

RESEARCH REVIEW

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The Institute for Economic Development (IED) is a research center within Boston University's Department of Economics swfocusing on the economic problems of developing countries.

“TURNOVER AND JOB TRAINING IN DEVELOPING AND DEVELOPED COUNTRIES: EVIDENCE FROM COLOMBIA AND THE UNITED STATES”

Julie Anderson Schaffner

IED Discussion Paper 115, May 2001

Recent research documents that job turnover rates are often much higher in developing countries than in developed countries. This observation suggests the hypothesis that long-lasting employment contracts, which may be required for the economical adoption of high productivity production and personnel practices, are more costly to implement in developing countries. Higher costs of long-term employment contracting may in turn help to explain why labor productivity (and GNP per capita) are so much lower in developing countries than in developed countries, even after controlling for differences across countries in physical capital per worker and in levels of formal education. But empirical evidence of a link between high turnover pressures and low productivity in developing countries relative to developed countries is thus far lacking.

This paper takes a step in the direction of examining the link between turnover pressures and productivity by examining the relationship between turnover and the incidence and cost of an observable practice thought to increase labor productivity: job training. It employs high quality household survey data from Colombia and the United States to shed light on two questions. First, do the economic circumstances underlying higher job turnover rates also result in lower incidence of job training in developing countries? Second, do higher job turnover rates imply higher costs of keeping trained positions filled? Paying careful attention to matters of measurement, weighting, and conditioning, the paper documents that the incidence of post-school formal job training acquired for the current main job is in fact higher in Colombia than in the United States. The paper argues that if high turnover pressures tend to reduce the incidence of training in developing countries relative to developed countries generally, then evidence of the problem should have emerged in this two-country comparison. Thus, the results appear to rule out the sim-

plest route through which higher turnover and training costs might reduce productivity. The paper goes on to document, however, that while male private sector wage employees in Colombia accumulate training experiences at a higher rate over the course of their working lives than their counterparts in the United States, their wages tend to rise more slowly as they age. This result appears robust to attempts to mitigate biases associated with omitted cohort effects and endogenous selection into private sector wage employment. The most compelling interpretation of these patterns is that higher turnover rates cause the value of past job training investments to be eroded more rapidly in Colombia than in the United States. If this is the case, then higher turnover increases the cost of keeping trained positions filled. Because the increased costs take the form of more labor hours (of trainees and trainers) diverted away from directly productive activities toward training activities, they represent reductions in average labor productivity. The paper thus provides empirical evidence of a link between higher turnover pressures and lower labor productivity in developing countries.

“WOMEN’S LEADERSHIP AND POLICY DECISIONS: EVIDENCE FROM A NATIONWIDE RANDOMIZED EXPERIMENT IN INDIA”

Raghavendra Chattopadhyay and Esther Duflo

IED Discussion Paper 114, May 2001

It is becoming almost conventional wisdom nowadays that increasing the political representation of women is a “win-win” proposition. Familiar arguments include the improvement of equity owing to a better representation of women’s needs, increasing levels of efficiency due to women’s (perceived) greater zeal in channeling investment toward child health and education, both of which are recognized as having a significant long run impact upon growth. Historically however, women’s political representation has advanced rather slowly in spite of rapid economic advancement in a large number of countries. One policy

measure that nations are increasingly resorting to in order to increase representation is the reservation of political offices for women candidates. For example, since 1990, ten Latin American countries have passed electoral laws stipulating a requirement that a minimum proportion of candidates be women for all parties. In the context of this policy innovation, an open question is whether different policy preferences of women translate into a different menu of policies or is it the case that institutional factors (for example, women representatives merely acting as proxies for their spouses) dictate the course of policy making?

In this paper, Chattopadhyay and Duflo study the policy consequences of such mandated representation by taking advantage of a unique experiment implemented recently in India: since 1998, a third of all positions of chief of village councils have been reserved for women, and moreover, the reserved councils are selected randomly. The council chief makes decisions about which public goods to provide, and where to provide them. This is especially important given that in 1993, a constitutional amendment gave substantial power to village councils to define and implement local development projects and to maintain local infrastructure using state funds. Chattopadhyay and Duflo conduct a detailed survey of all investment in local public goods in all the councils in the district of Birbhum in West Bengal, and compare investments made in reserved and unreserved councils. Since the councils were randomly selected for reservation, differences in investment decisions can be attributed to the policy of mandated representation of women.

