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Summaries

The role of Polish environmental funds: Too generous or too restrictive?

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In economies in transition, environmental funds have provided subsidized financing to stimulate environmental investments which would be postponed because of a combination of factors including more pressing economic investment priorities, weak capital markets, and lax enforcement. The demand for financial support from environmental funds has exceeded supply, requiring funds to reject some applications. The authors have conducted a survey of the applicants of these rejected applications to determine whether their projects were undertaken with alternative financing, postponed to secure alternative funding, or abandoned because the financing 'gap' could not be closed. A majority of survey respondents secured financing and completed their projects, an indication that the fund's support, while attractive, was not essential for these projects to be implemented. Only a few projects had been abandoned, but those which were reportedly postponed, may have been abandoned if the financing gap could not have been closed.

Are the costs of pollution abatement lower in Central and Eastern Europe? Evidence from Lithuania

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The European transition countries in Central and Eastern Europe and the Former Soviet Union are engaged in a variety of environmental policy

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initiatives. On the one hand, several countries are revising and upgrading their systems of pollution charges. Many of these same countries are also analyzing the cost implications of harmonizing their environmental policy structures with those of the European Union. Both these exercises require estimates of pollution abatement costs, but at present estimates based on observed behavior in the region are completely lacking.

It is important to have accurate estimates, rather than engineering estimates, because of the unique position in which these countries often find themselves. Firms continue to orient themselves to the task of competing in a market context, and this reality has meant that industrial structures, product mixes, and production processes are changing rapidly. Technologies are often extremely old and inefficient, and therefore possibilities exist to update production processes and reduce waste. As retained earnings have increased and access to finance has improved, firm managers have replaced out-of-date capital, resulting in better products, more efficient operations, higher profits, and less pollution emissions.

These 'win–win' situations are believed to be widespread during this transition period, and it has therefore been claimed that pollution reductions can be achieved at lower cost in Central and Eastern Europe and the former Soviet Union than in the West. That pollution reductions decisions are probably part and parcel of overall business decisions also implies that identifying pollution abatement costs is likely to be more difficult than in non-transition contexts. Indeed, textbook matchings of investments and pollution reductions achieved may be elusive in the region.

Despite the importance of abatement cost information to policy making, to date there has been little or no systematic evaluation of the costs of reducing pollution in transition countries. The main purpose of this paper is to partially fill this research gap using firm-level data from Lithuania. Abatement cost estimates for key air pollutants are presented based on investments made in Lithuania during 1993–4. The paper also attempts to estimate the demand for pollution directly using data on pollution charges from 1994. Using both methods, it is shown that for at least some key pollutants marginal and average abatement costs are probably substantially lower in Lithuania than in western countries. One policy implication of these results is that low rates of pollution charges *will* have effects on polluter behavior. During the transition period, modest increases in charge rates are therefore probably all that are justified.

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The effect of supply and demand shocks on the non-market valuation of local public goods

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When economists wish to estimate the benefits of improving a local public good, such as air quality, water supply, crime reduction, or public education, they often assume that households have chosen a residential location that offers them the highest level of these goods that they can afford. We point out that when a shock has recently occurred households may no longer be at their optimal consumption level for these goods. Shocks may be induced by war, a far-reaching regulation, a substantial change in infrastructure policy, an income shock due to macroeconomic changes or, in our case, the creation of a housing market in post-socialist Europe and Asia. Supply shocks change the spatial distribution of these quasi-fixed goods over residential locations, while demand shocks change households' willingness to pay (WTP) for these goods. In either case, after the shock many households are likely to have either too much or too little of the good. As a result, there may be residential locations available to which households could locate that would make them better off.

We point out that the estimated value of an improvement or a reduction in a good that has been affected by a shock is likely to change throughout the adjustment period. This is because as households relocate in response to having either too much or too little of the good, their level of consumption of the good changes. As their level of consumption changes so does their willingness to pay for an improvement or their willingness to accept a reduction in that good. In this paper, we discuss how an adjustment period, which leads to an improvement in the efficiency with which households consume the good, will affect households' willingness to pay (willingness to accept) for an improvement (a reduction) in that good. We discuss how the inter-temporal change in the magnitude of the benefits will depend upon the magnitude of the shock, the transaction costs associated with residential relocation, and changes in other goods that are complements or substitutes to the good being valued.

Empirically, we look for evidence that the creation of housing markets in the post-socialist city of Iasi, Romania and the subsequent spatial readjustment of households may affect the inter-temporal stability of willingness to pay estimates for municipal water services. Based on cross-sectional data from a stated preference survey, we show that spatial adjustment appears to be increasing the efficiency with which local public goods are being consumed. Furthermore, we show that preliminary benefit estimates for improved water services during the transition may be

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substantially higher than long-run estimates. This limited evidence supports our basic concern that if economists estimate benefits without an awareness of the implications of future readjustments to supply or demand shocks, they may recommend *non-optimal* levels of long-run investment, regulation, taxation, and user fees.

