, İstanbul, July 2009

“Increasing Share of Agriculture in Employment in the Time of Crisis: Puzzle or Not?”

Undersecretariat for State Planning Organization, Ankara, June 2011

Anadolu International Conference in Economics II, Eskişehir, June 2011

TOBB University of Economics and Technology, Ankara, May 2011

Refereeing and Professional Memberships

Referee for Professional Journals: Bulletin of Economic Research, CESifo Economic Studies, Economics Bulletin, Emerging Markets Finance and Trade, Journal of Economic Dynamics and Control, The B.E. Journal of Macroeconomics.

Member of the American Economic Association, Econometric Society, European Economic Association, Royal Economic Society, Society for Economic Dynamics.

Agricultural Productivity and Growth in Turkey

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Abstract

This paper investigates the growth experience of one country in detail in order to enhance our understanding of important factors that affect economic growth. Using a two-sector model, we identify the low productivity growth in the agricultural sector as the main reason for the divergence of income per capita between Turkey and its peer countries between 1968 and 2005. An extended model that incorporates distortions in the use of intermediate goods in producing the agricultural output indicates that policies that have different effects across sectors and across time may be important in explaining the growth experience of countries.

JEL Classification: O11, O40, O57.

Key Words: Sectoral productivity differences; International comparisons; Turkey; Agriculture; Two-sector model

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1 Introduction

In 1960, GDP per capita in Turkey was 73% of GDP per capita in Greece, Portugal, and Spain. By 1977, this ratio had fallen to around 50% and it remained at this level until very recently. In this paper we investigate the reasons behind this relative stagnation and inquire whether we can isolate particular policies or features that may have been responsible for this experience.

Many authors have focused on the role of institutions, human capital, and macroeconomic policies in affecting economic growth in developing countries. For example, Hall and Jones (1999) attributed most of the differences in output per worker to differences in institutions and government policies across countries. Acemoglu, Johnson, and Robinson (2001) estimated large effects of institutions on income per capita. Glaeser, La Porta, Lopez-de-Silanes, Schleifer (2004) and Barro (1999), among others, have focused on the role of human capital.

Recently, models of sectoral transformation have been emphasized in providing an alternative insight into these differences. For example, Gollin, Parente, and Rogerson (2002) and Restuccia, Yang, and Zhu (2008) discuss the importance of the agricultural sector in accounting for the differences in income per capita while Duarte and Restuccia (2010) conclude that low productivity in services explains the lack of convergence across a large set of countries.

Our investigation of the historical data for Turkey reveals that the divergence of income per capita between Turkey and its peers took place in a period where some of the fiscal and monetary policy indicators such as the share of government consumption in GDP and the inflation rate were not significantly different between them. In addition, neither one of the peer countries was a member of the European Union. A striking difference, however, was present in their sectoral employment shares and sectoral productivities. Turkey had a much larger share of employment in agriculture in 1960 and the decline in this share was much slower compared to its peers.

These observations steered us towards examining the growth experience of Turkey through the lens of a multi-sectoral model. Our results indicate that the main reason behind Turkey's relative stagnation was its low

agricultural productivity growth. While this result may not be surprising given the large differences in agricultural productivity levels across these countries, it transforms the focus of the investigation, for Turkey, into policies that have different effects across sectors and across time. We provide some evidence that policies that discriminated against agriculture deserve special attention for understanding the low productivity growth in the Turkish agricultural sector.

Figure 1 shows the GDP per capita in Turkey and in a set of European countries, relative to the GDP per capita in the U.S. between 1950 and 2008. Comparing the growth experience of these countries relative to the U.S. highlights the difference between countries who caught up with the U.S. versus countries who did not. We divide the European countries into two sub groups: “Europe 1” (Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Sweden, Switzerland, and the United Kingdom) and “Europe 2” (Greece, Portugal, and Spain).

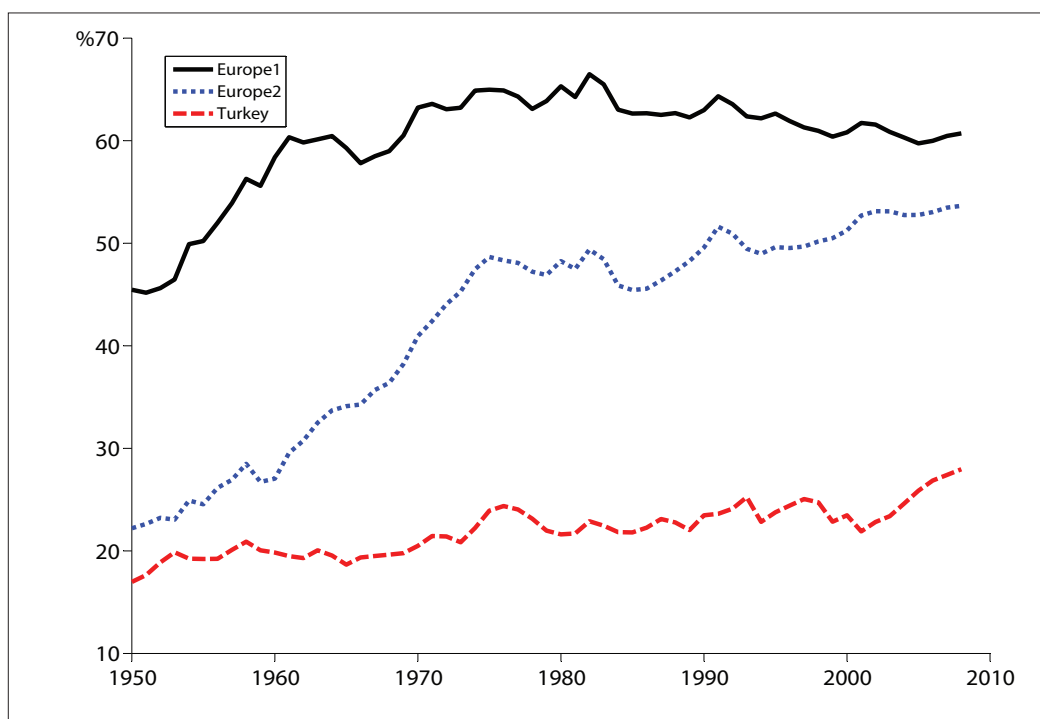


Figure 1: GDP per Capita Relative to the U.S.

Relative income in “Europe 1” started at 45% of the U.S. level in 1950, reached 66% in 1982, and then fluctuated around 60% after that. Relative income in “Europe 2” was 22% of the U.S. level in 1950 and ended up at 54% in 2008. Turkish GDP per capita started at 17% of the U.S. level in 1950 and ended up at only 28% in 2008. Since per capita GDP relative to the U.S. in the second set of European countries was similar to that in Turkey in the 1950s, we define them as a relevant peer group for Turkey.¹ This set of European countries had caught up significantly with the U.S. by the mid-1970s while Turkey had remained relatively stagnant. Consequently, the divergence in the Turkish GDP per capita relative to its peers took place mainly before the mid-1970s. In particular, Turkish GDP per capita declined from 73% of its peers in 1960 to 50% in 1977 and stayed around 47% in the 1980s and 1990s.

Before mid-1970s Turkey had enjoyed high growth rates relative to its own historical averages. For example, between 1960 and 1977, the growth rate of per capita GDP was 3.8% compared to 1.6% between 1977 and 2001. Examining the Turkish data in isolation led many observers to identify the period before the mid-1970s as a successful growth episode. In fact some analysts had even attributed the “high” growth rates in this period to be a consequence of the state-led importsubstitution strategy.² Our analysis, however, identifies 1960 to 1976 as the period where Turkey fell behind its peers.