Chattopadhyay and Duflo's results suggest that reservation does affect policy. Women elected as leaders under mandated reservation invest more in public goods most closely linked to women's concerns. These include drinking water, fuel, and employment generating activities such as road construction. These are precisely the issues most frequently raised by women in the villages surveyed by the authors. This correspondence with women's needs also strongly suggests that the effects of women's reservation on public goods provision are mostly due to gender rather than other consequences of altering the political competition through quotas. Another positive impact of mandated reservation is to be found in the significantly higher

participation of women in the political process in councils that are reserved for women. On the other hand, the authors find no evidence that women leaders are more efficient or less corrupt than their male counterparts. Therefore, one cannot make welfare statements concerning the impact of reservation without specifying a social welfare function.

"TRANSITION DYNAMICS IN VINTAGE CAPITAL MODELS: EXPLAINING THE POST-WAR CATCH-UP OF GERMANY AND JAPAN"

Simon Gilchrist and John C. Williams

IED Discussion Paper 113, January 2001

What explains the postwar economic growth miracles of Germany and Japan? Traditional explanations based on a catch-up story owing to low initial capital stocks relative to current technological opportunities have been explored but found wanting. According to the standard neoclassical growth model, such a process of catch-up through capital deepening implies high initial rates of investment, rising capital-output ratios and simultaneously high rates of growth in productivity and capital (relative to labor). In contrast, both Germany and Japan's postwar experience is characterized by low rates of investment, an initial *decline* in the capital-output ratio and delayed growth in capital relative to labor productivity. That model, therefore, fails to provide an adequate understanding of the underlying forces explaining the postwar catch-up of these countries with output and productivity standards in the USA. In this paper, Gilchrist and Williams argue that the observed patterns of these macroeconomic variables are consistent with a richer version of the neoclassical growth model that allows for a putty-clay production technology and capital accumulation with embodied technological change.

Gilchrist and Williams enrich the standard growth model to allow for a production technology where the capital-labor ratios of existing vintages of machines are rigid. Such rigidities imply binding capacity constraints and rapidly rising marginal costs at

the onset of an expansion. As a result, in early stages of the (postwar) catch-up, investment is directed at adding new machines with relatively low capital intensity. Such capital widening allows for a rapid expansion of employment and output at relatively low rates of investment. As capacity expands, employment rises, and output growth outpaces growth in the capital stock. As a consequence, the capital-output ratio falls for a substantial period of time and the economy shows no evidence of "capital deepening" in the initial transition period. In the longer run, the process switches to one corresponding to capital deepening: raising the quantity of capital per worker. During this latter stage therefore, capital serves as a substitute for labor and the capital-labor ratio increases rapidly. Their model, thus, naturally admits a distinction between investment on extensive and intensive margins that is entirely absent from the standard neo-classical model.

In addition to putty-clay production, the authors emphasize embodied technological change as a source of rapid growth for Germany and Japan in the postwar period. Such technological growth opportunities reflect the outdated nature of the existing war-time capital stock. According to their model, an improvement in technology embodied in new capital goods also implies an initial phase of capital widening followed by a later phase of capital deepening. It also implies rapid productivity growth owing to the fact that new machines embody "best-practice" technologies.

Gilchrist and Williams simulate the model to test its predictive performance against historical data on patterns of capital accumulation and growth in postwar Germany and Japan. Their results indicate that a combination of capital destruction (of the magnitude that occurred in these countries during the war) and embodied technological change are key elements in explaining the postwar transition dynamics such as declining capital-output ratios in the first phase of recovery that corresponds to capital widening (in the 1950s), and its gradual recovery in the subsequent phase of capital deepening (in the 1960s and 1970s). Allowing for a gradual phasing in of embodied technology combined with capital destruction also captures the major features of capital and productivity dynamics during the postwar transition resulting in a

striking improvement over earlier models as evidenced in their model's success at generating plausible dynamics for real rates of return on investment. An important implication of Gilchrist and Williams' analysis lies in the reinterpretation of these "economic miracles" as a closing of the gap in "machines". That is, in the postwar period, Germany and Japan regained access to advanced technologies embodied in capital goods available from the USA and elsewhere, and this process was slowed by the putty-clay nature of capital.

"WHAT CAN ACCOUNT FOR FLUCTUATIONS IN THE TERMS OF TRADE?"

Marianne Baxter and Michael Kouparitsas
IED Discussion Paper 112, December 2000

Extreme volatility in terms of trade is a well documented empirical phenomenon world-wide. Sharp movements in terms of trade can potentially lead to sudden changes in a country's trade balance and current account and, in several cases, a possible difficulty in financing the national debt burden. Within a country sharp movements in terms of trade can cause severe sectoral imbalances with respect to output and wages. These fluctuations have therefore been a perennial source of concern to policymakers in developing countries and industrialized nations alike who wish to avoid both the difficulties with financing current account imbalances as well as the internal imbalances. Pinning down the source of these shocks can help in devising policies that can mitigate the ensuing economic disruption. This paper by Baxter and Kouparitsas is a contribution toward the search for the source of terms of trade shocks.

Relative price volatility of different bundles of goods (for example, manufactures and fuels) has long been recognized as an important source of terms of trade shocks owing to countries often having very different export and import goods baskets. In addition, Baxter and Kouparitsas point out that in spite of their diversified export baskets industrialized nations also suffer from large terms of trade fluctuations. This seems to be indicative of market imperfections that preclude the law of one price to operate in world

markets. This may then turn out to be a major explanation for terms of trade fluctuations. Baxter and Kouparitsas use World Bank data on exports and imports for 100 countries and three major categories of goods to decompose a country's terms of trade volatility into two components: one stemming from differences in the composition of import and export baskets which represents the (relative) goods price effect, and the second component owing to cross-country differences in the price of a particular class of goods. They consider two alternate decompositions both consistent with this methodology.

A number of insights are generated through such a decomposition procedure. Baxter and Kouparitsas find that, while for fuel exporting countries most of the terms of trade variations do indeed stem from goods price effects, for countries that export non-fuel commodities no such generalization is possible since there is great dispersion in the importance of either effect. The paper also exposes some inherent weaknesses in the early open economy business cycle macro models. For example, both decompositions unearth a significant impact of country price effects indicating that international business cycle models should explicitly account for market imperfections such as trade barriers if they are to track terms of trade volatility accurately. In a similar vein, most early models that focused on a small number of production sectors and production of durable goods produce very little terms of trade volatility. The results of this paper suggest the need to incorporate production and trade of non-manufactured goods (fuel and commodities) into these models.

"THE EFFECTS OF PROXIMITY AND TRANSPORTATION ON DEVELOPING COUNTRY POPULATION MIGRATIONS"

Robert E.B. Lucas

IED Discussion Paper 111, November 2000

While economists have traditionally been averse to immutable laws, Ravenstein's law of migration, which

in its general form states that the number of people migrating between two regions is inversely proportional to the distance between them, controlling for population size, has stood the test of time well. Both in industrialized and developing countries, and with respect to both internal and external migration, greater distances do indeed deter movement. Given this regularity it is quite remarkable that we understand very little about the underlying causes behind this deterring effect of distance. In development economics, migration has been of interest solely as a process of transferring labor from the agricultural sector to the industrial sector. Proximity or remoteness of a village from an urban center was generally neglected and development models glossed over rural-rural migration by assuming a uniform rural sector.

This paper by Lucas seeks to address two questions related to the issue of distance. First, why should distance play such a pervasive and persistent role in migration patterns? Second, what are the economic consequences of distance as a deterrent to migration? With respect to the first question, Lucas concludes that information about remote locations may be costlier to acquire, thus making longer moves riskier. Moreover, the single-most important source of information for potential migrants is the network of previous migrants. Lucas also suggests two other important sources emanating respectively from labor and asset market characteristics of the migrant. In particular, if labor markets tend to be more homogeneous locally, unemployed migrants may migrate shorter distances to better transfer their job skills. If the potential migrant has asset holdings in his village, then shorter distances make for better monitoring and control of these assets. Turning to the question of why we should be concerned about the centrality of distance in explaining migration patterns, Lucas points to the impact upon the difficulty of out-migration from remote and poor regions leading to the generation of poverty traps. Lucas looks at a number of natural mechanisms that serve to perpetuate this problem. A combination of a *brain drain* effect and economies of scale in production serve to exacerbate the preexisting economic distance between regions. Other important contributing factors include the dwindling amount of remittances from out-migrants that serve to simultaneously lower household incomes in remote areas and indirectly remove an important insurance

buffer for bad times.