Examining the sectoral data reveals that while GDP per capita in Turkey was similar to its peers in 1960, there were significant differences in the sectoral allocation of labor between them. In 1960, the share of employment in agriculture was 76% in Turkey, 57% in Greece, 44% in Portugal, and 42% in Spain. The rate of de-agriculturalization was also very different between these countries. While all countries experienced a decline in the share of agriculture over time it was much slower in Turkey compared to its peers. By 2008, the share of employment in agriculture had fallen to 24% in Turkey, 11% in Greece, 12% in Portugal, and 4% in Spain.³

¹ Data are from the Conference Board, *Total Economy Database*. In addition to similar per capita GDP levels and geographical proximity, certain institutional setups such as the civil and penal codes were also comparable across these countries.

² See, for example, Çeçen, Doğruel, and Doğruel (1994), and Günçavdı, Bleaney, and McKay (1999).

³ The data are from the OECD *Employment and Labor Market Statistics*.

In this paper we use a two-sector model to examine the reasons behind the slow de-agriculturalization, and increased divergence of income per capita in Turkey relative to its peers.⁴ In our model, labor allocation between sectors is driven by the differences in sectoral productivity growth rates as well as the income effect of non-homothetic preferences. We calibrate the preference parameters of the model to Spain, the peer country with the fastest growth, between 1968 and 2005. We use this framework to examine the role of sectoral productivity growth rates in generating differences in sectoral allocations over time between these two countries. We investigate if it is low productivity in agriculture or industry (or both) that is responsible for the slow de-agriculturalization and the low overall productivity in Turkey.⁵ We conduct a counterfactual experiment in which we equip Turkey with either the agricultural or the industrial productivity growth from Spain starting in 1968. Our results indicate that if Turkey had inherited Spanish agricultural productivity growth from 1968 to 2005, de-agriculturalization would have been much faster and the growth rate of aggregate GDP per capita would have been much higher. Inheriting Spanish industrial productivities, on the other hand, would not have contributed to the growth experience. Our findings reveal that Turkey would not have fallen behind its peers had it inherited the Spanish productivity growth in agriculture during the 1960s and 1970s. Similar results are obtained where sectoral productivity data from several other European countries are used in the counterfactual experiment.

This result is due to the fact that while Turkish productivity growth was lagging behind its peers in both sectors, it was particularly worse in agriculture. Our results provide support for the general finding in this

⁴ Our framework is similar to Adamopoulos and Akyol (2009) and our results fit well with the recent literature on models of sectoral transformation that highlights the importance of agriculture, such as Gollin, Parente, and Rogerson (2002, 2004, 2007); Restuccia, Yang, and Zhu (2008); and Lagakos and Waugh (2011).

⁵ Gollin (2009) provides a detailed survey of theories related to the role of agriculture in economic growth. He summarizes some of the debate in economic history such as whether or not agricultural productivity improvements preceded the industrial revolution and whether government assistance should prioritize agricultural development or industrial development. There is still a debate on whether the structural transformation is achieved by increases in productivity in the industrial sector, which pulls employment out of the agricultural sector, or increases in productivity in the agricultural sector, which pushes employment out of agriculture to the industry (see Alvarez-Cuadrado and Poschke (2011) and the references therein).

literature where agricultural productivity growth plays a key role in the lack of catch up in relative incomes across countries. For the case of Turkey, however, most of the recent attention has been on the role of institutions, low human capital, and flawed macroeconomic policies in hampering growth.⁶

Our results may help refocus the attention to policies that have different effects across sectors and across time. We show some preliminary evidence that indirect policies such as import substitution and overvalued exchange rates that discriminated against agriculture in Turkey may have hampered the efficient use of intermediate inputs, resulting in lower agricultural productivity. A more systematic study of how agricultural policies, like those discussed in Krueger (1974), Olgun (1991) or Olgun and Kasnakoğlu (1989), among others, affect economic growth is left for future research.

Like many models in this literature, our model assumes that average wages per worker are equated across sectors. This is not the case in many developing countries, as pointed out by Gollin, Lagakos and Waugh (2012). The literature has come up with two basic explanations for this puzzle: lower human capital levels and/or hours in non-agriculture; and serious mis-measurement issues in value added in agriculture. However, none of these explanations has proven entirely satisfactory. Gollin, Lagakos and Waugh (2012) show that, quantitatively, the human capital channel provides at best a partial explanation of the gaps in developing countries. Herrendorf and Schoellman (2011) come to a similar conclusion about the role of human capital using data for the United States and report that mis-measurement issues in agriculture are very important. However, Gollin, Lagakos and Waugh (2012) argue that even after taking all these measurement issues into consideration, a large agricultural productivity gap remains. We leave more comprehensive work in examining why incomes are not equated across sectors in Turkey for future research.

The rest of the paper is organized as follows. Section 2 introduces the two-sector model and Section 3 provides the results. Section 4 concludes.

⁶ See, for example, Altuğ, Filiztekin, and Pamuk (2008).

2 A Two-Sector Model

There has been a recent growing interest in multi-sector general equilibrium models to understand the sources of the structural transformation of production and to quantify the impact of the shift in resources across the sectors on aggregate growth and productivity. These studies utilize two (agriculture and non-agriculture) or three (agriculture, industry, and services) sector models and rely on two types of forces to generate the structural transformation observed in the data. The first type of models, such as Baumol (1967) and Ngai and Pissarides (2007) view the structural transformation as a supply-side phenomenon based on the sectoral differences in productivity growth. The second type of models views the structural transformation as a demand-side phenomenon based on the sectoral differences in income elasticities of demand (see, for example, Kongsamut, Rebelo, and Xie (2001)). There are also some models, known as hybrid models, that combine two types of channels (see, for example, Duarte and Restuccia (2010) and Rogerson (2008)).⁷

Our model is based on a hybrid model of structural change, in which the re-allocation of economic activity between agriculture and nonagriculture is driven by non-homothetic preferences and differences in sectoral productivity growth rates. Specifically, we study a two-sector closed economy model to understand the role of sectoral productivity changes on the structural transformation of Turkey combined with the Engel's law of demand.^{8,9}

⁷ See also Acemoğlu and Guerrieri (2008), Alvarez-Cuadrado and Poschke (2011), Buera and Kaboski (2009), Echevarria (1995, 1997), and Gollin, Parente, and Rogerson (2002, 2004, 2007) and the references therein for recent studies of structural transformation.

⁸ Closed economy abstraction is quite reasonable especially until the 1980s where Turkey followed an import substitution policy. The average ratio of imports to GNP between 1960 and 1977 is 7%. After the 1980s, there is a significant and consistent increase in the share of imports in GNP, with an average of 19.5% between 1977 and 2006.

⁹ Strictly speaking, Engel's law refers to low income elasticity of demand for agricultural good. Historically, increasing per-capita incomes were not only associated with a strong decline in the employment share in agriculture but also with a strongly declining budget share for food, the latter relationship being known as Engel's law. In this paper we use it to refer to structural change driven by nonlinear income effects that influence demand for agricultural good (see, for example, Foellmi and Zweimüller (2008) and İşcan (2010)).