The paper concludes with a number of suggestions for both additional research and data needs on the one hand, and also suggestions intended to better inform policy decisions that impinge upon the geographic distribution of poverty, and hence upon the potential for trickle-down development.

“TECHNOLOGY, TRADE, AND GROWTH: A UNIFIED FRAMEWORK”

Jonathan Eaton and Samuel Kortum
IED Discussion Paper 110, January 2001

Considerable attention has recently been devoted to the links among innovation, technology, trade, and growth. This paper develops a theory of these links that suits itself to empirical implementation. It provides a common treatment of technology to address questions as diverse as explaining trends in productivity, patents, and R&D in the USA; the extent of technology diffusion among major research countries; the relationship between technology diffusion and trade; and finally, the relationship between productivity of individual producers and their ability to penetrate export markets. In earlier papers, the theory was augmented to capture the crucial features of the particular applications. In this paper, they present the most parsimonious framework to draw the connections between the forces driving innovation and productivity as well as the implications of technology for trade.

Their approach enables them to confront new issues. These include the effect of increased openness on research incentives and growth and the role of scale effects and research activity on growth. While larger markets induced by opening the economy to trade may spur greater innovation, the greater difficulty – and hence, cost – in coming up with ideas that can successfully compete in a larger arena may discourage it. The model illustrates the possibility that these forces can exactly cancel each other. Hence,

while market enlargement produces static gains from trade, there may be no dynamic gains forthcoming through the accumulation of technology. The authors find that lowering geographic barriers benefits countries with a smaller labor force disproportionately. Under frictionless trade, relative wages across countries only depend upon relative research productivities.

An exciting possibility for future work is the quantitative application of the model to capture the heterogeneity behind aggregate data. Eaton and Kortum point out that their framework can, for example, link data on aggregate productivity to international patent counts and data on aggregate trade flows to the export behavior of individual plants.

“TRADE IN CAPITAL GOODS”

Jonathan Eaton and Samuel Kortum
IED Discussion Paper 109, December 2000

Innovative activity is highly concentrated in a small number of advanced countries which are also the major exporters of capital goods to the rest of the world. Hence a critical determinant of a country's productivity may well be its access to capital goods from around the world and its willingness and ability to make use of them. In their paper, Eaton and Kortum develop a multi-country model of trade in capital goods to assess its role in spreading the benefits of technological advances.

The paper draws connections between a number of important empirical observations. Empirical work in growth theory has sought to establish links between cross-country productivity differences and differences in the rates of capital accumulation. Eaton and Kortum propose that differences in the rates of capital accumulation derive much more from differences in the relative price of capital than simply from differences in savings rates. Therefore, poor countries are getting much less per dollar saved than the richer ones. This naturally begs the question of whether impedi-

ments to trade in capital goods could be at work, and leads them to explore the link between productivity and imports of capital goods. Finally, if the relative price of capital goods is indeed lower in some countries than in others, this implies a possible link between patterns of international trade and deviations from the law of one price, and points to the importance of geographic barriers between countries. In this context, Eaton and Kortum propose new measures of differences in the costs of capital goods across countries.

Applying their empirical framework to data for 1985 across 34 countries, Eaton and Kortum find geographic barriers to be quantitatively important. Moreover, their model enables them to estimate the full cost of buying and using imported equipment in the presence of such barriers. Their trade-based measure of equipment prices falls systematically with development, being the lowest in countries like Germany and the USA and more than 3.5 times these levels in Iran and Kenya. Taken in conjunction with lower consumption goods prices in poorer nations, these differences are even more telling. Since the standard measures of equipment prices, like the ones issued by the UN's International Comparisons Program, show no systematic linkage, Eaton and Kortum's results indicate that these earlier measures may not be fully accounting for quality differences and other indirect costs such as learning to operate imported capital. They also estimate that differences in the relative price of equipment account for over 25 percent of the productivity differences between developed and developing nations.