2.1 Technology

At each date t , there are two sectors, agriculture (A) and industry (I). The industrial sector, in this section, is more properly thought of as the non-agricultural sector. It incorporates both services and manufacturing.¹⁰ The production function for sector $j=A,I$ is given by:

$$Y_{j,t} = \theta_{j,t} N_{j,t}, \quad (1)$$

where $Y_{j,t}$ is the output of sector j , $N_{j,t}$ is labor allocated to production, and $\theta_{j,t}$ is sector j 's labor productivity at date t . We assume that labor is fully mobile across sectors and the wage rate in the economy is given by:

$$\omega_t = \theta_{j,t} p_{j,t}, \quad (2)$$

where $p_{j,t}$ is the price of good- j and ω_t is the wage-rate in the economy at date t . Given the absence of any distortions, relative prices reflect relative productivities in this economy, i.e., $p_{I,t}/p_{A,t} = \theta_{A,t}/\theta_{I,t}$. Since we abstract from capital and fixed factors in production, differences in labor productivity implicitly incorporate differences due to capital as well as due to technology adoption, regulation, etc. across sectors.

2.2 Household's Problem

The economy is populated by an infinitely-lived representative household. Population is constant and normalized to one. Preferences are described by a period utility function given by:

$$U(C_t) = \log(C_t). \quad (3)$$

¹⁰ Our findings extend to a three-sector model for Turkey that separately examines agriculture, manufacturing, and services (see Duarte and Restuccia (2010) for a general equilibrium model of structural transformation with three sectors).

C_t is a composite consumption good derived from the agricultural, A_t , and non-agricultural consumption, I_t , via a CES aggregator:

$$C_t = (\gamma_A^{1/\eta} (A_t - \bar{A})^{(\eta-1)/\eta} + \gamma_I^{1/\eta} I_t^{(\eta-1)/\eta})^{\eta/(\eta-1)}.$$

The parameter $\bar{A}$ represents the subsistence level of agricultural good consumption and satisfies at each date t :

$$\theta_{A,t} > \bar{A} > 0. \quad (4)$$

The first inequality states that the economy's agricultural sector is productive enough to provide the subsistence level of food to all households (see Matsuyama 1992). The second inequality implies that preferences are non-homothetic and the income elasticity of demand for the agricultural good is less than unity. It is also assumed that the representative household has enough income to purchase more than $\bar{A}$ units of agricultural good. The weight γ_j influences how consumption expenditure is allocated between the two sectors, with $\gamma_A, \gamma_I > 0$, and $\gamma_A + \gamma_I = 1$.

The parameter $\eta > 0$ is the (constant) elasticity of substitution between agricultural and industrial goods and it underlies the magnitudes of price responses to quantity adjustments. A lower substitution elasticity implies that sharper price changes are needed to accommodate a given change in quantities consumed. If η approaches 1, preferences over the two goods approach a Cobb-Douglas so that the substitution effect vanishes regardless of the magnitude of the differences between sectoral productivities.

We assume that the household is endowed with one unit of productive time in each period that it supplies inelastically to the market. At each date, the household chooses consumption of each good to maximize its lifetime utility subject to the budget constraint:

$$p_{A,t} A_t + p_{I,t} I_t = 1, \quad (5)$$

taking prices as given. The demand for labor must equal the exogenous labor supply at every date:

$$N_{A,t} + N_{I,t} = 1. \quad (6)$$

Since there is no international trade or capital accumulation, the following conditions hold at each date, implying that the market must clear for each good produced:

$$A_t = Y_{A,t}, \quad I_t = Y_{I,t}. \quad (7)$$

2.3 Equilibrium

A competitive equilibrium consists of consumption decisions $\{A_t, I_t\}$ of the households, factor allocations $\{N_{A,t}, N_{I,t}\}$, sectoral output decisions $\{Y_{A,t}, Y_{I,t}\}$ of the firm, and prices $\{p_{A,t}, p_{I,t}\}$ such that given prices, the firm's allocations solve its profit maximization problem, the household's allocations solve the household's utility maximization problem, and all product and factor markets clear.

One can combine the first-order conditions for the household maximization problem with the market-clearing conditions to obtain the following equation that explicitly characterizes the equilibrium employment share in agriculture:

$$N_{A,t} = \left(\frac{Y_A \theta_{A,t}^{\eta-1}}{Y_A \theta_{A,t}^{\eta-1} + Y_I \theta_{I,t}^{\eta-1}} \right) + \left(\frac{Y_I \theta_{I,t}^{\eta-1}}{Y_A \theta_{A,t}^{\eta-1} + Y_I \theta_{I,t}^{\eta-1}} \right) \frac{\bar{A}}{\theta_{A,t}}. \quad (8)$$

The equilibrium employment share in the industrial sector is given by:

$$N_{I,t} = 1 - N_{A,t}. \quad (9)$$

2.4 Calibration

Our main calibration target is to match the sectoral employment shares in Turkey in 1968. Once we have those shares, we equip the model with the sectoral productivity levels for each year in Turkey, using Turkish productivity data, until 2005.

Our counterfactual experiments involve comparing sectoral productivity growth rates between Turkey and Spain. As argued in Duarte and Restuccia (2010), the lack of PPP adjusted sectoral output data across countries necessitates a method to determine relative productivity differences between two countries.

In order to focus on the role of productivity differences in explaining sectoral transformation, we assume that preference parameters are invariant across countries. Therefore, we set γ_A and η to match the secular decline in agriculture in Spain between 1968 and 2005. We experiment with different γ_A and η values: $\gamma_A = 0.04$ and $\eta = 0.5$ so that the goods are complements, and $\gamma_A = 0.01$ and $\eta = 1.5$ so that the goods are substitutes. Since η determines the amount of substitution among different goods, it dictates the amount of labor that will be reallocated to the non-agricultural sector in response to uneven changes in productivity growth.

We normalize the level of productivity in each sector to one for 1968 in Spain and set $\bar{A}$ to match the share of employment in agriculture in Spain in 1968 based on:

$$\bar{A} = (N_{A, 1968} - \gamma_A) / (1 - \gamma_A). \quad (10)$$

We follow Duarte and Restuccia (2010) and set the level of productivity in Turkey in 1968 for both sectors ($\theta_{A, 1968}$ and $\theta_{N, 1968}$) such that using γ_A , η and $\bar{A}$ the model economy matches the following two targets: (1) the share of employment in agriculture in Turkey in 1968¹¹ and (2) aggregate labor productivity level in Turkey relative to that of Spain in 1968.¹²

This method results in productivity levels in agriculture and non-agriculture in Turkey to be around 45% and 65%, respectively, of Spanish productivity levels in 1968. Once we have the initial productivity levels for each country we use data on sectoral labor productivity growth rates given in local currencies to obtain the time paths of sectoral productivities for the sample period for both countries.¹³

¹¹ Therefore matching the share of employment in non-agriculture as well.

¹² We use the Conference Board, Total Economy Database to get the aggregate labor productivity relative to Turkey and Spain in 1968. We use the series of labor productivity per person engaged in 1990 US\$ (converted at Geary Khamis PPPs). The implied aggregate productivity ratio between Turkey and Spain in 1968 was 0.5261.

¹³ Sectoral value added (measured in constant prices in Euros) and employment data for Spain are obtained from the Groningen Growth and Development Centre (GGDC) 10-sector database (see Timmer and de Vries (2007)). We use GDP by kind of economic activity in constant prices and employment by kind of economic activity to derive labor productivity series for Turkey between 1968 and 2005. Turkish data are from the Turkish Statistical Institute and the OECD Employment and Labor Market Statistics. All time series are de-trended using the Hodrick-Prescott filter with a smoothing parameter of 6.25 for annual data before any ratios are computed (see Ravn and Uhlig (2002)).