"PERSISTENT INEQUALITY"

Dilip Mookherjee and Debraj Ray

IED Discussion Paper 108, September 2000

The neoclassical growth model and its reformulations in the context of intergenerational mobility predict that in the absence of persistent random shocks, the market mechanism promotes a tendency towards con-

vergence of incomes across different agents, families or countries. In contrast, a recent literature based on capital market imperfections generates opposite predictions about the persistence of inequality and the permanent impact of one-shot redistributive policies. These models are set in a wide variety of contexts including labor markets, occupational choice, and human capital. The features they typically share in common are assumptions concerning indivisibilities in investment, occupation or locational choices, and savings behavior not based on dynamic optimization of long run utility.

Mookherjee and Ray's paper provides a general setting that encompasses several different modeling approaches, as well as extending it in new directions. Their model allows a flexible formulation of the degree of divisibility of investment choices, varying from perfect indivisibilities to perfect divisibility. They allow for pecuniary externalities in the returns to and the costs of human capital accumulation, thus allowing investment thresholds to arise endogenously from the operation of the price mechanism. In particular, both returns and costs of investments depend on relative prices. Under weak conditions (e.g., the existence of at least two professions that are distinct in terms of training cost and returns) they show that long run inequality is inevitable, despite savings motivated by long-run optimization, a convex technology, and absence of any random shocks.

However, the conclusions concerning history dependence of the long-run wealth distribution (i.e., multiplicity of long-run steady states) do depend on the divisibility of investments. Greater occupational heterogeneity restricts the multiplicity of steady states, with a unique steady state in the case of perfect divisibility. An important implication of these results concerns the impact of one-shot redistributive policies: these have long-run impact only if there is significant indivisibility in investments.

The authors subsequently study the question of convergence to steady states and comparative dynamic effects of redistributive policies in a two occupation context. Finally, they enlarge the model to encompass multiple forms of (financial or physical) capital, and show that it is possible for ownership of human

and nonhuman capital to be negatively correlated in a manner that eliminates inequality.

“CONTRACTUAL STRUCTURE AND WEALTH ACCUMULATION”

Dilip Mookherjee and Debraj Ray
IED Discussion Paper 107, June 2000

Whether historical levels of inequality and poverty constrain the current performance of economies is a matter of central importance to the economics of institutions, growth, and development. In recent years it has also been the subject of intense scrutiny by researchers who are interested in explaining the evolution, persistence, and macroeconomic consequences of wealth inequality. Following the early work of Loury, most of the subsequent literature explains persistence of wealth inequalities either via randomness in abilities, or a combination of capital market imperfections, investment indivisibilities and fixed savings rates. In this paper Mookherjee and Ray ask whether poverty traps and persistent wealth inequality can result even with a convex technology and endogenous savings behavior derived from optimization of discounted future utility. In this model, agents face credit constraints owing to a combination of moral hazard and limited liability. Asset accumulation relaxes future credit constraints, providing a strong incentive for poor agents to save. But at the same time, the presence of moral hazard may *endogenously* generate nonconvexities in the returns to savings, constraining savings incentives of the poor *vis-à-vis* nonpoor households.

Mookherjee and Ray demonstrate that relative bargaining power between borrowers and lenders in credit markets can have a decisive impact upon the resulting pattern of asset accumulation and long-run inequalities in the distribution of wealth. They find that in the case where lenders have all the bargaining power, poverty traps can emerge. This is because the surplus that accrues to moderate wealth accumulation

of the poor is entirely extracted by the lender. This generates a nonconvexity in returns to investment that sharply inhibits the poor agents' incentives to save. In contrast, wealthy agents are able to extract a sufficient proportion of their surplus and thus have a sufficient incentive to save; consequently, their wealth drifts upward over time. The long run wealth distribution is polarized between a class of poor agents with zero wealth, and a class of rich agents with high wealth levels, with no mobility between the two classes. On the other hand, if there is a competitive supply of lenders, all the benefits of saving accrue entirely to the borrowers, independent of their level of wealth. This is sufficient to preclude poverty traps: agents accumulate wealth indefinitely irrespective of their initial wealth, rendering historical wealth distributions irrelevant in the long run.