3 Results

We start this section by discussing our key findings. Next, we examine the properties of our model economy in more detail and conduct several sensitivity analyses.

3.1 Key Findings

In Figure 2, we display the agricultural and non-agricultural employment shares that are generated by the model economy against their data counterparts in Turkey. Two observations stand out. First, the model captures the secular decline in the share of employment in agriculture reasonably well. Second, η plays a quantitatively insignificant role on the share of employment in each sector. The results with $\eta = 0.5$ and $\eta = 1.5$ are very similar. This finding indicates that labor allocation is mainly determined by increases in productivity in the agricultural sector during this time period in Turkey.

We use this framework to investigate the role of productivity growth in agriculture versus non-agriculture in impacting the speed of de-agriculturalization in Turkey. We ask what would have happened to the share of employment in the two sectors and the overall GDP per worker if Turkey had inherited Spanish productivity growth rates starting in 1968. More importantly, we are interested in finding out if inheriting sectoral productivity growth rates in both sectors or in one of them in particular would have put the Turkish economy in a significantly different growth path. In the following counterfactual experiment, we allow Turkey to inherit productivity growth rates of Spain starting in 1968 in each sector one at a time.

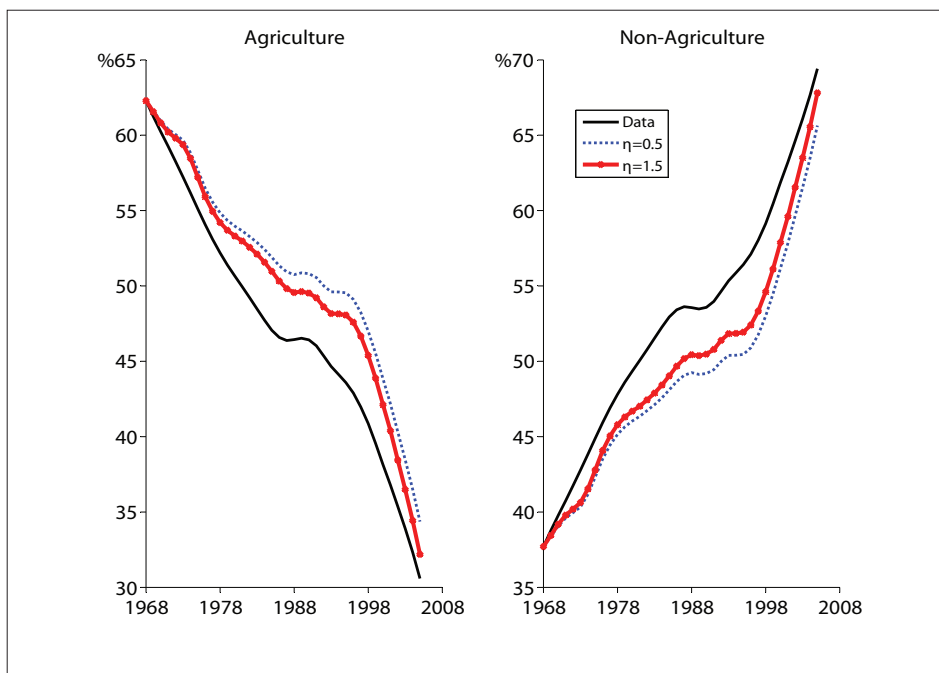


Figure 2: Benchmark

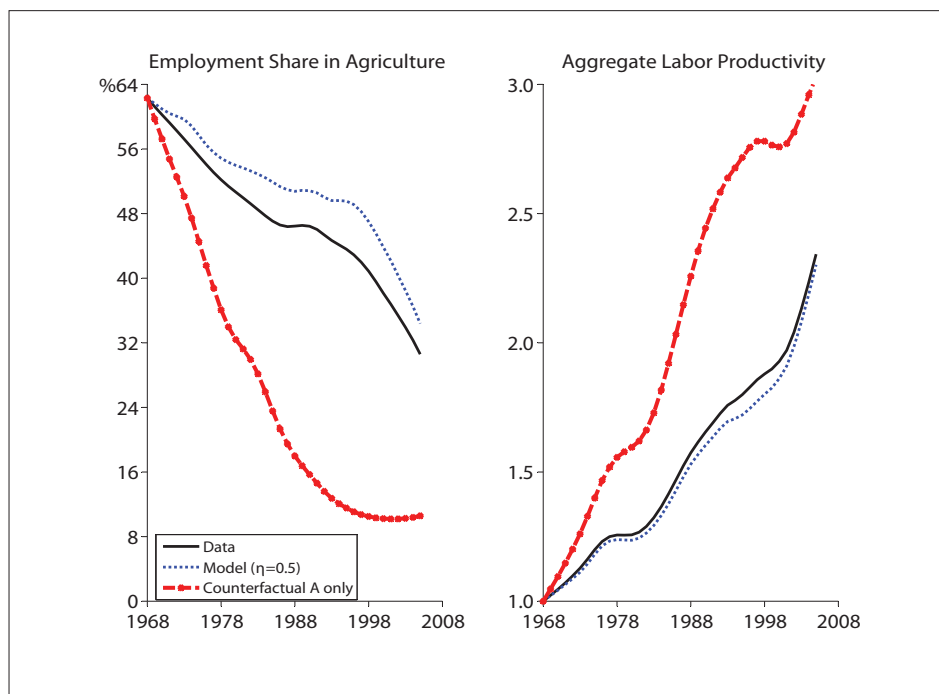


Figure 3: Role of Agriculture

Figure 3 shows the share of employment in agriculture and the GDP per worker that is obtained under the first counterfactual experiment where we only use the agricultural productivity growth from Spain and keep the non-agricultural productivity growth as it is in the benchmark. Compared to the benchmark results, this counterfactual experiment generates a much faster de-agriculturalization and a higher growth in overall productivity. By 2005, the share of employment in agriculture falls to around 10% and aggregate labor productivity is about three times its 1968 level.

A more interesting point emerges, however, when we compare the results from this counterfactual experiment with those from using sectoral productivities for both sectors from Spain. Comparing the series labeled “Counterfactual A only” to the series “Counterfactual A&I” where both productivities are taken from the Spanish data in Figure 4 reveals the importance of the agricultural sector in driving the results. In particular, the fast decline in the share of employment in agriculture and the high growth in aggregate labor productivity are accomplished by feeding in the agricultural productivities alone.

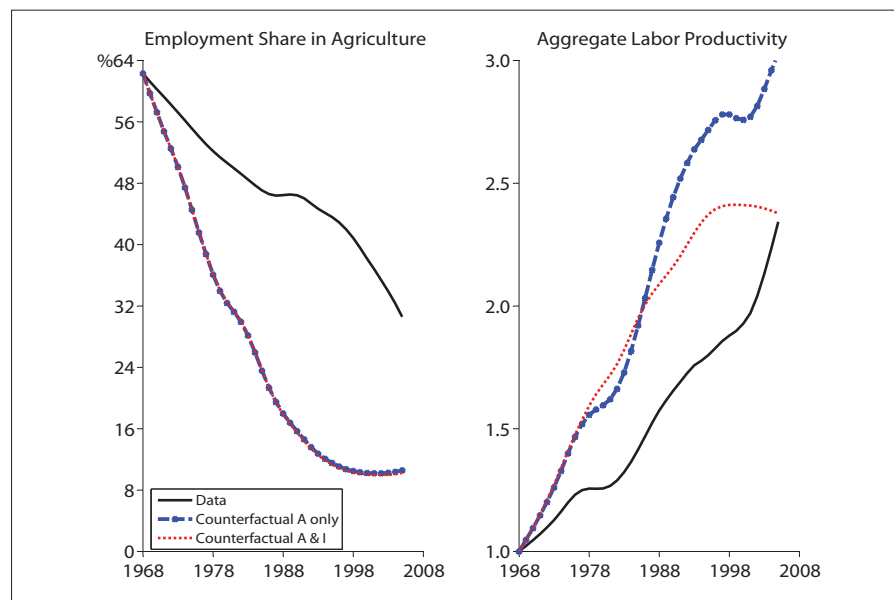


Figure 4: Role of Agriculture versus Non-agriculture

In the first panel of Figure 4, the employment share in agriculture implied by both counterfactual experiments coincide. This is due to the fact that, first, differences in growth rates in the industrial sector between Turkey and Spain are not very large, and second, their impact in equation (8) is

small. The period from 1968 to the late 1970s, when Turkey was falling behind its peers, displays significantly higher growth in labor productivity that comes entirely from productivity growth in the agricultural sector. These results are nearly identical for the $\eta = 1.5$ case.

Figure 5 shows the data as well as the model simulations for GDP per worker in Turkey relative to GDP per worker in Spain between 1968 and 2005. The series labeled “Data” shows the relative stagnation of Turkey as its per worker GDP declines from 53% of Spanish levels in 1968 to 46% in 1984. Our benchmark simulations capture this relative stagnation fairly well. Results for the counterfactual experiment when Turkey inherits Spanish agricultural growth is depicted in the series labeled “Counterfactual A only”. According to this experiment, relative GDP per worker in Turkey would have increased steadily from 53% of Spanish levels in 1968 to 61% by 1984. We also report results of the counterfactual experiment where Spanish productivity growth in both sectors are inherited by the Turkish economy. Comparison of the two counterfactual experiments reveals that the role of productivity growth in industry would have been minimal in the earlier period and detrimental in the later period. These results confirm our earlier conclusion that lack of growth in agricultural productivity was the main culprit for the relative stagnation of Turkey.

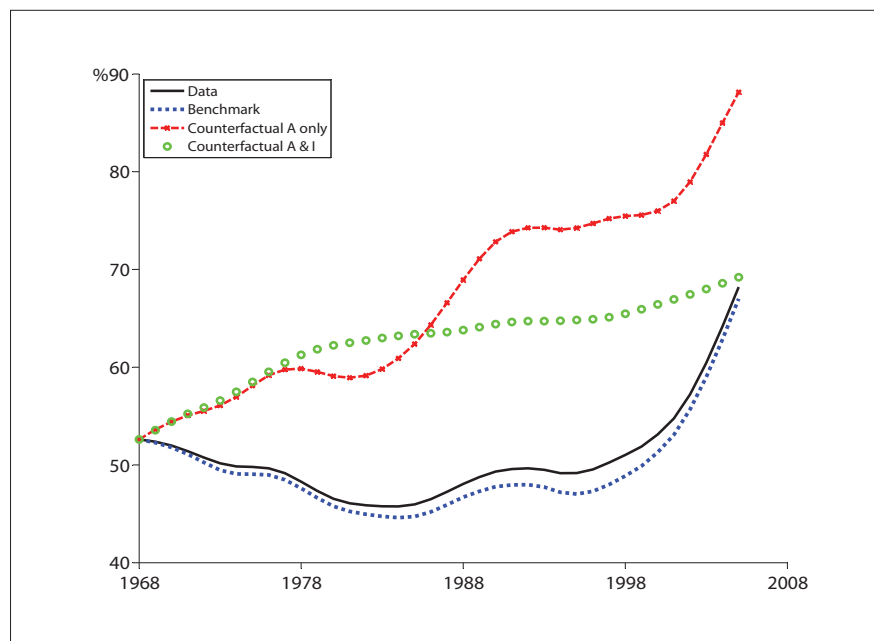


Figure 5: Convergence

Our results suggest that labor allocation to agriculture is mainly driven by agricultural productivity or the “push” channel. These findings are consistent with the recent literature. For example, Alvarez-Cuadrado and Poschke (2011) state that productivity improvements in the non-agricultural sector (the “pull” channel) were the main driver of structural change before 1960 for a large set of countries.¹⁴ After that, the evidence indicates productivity changes in agriculture as the driver of this change. In other words, their results suggest that the “pull” channel dominates the earlier stages of de-agriculturalization, while the “push” channel dominates the later periods. These results are in line with our findings for Turkey between 1968 and 2005.

3.2 An Extension

In this extension, we investigate one channel through which productivity in general and agricultural productivity in particular might have been adversely affected in Turkey. Between 1960 and 1980, import substitution was the official development strategy in Turkey. Under this regime, most agricultural products could only be imported by state economic enterprises. Moreover, only these enterprises could import agricultural inputs such as fertilizer and pesticides, often at an overvalued exchange rate. Krueger (1974) studies the growth effects of this regime in Turkey in the 1960s. Focusing on the income gap between Turkey and its European neighbors, Krueger (1974) conducts several counterfactual experiments to investigate the growth rate that could have been achieved under alternative policies instead of the quantitative-restriction and the import-substitution regime that was present in Turkey. Krueger’s econometric analysis suggests that “alternative strategies could have resulted in significant increases in the rate of growth of manufacturing output and value-added at both Turkish and international prices, reduced import requirements for both new investment and for intermediate goods, a reduced incremental capital-output ratio, and greatly increased employment opportunities for the same level of investment.” (Krueger 1974, Chapter 9).

¹⁴ Alvarez-Cuadrado and Poschke (2011) study the de-agriculturalization in 12 industrialized countries since the 19th century. The countries are Belgium, Canada, Finland, France, Germany, Japan, the Netherlands, South Korea, Spain, Sweden, the United Kingdom, and the United States.

Krueger, Schiff, and Valdes (1988) use a measure called the relative rate of assistance (RRA) to quantify the impact of sector-specific and economy wide policies on agricultural incentives. Anderson and Valenzuela (2008) provide data on estimates of (RRA) for 75 countries from 1955 to 2008.¹⁵ These estimates attempt to capture the entire array of governmental policies that affect agricultural incomes relative to what they would be in the presence of a free market system. Policies considered include direct interventions to agricultural prices (price setting by the government, subsidies to inputs, policies affecting the costs of transportation and marketing). Indirect interventions are the ones that affect the prices of agricultural tradables relative to non-tradables through their impact on the real exchange rate or to other tradables as a result of industrial protection or import substitution policies. These policies affect production incentives by making agriculture more or less attractive than other sectors of the economy. Using this data set, Dennis and İşcan (2011) find that the rates of both structural change and productivity growth in agriculture have been very slow in countries that discriminated against their agricultural sector.