The central lesson emerging from Mookherjee and Ray's paper is that institutional characteristics of an economy may play a central role in limiting savings incentives of the poor, thus perpetuating poverty. This suggests the need for greater attention to allocation of bargaining power between borrowers and lenders in studies of credit markets in developing countries, as well as in policy analyses.

The Political Economy of Development

A conference on the Political Economy of Development was held at Yale University on March 16-18, 2001, featuring sessions on Institutions and Development, Law and Property Rights, Democracy and Government Responsiveness, Regulation and Political Economy, and Decentralization. The conference was organized by Leonard Wantchekon of Yale's Department of Political Science and Economic Growth Center and by Dilip Mookherjee of Boston University's Department of Economics and Institute for Economic Development. Further information about this conference (including paper downloads) can be found on the website: <http://www.econ.yale.edu/~egcenter/PED-Programme-Feb23.html>

IED RESEARCH IN PROGRESS

The following paragraphs summarize the projects and development-related research being conducted by Institute affiliates from the Economics Department at Boston University.

Eli Berman's current research touches on development from a number of unconventional angles. He is investigating to what extent the tendency of new technologies to complement educated workers ("skill-biased" technological change) can explain why income in poorer countries has failed to catch up with that in the developed world. Another project explores the effect of radical Islam on fertility and how subsidies to radical religious groups can reverse fertility transitions. Other work includes an investigation (with Zaur Rzakhonov) of whether immigrants move for the sake of their children, and what effect the resulting self-selection has on fertility. In collaboration with Kevin Lang and Erez Siniver he is also studying the complementarity of skills and language in the labor productivity of immigrants.

Maristella Botticini is a John M. Olin Junior Faculty Fellow for the current academic year 2000-2001. Her recent publications include: "The Choice of Agrarian Contracts in Early Renaissance Tuscany: Risk Sharing, Moral Hazard, or Capital Market Imperfections?," *Explorations in Economic History* 37 (July 2000): 241-57, with Daniel A. Akerberg, and "A Tale of 'Benevolent' Governments: Private Credit Markets, Public Finance, and the Role of Jewish Lenders in Medieval and Renaissance Italy," *Journal of Economic History* 60 (March 2000): 165-89. Her manuscript *The Price of Love: Marriage Markets and Intergenerational Transfers in Comparative Perspective* will be published by Princeton University Press. The book will offer a comparative analysis of marriage markets and intergenerational transfers by merging original research on medieval and Renaissance Florence with secondary literature on dowries, bride prices, marriage markets, and bequests in past and contemporary societies, such as ancient Greece, the Roman empire, the Byzantine empire, China, India, and African societies.

In "A Human Capital Interpretation of the Economic History of the Jews" with Zvi Eckstein (Tel Aviv University) she addresses the extent to which a human capital model of occupational choice can explain the trends in Jewish population and the transition from agriculture to crafts and trade in the first millennium. They argue that migrations, expulsions, and taxation are not sufficient to explain these changes

and emphasize instead the role of religion and human capital accumulation. In additional research, she uses tax records and census data to reconstruct wealth distribution and inequality in Florence from 1250 to 1450 to study the effect of demographic shocks (plagues) on wealth distribution and growth and together with Aldo Rustichini (University of Minnesota), she is studying the determinants of biased sex ratios in medieval Florence.

Peter Doeringer's book on organizational strategies and economic performance of "new economy" manufacturing plants, *Startup Factories: High Performance Management, Job Quality, and Regional Advantage* (with David Terkla and Christine Evans-Klock), has been accepted for publication by Oxford University Press. He is working on a comparative study on "The International Transferability of Workplace Practices by Japanese Multinationals" (with Edward Lorenz, David G. Terkla, and Christine Evans-Klock) and is continuing his research on the small enterprise networks and global commodity chains in Europe.

During the last year Jonathan Eaton and Samuel Kortum completed their paper "Trade in Capital Goods," IED Discussion Paper 109, summarized on page 6, which is scheduled to appear in the *European Economic Review* this summer. "Technology, Trade, and Growth: A Unified Framework," IED Discussion Paper 110, summarized on page 6, is to appear in the *European Economic Review Papers and Proceedings* this summer. They are continuing to pursue research on the connections between trade and innovation. This work is supported by a grant to the IED from the National Science Foundation.