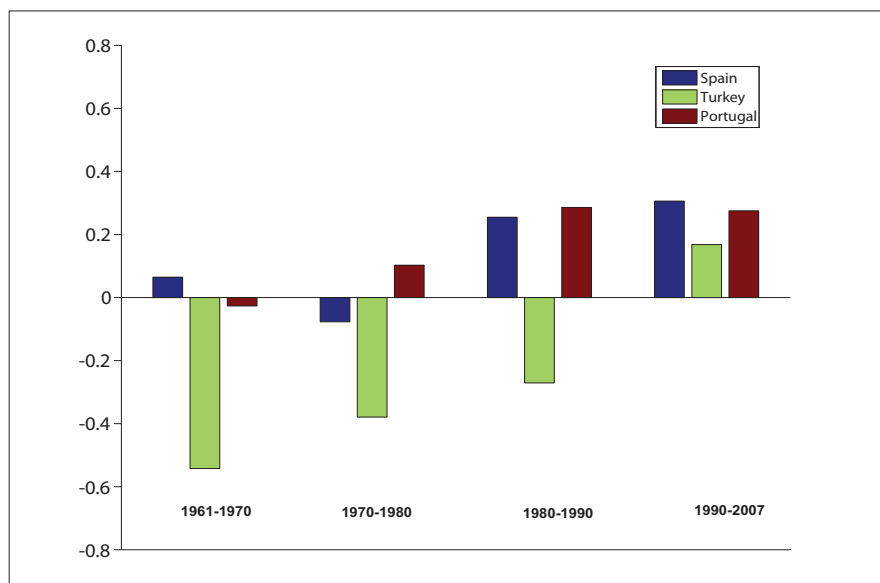


Figure 6: Relative Distortion

¹⁵ RRA is defined as $\frac{1 + NR_{ag}}{1 + NR_{non-ag}} - 1$ where NR_{ag} is the nominal rate of assistance to agriculture and NR_{non-ag} is the nominal rate of assistance to non-agriculture. There is no data for Greece.

Krueger, Schiff, and Valdes (1988) show that government policies regarding agriculture have adversely affected agricultural incentives in developing countries where the bulk of the discrimination was due to indirect price interventions. Among the eighteen developing countries examined, indirect taxation and tax due to industrial protection were highest in Turkey. The average reduction in farm prices relative to nonfarm prices because of the indirect interventions was 37% in Turkey while direct policies were subsidizing agriculture at a rate of 5.3% between 1961 and 1983.¹⁶

Figure 6 provides data on the relative rate of assistance to agriculture for Spain, Portugal, and Turkey obtained from Anderson and Valenzuela (2008). Turkey exhibits high but declining levels of discrimination against agriculture until the 1990s while the rest of the countries exhibit varying degrees of protection to agriculture.

One way to incorporate the measure of RRA into the two-sector model of the previous section is to assume that low output prices discourage the application of intermediate inputs that are needed for the production of the agricultural good. This is a simplification of the impact of RRA where inefficiencies created by subsidizing one good versus the other are much more complicated. Nevertheless, we proceed with this interpretation to see the potential quantitative impact of this measure on agricultural productivity in Turkey. We use a version of the model in Restuccia, Yang, and Zhu (2008) that incorporates the impact of distortions to intermediate goods on agricultural productivity.

In particular, we make one change in the previous model and assume a different production function in the agricultural sector given by:

$$Y_{A,t} = X_t^\alpha (\theta_{A,t} N_{A,t})^{1-\alpha}, \quad (11)$$

where X_t is the intermediate input used in the production of the agricultural good $Y_{A,t}$ and α is the intermediate-input elasticity of output in agriculture. This intermediate input may consist of chemical fertilizers, pesticides, hybrid seeds, fuel, energy, and other purchased factors. Restuccia,

¹⁶ Krueger (1992) argues that in Turkey, agricultural producers associations were influential in affecting direct interventions but were virtually voiceless in affecting trade and exchange rate policies.

Yang, and Zhu (2008) introduce a distortion that requires one unit of non-agricultural output to produce $1/\pi_t$ units of X_t . Therefore, a low value of π_t implies high efficiency of producing the input. With this formulation in competitive factor and output markets, π_t is the price of intermediate inputs relative to non-agricultural goods.

In this setup, the representative farmer maximizes profits by choosing labor inputs and the use of the intermediate input:

$$\max \quad p_{A,t} X_t^\alpha (\theta_{A,t} N_{A,t})^{1-\alpha} - \pi_t X_t - \omega_t N_{A,t}, \quad (12)$$

where $p_{A,t}$ is the price of agricultural goods relative to non-agricultural goods; thus, the price of non-agricultural goods is treated as the numeraire. The solution to this problem yields the following first-order conditions:

$$\frac{X_t}{Y_{A,t}} = \frac{\alpha p_{A,t}}{\pi_t}, \quad (13)$$

and

$$p_{A,t} (1 - \alpha) \frac{Y_{A,t}}{N_{A,t}} = \omega_t = \theta_{i,t}. \quad (14)$$

The intensity of using intermediate inputs is determined by the elasticity of output to intermediate inputs, α , and by the price of the agricultural good relative to the cost of intermediate inputs. We only consider direct barriers in the market for intermediate inputs X_t that increase π_t , the resource cost of converting non-agricultural output into X_t . A high value of π_t represents a high level of direct barriers confronting farmers in using the technical input.¹⁷ The production function in the non-agricultural sector and the utility function are the same as in the previous section.

To examine changes in productivity over time in Turkey, we focus on four key variables of the competitive equilibrium: the intermediate input ratio $X_t / Y_{A,t}$, the share of employment in agriculture $N_{A,t}$, labor productivity in agriculture $Y_{A,t} / N_{A,t}$, and aggregate labor productivity Y_t . The agricultural

¹⁷ Restuccia, Yang, and Zhu (2008) also consider labor market distortions that increase the cost of reallocating labor from agriculture to non-agriculture.

production function yields the following decomposition of agricultural final output per worker:

$$\frac{Y_{A,t}}{N_{A,t}} = \theta_{A,t} \left(\frac{X_t}{Y_{A,t}} \right)^{\alpha/(1-\alpha)}. \quad (15)$$

Labor productivity in agriculture depends positively on the intensity of technical input use $X_t / Y_{A,t}$. We can get the following expressions after performing simple algebraic manipulations:

$$\frac{X_t}{Y_{A,t}} = \left[\frac{\alpha}{\pi_t(1-\alpha)} \frac{\theta_{l,t}}{\theta_{A,t}} \right]^{1-\alpha}, \quad (16)$$

and

$$\frac{Y_{A,t}}{N_{A,t}} = \theta_{l,t}^\alpha \theta_{A,t}^{1-\alpha} \left[\frac{\alpha}{\pi_t(1-\alpha)} \right]^\alpha. \quad (17)$$

The consumption allocation equations of the representative household imply:

$$A_t = \bar{A} + \frac{Y_A}{Y_l} p_{A,t}^{-\eta} l_t. \quad (18)$$

Substituting the market-clearing conditions for A_t and l_t into the above equation, we obtain:

$$Y_{A,t} = \bar{A} + \frac{Y_A}{Y_l} p_{A,t}^{-\eta} (Y_{l,t} - \pi_t X_t). \quad (19)$$

Notice that $\pi_t X_t = (\alpha/(1-\alpha)) \theta_{l,t} N_{A,t}$. Now, substituting (14), (15) and (16) into equation (19) we can derive the following equation for the share of employment in agriculture:

$$N_{A,t} = \frac{\bar{A} + \frac{Y_A}{Y_l} \left(\frac{Y_{A,t}}{N_{A,t}} \right)^\eta \left(\frac{1-\alpha}{\theta_{l,t}} \right)^\eta \theta_{l,t}}{\left(\frac{\alpha \theta_{l,t}}{\pi_t(1-\alpha)} \right)^\alpha (\theta_{A,t})^{1-\alpha} + \frac{Y_A}{Y_l} \left(\frac{Y_{A,t}}{N_{A,t}} \right)^\eta \left(\frac{1-\alpha}{\theta_{l,t}} \right)^{\eta-1}}. \quad (20)$$

If the benchmark economy for Turkey incorporates distortions, then it must be the case that the observed labor productivity, $Y_{A,t}/N_{A,t}$, is a result of an unobserved $\theta_{A,t}$ and exogenously taken π_t . We solve equation (17) for $\theta_{A,t}$ that, together with π_t , results in the observed $Y_{A,t}/N_{A,t}$. Other than this modification, we follow the procedure outlined in the previous calibration exercise to conduct this counterfactual experiment where $\eta = 0.5$, $\gamma_A = 0.04$, and $\alpha = 0.5$. We solve equation (20) for the employment share in agriculture.

3.2.1 Results

In this section, we assume that Spain has no distortions in the use of intermediate inputs ($\pi_t = 1$); while π_t in Turkey is set to 1.36 between 1968 and 1980, 1.25 until 1990, and 1.0 afterwards. These numbers reflect the period averages of relative distortions capturing the existence of significant but declining distortions on the use of intermediate inputs in the Turkish economy as shown in Figure 6. While the *RRA* discussed in the previous section may not directly correspond to the π_t used to capture the distortions, the purpose of this section is to examine the quantitative implication of a distortion on the economy that mainly affects the use of intermediate inputs. We interpret the size of *RRA* to reflect the potential distortions faced in the agricultural sector.

In this experiment, we are interested in measuring the quantitative impact of the distortions in the use of intermediate inputs on the share of labor in agriculture and productivity in agriculture in Turkey. The first panel in Figure 7 presents the share of employment in agriculture with and without distortions.

The economy is calibrated to start from an employment share of 62% with the distortions since now the benchmark economy has distortions. Setting $\pi_t = 1$ as a counterfactual experiment where distortions are eliminated results in a starting employment share of 54% instead. In other words, the existence of a 36% distortion on the use of intermediate inputs results in a 16% higher share of employment and 14% lower productivity in agriculture.¹⁸

¹⁸ This framework generates the same results for the counterfactual experiment conducted earlier where the lack of productivity in the agricultural sector is shown to be the major determinant of the divergence in income per capita between Turkey and its peers.

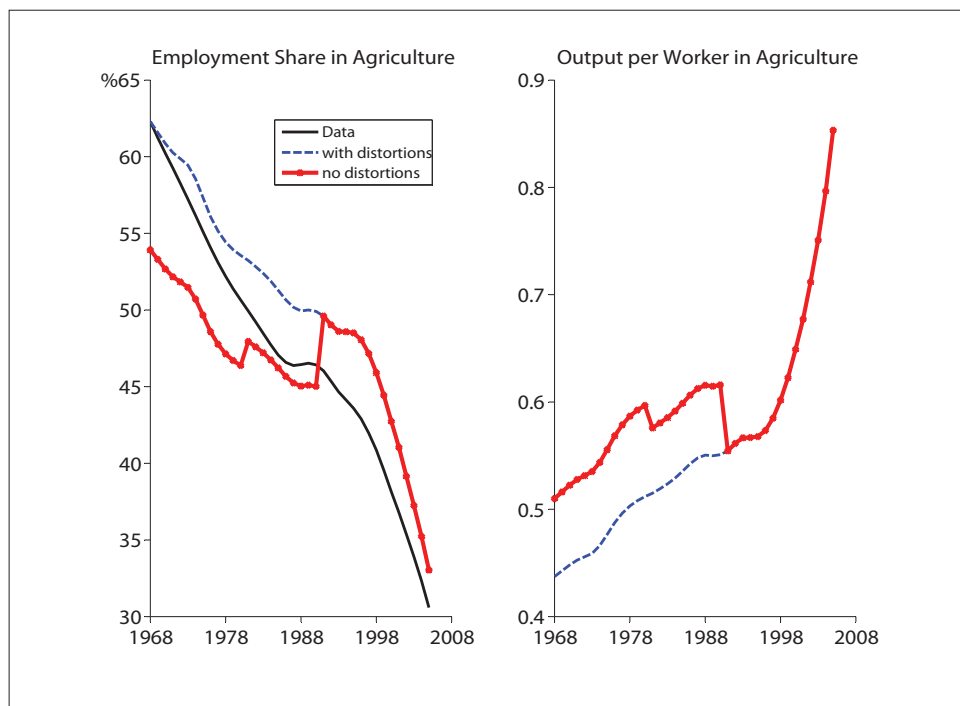


Figure 7: Role of Distortions

This is a stylized experiment that does not model all the complicated features of the agricultural policies that were followed in Turkey. However, it demonstrates that policies that discriminated against agriculture indirectly can have important quantitative effects. A more detailed study of these policies is left for future research.

4 Conclusions

This paper examines the growth experience of Turkey through the lens of a multi-sectoral model. We compare the Turkish experience with countries that we identify as its peers: Greece, Portugal, and Spain. All of these countries had similar levels of per capita GDP in 1950. However, Turkish GDP per capita fell behind its peers during the 1960s and 1970s. These countries shared similar political turmoil during this period. There were at least three military coups in Turkey (1960, 1971, and 1980), Greece had a military junta between 1967 and 1974, Portugal a military coup in 1974 and its first free elections in 1975, while Spain ended the Franco regime in 1975. Neither one of the countries were yet a member

of the European Union. Greece joined the European Union in 1981, while Spain and Portugal in 1986. Growth rate of per capita GDP in all these countries were high relative to their historical standards during the 1960s and 1970s. However, the growth rate of the Turkish economy was about half that of its peers. Consequently, Turkey experienced a decline in living standards relative to its peers in this period.

Using a two-sector model, we show that low agricultural productivity in Turkey accounts for the increased income gap between Turkey and its peers in the 1960s and 1970s. Our results indicate that if Turkey could have experienced the Spanish productivity growth in agriculture, the peer country with the fastest growth rate, the share of employment in agriculture would have declined much more rapidly and the overall per capita GDP would have increased more dramatically. We argue that policies that discriminated against agriculture deserve special attention for understanding the lack of convergence in the Turkish economy. Our results may help refocus the attention to policies that have different effects across sectors and across time.