In another set of projects, Eaton and Kortum have been studying international trade at the level of individual producers. Their work with Andrew Bernard and J. Bradford Jensen, "Plants and Productivity in International Trade," IED Discussion Paper 105, summarized in last year's Research Review, dealt with exports of U.S. manufacturing plants. Recently, they joined forces with Francis Kramarz of INSEE-CREST to study exporting and importing patterns of French firms to and from individual foreign countries. The French data provide a means of analyzing the

individual export destinations of producers.

Kortum and Tor Jakob Klette (University of Oslo) are developing a dynamic model of heterogeneous firms interacting in a market. The objective of this work is to understand the links between firm-level R&D, firm-level patenting, firm growth, and the size distribution of firms within an industry. An early version of their paper "Innovating Firms: Evidence and Theory" has been presented at the Productivity Group of the National Bureau of Economic Research and at the International Conference on Technological Policy and Innovation, in Paris. Klette has visited the IED for extended periods on two different occasions as part of this collaboration.

In October 2000 **Jonathan Eaton** presented a paper on developing country debt (co-authored with Ken Kletzer of the University of California-Santa Cruz) at the meetings of the Latin American and Caribbean Economics Association in Rio de Janeiro. His work with **Kortum** was presented at the International Seminar on Macroeconomics in Helsinki, at the Summer Meetings of the International Trade and Investment Group of the National Bureau of Economic Research, at a conference organized by the Center for Economic Policy Research at the University of Copenhagen, at a conference on globalization at the Bavarian-American Academy in Munich, and at the Murray S. Johnson Conference at the University of Texas.

Eaton also served as a consultant for the European Commission on technology policy for Europe. **Kortum** has contributed to The National Academy's initiative on Intellectual Property in the Knowledge-Based Economy.

Randall Ellis' recent research focuses on how payments systems affect the health delivery systems, a topic of major interest in the U.S. and abroad. **Ellis** helped develop the payment formula that is currently being used by the U.S. Medicare program to pay managed care health plans for all managed care enrollees. Several other countries are interested in the same payment approach. During the past year he has presented talks in Alberta, Canada on risk adjustment, and in Marseille, France on hospital payment reform.

Simon Gilchrist was a visiting scholar at the Federal Reserve Bank of Boston for the 2000-2001 academic year, and at the Bank of England (December, 2000) and University of Paris I: Pantheon-Sorbonne (November, 2000, May, 2001). During that time, "Putty-

clay and Investment: A Business Cycle Analysis" was published in *The Journal of Political Economy*, Oct. 2000 (with John Williams), IED Discussion Paper 113, summarized on page 3, was presented at the Bank of England, NYU, Rochester, Federal Reserve Bank of Minnesota, the Federal Reserve Bank of New York, the Federal Reserve Bank of Boston and the NBER Economic Fluctuations and Growth conference and will be presented at the NBER Summer Institute program for Economic Growth. "External Constraints on Monetary Policy and the Financial Accelerator" (with Mark Gertler and Fabio Natalucci), which examines the benefits of fixed versus flexible exchange rates in the presence of a financial accelerator mechanism, was presented at two conferences: "Monetary Policy and Asset Prices" organized by the Riksbank, Stockholm, Sweden June 1999 and at the SEPR Conference on Monetary Policy, Stanford University, March 2000. "Productivity and the PC Revolution" (with Vijay Gurbaxani and Robert Town) examining the productivity benefits of personal computers in U.S. manufacturing was presented at the Conference on Advances in the Measurement of Intangible (Intellectual) Capital at NYU.

Laurence Kotlikoff has been working on the economics of demographic change using a sophisticated life-cycle multi-period general equilibrium model, which permits one to analyze alternative reforms to government pension systems, including privatization. He has also been studying how the process of leaving bequests to the next generation on an involuntary basis (due to the absence of well functioning annuity markets) affects the distribution of wealth. Finally, together with economists at The World Bank, he has been co-running an international workshop on pension reform that draws participants from all over the globe.