References

1. **Acemoğlu, Daron, and Veronica Guerrieri.** 2008. "Capital Deepening and Non-Balanced Economic Growth." *Journal of Political Economy*, 116(3): 467-98.
2. **Acemoğlu, Daron, Simon Johnson, and James A. Robinson.** 2001. "The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review*, 91(5): 1369–1401.
3. **Adamopoulos, Tasso, and Ahmet Akyol.** 2009. "Relative Underperformance *Alla Turca*." *Review of Economic Dynamics*, 12(4): 697-717.
4. **Alvarez-Cuadrado, Francisco, and Markus Poschke.** 2011. "Structural Change Out of Agriculture: Labor Push versus Labor Pull." *American Economic Journal: Macroeconomics*, 3(3): 127-58.
5. **Anderson, Kym, and Ernesto Valenzuela.** 2008. "Estimates of Global Distortions to Agricultural Incentives, 1955 to 2007." World Bank, Washington D.C. <http://www.worldbank.org/agdistortions>
6. **Altuğ, Sumru G., Alpay Filiztekin, and Şevket Pamuk.** 2008. "Sources of Long-Term Economic Growth for Turkey, 1880-2005." *European Review of Economic History*, 12(3): 393-430.
7. **Barro, Robert J.** 1999. "Determinants of Democracy." *Journal of Political Economy*, 107(S6): S158-S183.
8. **Baumol, William J.** 1967. "Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis." *American Economic Review*, 57(3): 415-26.
9. **Buera, Francisco J., and Joseph P. Kaboski.** 2009. "Can Traditional Theories of Structural Change Fit the Data?" *Journal of the European Economic Association*, 7(2-3): 469-77.
10. **Çeçen, A. Aydın, A. Suut Doğruel, and Fatma Doğruel.** 1994. "Economic Growth and Structural Change in Turkey 1960-88." *International Journal of Middle East Studies*, 26(1): 37-56.

11. **Dennis, Benjamin N., and Talan İşcan.** 2011. "Agricultural Distortions, Structural Change, and Economic Growth: A Cross Country Analysis." *American Journal of Agricultural Economics*, 93(3): 885-905.
12. **Duarte, Margarida, and Diego Restuccia.** 2010. "The Role of the Structural Transformation in Aggregate Productivity." *Quarterly Journal of Economics*, 125(1): 129–73.
13. **Echevarria, Cristina.** 1995. "Agricultural Development vs. Industrialization: Effects of Trade." *Canadian Journal of Economics*, 28(3): 631-47.
14. **Echevarria, Cristina.** 1997. "Changes in Sectoral Composition Associated with Economic Growth." *International Economic Review*, 38(2): 431-52.
15. **Foellmi, Reto, and Josef Zweimüller.** 2008. "Structural Change, Engel's Consumption Cycles and Kaldor's Facts of Economic Growth." *Journal of Monetary Economics*, 55(7): 1317-28.
16. **Glaeser, Edward L., Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Schleifer.** 2004. "Do Institutions Cause Growth?" *Journal of Economic Growth*, 9(3): 271-303.
17. **Gollin, Douglas.** 2009. "Agricultural Productivity and Economic Growth." <http://sites.google.com/site/douglasgollin/doug-gollin/research>
18. **Gollin, Douglas, David Lagakos, and Michael Waugh.** 2012. "The Agricultural Productivity Gap in Developing Countries." <https://sites.google.com/site/davidlagakos/home/research>
19. **Gollin, Douglas, Stephen L. Parente, and Richard Rogerson.** 2002. "The Role of Agriculture in Development." *American Economic Review Papers and Proceedings*, 92(2): 160-64.
20. **Gollin, Douglas, Stephen L. Parente, and Richard Rogerson.** 2004. "Farm Work, Home Work and International Productivity Differences." *Review of Economic Dynamics*, 7(4): 827-50.

21. **Gollin, Douglas, Stephen L. Parente, and Richard Rogerson.** 2007. "The Food Problem and the Evolution of International Income Levels." *Journal of Monetary Economics*, 54(4): 1230-55.
22. **Günçavdı, Öner, Michael Bleaney, and Andrew McKay.** 1999. "The Response of Private Investment to Structural Adjustment – A Case Study of Turkey." *Journal of International Development*, 11(2): 221-39.
23. **Hall, Robert E., and Charles I. Jones.** 1999. "Why Do Some Countries Produce So Much More Output per Worker than Others?" *Quarterly Journal of Economics*, 114(1): 83-116.
24. **Herrendorf, Berthold, and Todd Schoellman.** 2011. "Why is Measured Productivity so Low in Agriculture?" <http://sites.google.com/site/bertholdherrendorf/Home/research-1>
25. **İşcan, Talan B.** 2010. "How Much Can Engel's Law and Baumol's Disease Explain the Rise of Service Employment in the United States?" *The B.E. Journal of Macroeconomics*, 10(1), Article 26.
26. **Kongsamut, Piyabha, Sergio Rebelo, and Danyang Xie.** 2001. "Beyond Balanced Growth." *Review of Economic Studies*, 68(4): 869-82.
27. **Krueger, Anne O.** 1974. *Foreign Trade Regimes and Economic Development: Turkey*. A Special Conference Series on Foreign Trade Regimes and Economic Development. New York: National Bureau of Economic Research. <http://www.nber.org/books/krue74-1>
28. **Krueger, Anne O.** 1992. *The Political Economy of Agricultural Pricing Policy. Volume 5: A Synthesis of the Political Economy in Developing Countries*. Baltimore: Johns Hopkins University Press.
29. **Krueger, Anne O., Maurice Schiff, and Alberto Valdès.** 1988. "Agricultural Incentives in Developing Countries: Measuring the Effect of Sectoral and Economywide Policies." *The World Bank Economic Review*, 2(3): 255-71.
30. **Lagakos, David, and Michael Waugh.** 2011. "Selection, Agriculture, and Cross- Country Productivity Differences." <https://sites.google.com/site/davidlagakos/home/research>

31. **Matsuyama, Kiminori.** 1992. "Agricultural Productivity, Comparative Advantage, and Economic Growth." *Journal of Economic Theory*, 58(2): 317-34.
32. **Ngai, Rachel L., and Christopher A. Pissarides.** 2007. "Structural Change in a Multisector Model of Growth." *American Economic Review*, 97(1): 429-43.
33. **Olgun, Hasan.** 1991. "Turkey." In *The Political Economy of Agricultural Pricing Policy. Volume 3: Africa and the Mediterranean*, ed. In Anne O. Krueger, Maurice Schiff, and Alberto Valdès, 230-67, Baltimore: Johns Hopkins University Press.
34. **Olgun, Hasan, and Haluk Kasnakoglu.** 1989. *Trade, Exchange Rate, and Agricultural Pricing Policies in Turkey*. World Bank, Country Economics Department, Trade Policy Division, Washington, D.C.
35. **Organization for Economic Co-operation and Development (OECD).** 2008. *Employment and Labour Market Statistics Summary Tables*. Paris: OECD.
36. **Ravn, Morten O., and Harald Uhlig.** 2002. "On Adjusting the Hodrick-Prescott Filter for the Frequency of Observations." *Review of Economics and Statistics*, 84(2): 371- 76.
37. **Restuccia, Diego, Dennis Tao Yang, and Xiaodong Zhu.** 2008. "Agriculture and Aggregate Productivity: A Quantitative Cross-Country Analysis." *Journal of Monetary Economics*, 55(2): 234-50.
38. **Rogerson, Richard.** 2008. "Structural Transformation and the Deterioration of European Labor Market Outcomes." *Journal of Political Economy*, 116(2): 235-59.
39. **The Conference Board.** 2009. *Total Economy Database*.
40. **Timmer, Marcel P., and Gaaitzen J. de Vries.** 2007. "A Cross-Country Database For Sectoral Employment And Productivity In Asia And Latin America, 1950- 2005." Groningen Growth and Development Centre Research Memorandum GD-98, Groningen: University of Groningen.

41. Turkish Statistical Institute (TURKSTAT). 2007. *Statistical Indicators, 1923-2006*. Ankara: TURKSTAT.

42. Turkish Statistical Institute (TURKSTAT). 2008. *National Accounts*. Ankara: TURKSTAT. <http://www.turkstat.gov.tr/>

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