During the past year, **Kevin Lang** has completed "Language-Skill Complementarity: Returns to Immigrant Language Acquisition," with **Eli Berman** and **Erez Siniver** (College of Management, Israel) which examines the effect of learning Hebrew on the earnings of Russian immigrants to Israel. He is collaborating with **Berman** and **Siniver** in examining the effect of English knowledge on the earnings of Russian immigrants to Israel and with **Siniver** to study the extent of and causes of differences in earnings and test performance between students who attend colleges and those who attend university in Israel.

Glenn Loury's book *The Anatomy of Racial In-*

equality is scheduled for a February 2002 publication date by Harvard University Press. "Social Exclusion and Ethnic Groups: the Challenge to Economics" was published in the *Annual World Bank Conference on Development Economics: 1999*, Boris Plekovic and Joseph E. Stiglitz (eds.), Washington, D.C.: World Bank (2000)

Robert Lucas continued his work on several aspects of population migration. His chapter on designing household surveys to collect migration data appeared in a World Bank volume during 2000, and a paper on the interaction between geographic poverty traps and gravity migration models is forthcoming in the *Journal of Economic Geography*. Lucas is currently writing a paper on migration of highly skilled workers between East Asia and the OECD countries, and the role that these movements are playing in development patterns in East Asia. A paper on industrial pollution by plant size in Brazil and Mexico (co-authored with Susmita Dasgupta and David Wheeler of The World Bank) is forthcoming in *Environment and Development Economics*, and on the impact of the East Asia and Tequila financial crises on labor markets and household incomes (co-authored with Peter Fallon of The World Bank) is forthcoming in the *World Bank Research Observer*. Lucas is also working with Sari Pekkala, a former visitor to the IED, on intergenerational transmission of inequality in Finland, using a large data set covering a 45 year period during which Finland was transformed from a predominantly agrarian society to a high-tech industrial economy.

Dilip Mookherjee is conducting research (funded by the National Science Foundation and the MacArthur Foundation) with Jean-Marie Baland, Pranab Bardhan, Sanghamitra Das, and Rinki Sarkar on determinants of firewood collection by rural households in the Himalayan regions of Nepal and India (Himachal Pradesh and Uttaranchal). Their aim is to identify the relative validity of alternative hypotheses concerning deforestation based respectively on poverty, population pressure, commercialization, property rights, forest management and collective action in local communities. Research in Nepal has been based on World Bank LSMS data for 1995-96, and a first draft of the paper will become available this summer. Data collection in India is still under

way. Mookherjee is also collaborating with Sanghamitra Das on a project identifying sources of productivity differences between farmer cooperatives and privately owned sugar firms in India, and with Pranab Bardhan on the effects of land reforms and decentralization of farm input delivery to local governments in West Bengal since the late 1970s. Mookherjee won a Guggenheim fellowship for the next academic year to work on the West Bengal project, and plans to be on sabbatical in Spring 2002. Other research activities include theoretical analysis of hierarchies and decentralization in collaboration with Masatoshi Tsumagari, and the dynamics of inequality with Debraj Ray. Mookherjee and Ray recently edited *Readings in the Theory of Economic Development*, and have plans for a graduate textbook in development based on courses taught at Boston University.

2001 ROSENSTEIN-RODAN PRIZE WINNER ANNOUNCED

The Institute for Economic Development awarded the 2001 Rosenstein-Rodan Prize to Yulia Rodionova and Jay Surti for their paper "The Onset of Speculative Currency Attacks". The prize, in memory of Professor Paul Rosenstein-Rodan, is awarded annually to graduate students in economics submitting the best research paper in the field of development economics.

The abstract for this paper follows: "Speculative currency attacks provide an example of coordination problems wherein, conditional upon a successful attack, it is more profitable for a speculator to sell a little earlier than at the last moment. In this paper, we analyze the impact of introducing such *strategic substitutability* into an otherwise standard dynamic coordination game. Enriching the payoff structure in this manner yields the following results: increasing the ratio of speculative capital to central bank's foreign exchange reserves induces more aggressive selling strategies, thereby reducing the delay preceding a devaluation; allowing speculators to react sufficiently quickly to the actions of others yields a unique equilibrium where the coordination problem is successfully resolved resulting in an immediate devaluation. Aggregate uncertainty concerning speculative capital considerably increases the probability of a delay in the onset of an attack, and also, of coordination failure."

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