Controlling carbon emissions in China

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In this paper we examine the use of carbon taxes to reduce emissions of CO_2 in China. To do so, we develop a dynamic computable general equilibrium (CGE) model of the Chinese economy. In addition to accounting for the effects of population growth, capital accumulation, technological change, and changing patterns of demand, we also incorporate into our model elements of the dual nature of the Chinese economy where both plan and market institutions exist side by side.

After specifying the time paths of the exogenous variables used in the model, we run a 'business as usual' baseline simulation that gives us estimates of GDP, carbon emissions, and other endogenous variables for the 40 years starting from the 1992 base year. Most analyses for developed countries look at the effects of stabilizing or reducing emissions below some target, such as 1990 levels. However, China and other developing countries have raised strenuous objections to attempts to get them to agree to these types of targets. Therefore, we instead simulate the effects of uniform emissions reduction of 5, 10, and 15 per cent from our baseline. To do this we use the model to calculate a carbon tax rate that will hold carbon emissions to a given percentage of the baseline level. The imposition of carbon tax raises additional revenue for the government. In order to keep the emissions reduction simulations revenue neutral, we reduce all other taxes proportionately.

We then compare the outcomes of the carbon reduction simulations with the baseline solution. Increasing the percentage reduction in emissions requires a more than proportionate increase in the per unit tax rate on a ton of carbon. In the case of a 15 per cent reduction in carbon emissions, the imposition of sectoral carbon taxes on coal and oil results in an increase of 21 per cent in the price of coal and a 3 per cent increase in the price of oil in the first year. The imposition of the carbon taxes increases energy prices in general and this in turn increases the prices of other goods that use

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energy. Increases in prices result in a decline in the real wage and a fall in real household income. However, given our assumption that the labor supply in China is inelastic, the decline in the real wage does not have a distortionary effect on hours worked. At the same time, because of the reduction in taxes on enterprises, enterprise retained earnings are increased and this increase in retained earnings is transferred into an increase in investment. Over time, the increase in investment results in an increase in total output and, with a short lag, this is reflected in increases in consumption.

In all of the alternative scenarios, there is a very small decline in GDP in the first year of the simulation. However, in each case, GDP is increased in every year thereafter. In the 15 per cent emissions reduction case, by the thirtieth year of the simulation, the level of GDP is increased by almost 1 per cent over the baseline. Although subject to a number of caveats, we find potential for what is in some sense a 'double dividend', a decrease in emissions of CO_2 and a long-run increase in GDP and consumption.

The duality of taxes and tradable permits: A survey with applications in Central and Eastern Europe

SCOTT FARROW

The default distributional (equity) impacts of typical tax and tradable permit policies differ significantly. Default tax policy taxes all units of pollution and leads to a large monetary transfer to the government while default permit policy grants the asset value of the permit to the polluting firm. These differences caused by the default policy create a large political barrier to the implementation of behaviorally relevant pollution tax rates. Yet in Central and Eastern Europe, in contrast to the US, the pollution tax system is one of the stronger components of the system. Changing the default assumption for taxes to include tax credits can address two issues of major concern in Central and Eastern Europe: (1) raising pollution tax rates to behaviorally relevant levels, and (2) raising tax rates in a way that reduces industry opposition.

However, recent literature on pollution taxes in a general equilibrium setting with prior distortions, such as labor taxes, suggests that welfare losses can occur if environmental assets are allocated to industry. The

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paper investigates the welfare impact of asset allocation taking into account conditions that are relevant in Central and Eastern Europe, such as: (1) economic characteristics, (2) the stage of privatization, (3) the cost effectiveness of alternative policies, and (4) whether government expenditures must be held constant.

Integrating environmental taxes on local air pollutants with fiscal reform in Hungary: Simulations with a computable central equilibrium model

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Improved environmental protection may be sought using a variety of public policies. These policies can be implemented alone, or in combination, but the cost, effectiveness, and overall efficiency of these policies may vary. This paper examines the likely effects of two 'polar' policies for reducing local air pollution—a tax on emissions called environmental load fees (ELF) and emission abatement requirements (EAR) based on best available control technology—when applied to a transition economy like that of Hungary. We further extend this consideration of policy alternatives by examining how different uses of ELF revenues and simultaneous introduction of these policies is likely to affect the outcomes. In order to make this examination more comprehensive we used a broad model of the whole Hungarian economy, the Fiscal Environmental Integration Model (FEIM), to capture the ramifications of the policy choices as their effects rippled through the economy.

We found that while EAR was considerably more effective at reducing the target emissions, the ELF accomplished emission reductions at a fraction of the cost per unit of reduced emissions. Furthermore, the economic welfare cost of emission reductions could be cut by judicious use of the revenues from the ELF e.g. to reduce the tax on employment of labor. These results might suggest that a hybrid polity—one composed of both an ELF and EAR—might be both environmentally effective and less costly. Unfortunately, these policies do not combine in the way we would like, joint policies are dominated by the EAR in that these joint policies achieve large emission reductions but with disproportionately high economic

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welfare costs. A particularly unsettling result for those that would argue for 'use of all the policy options available' to protect the environment, is that the joint policies sometimes exhibit negative interaction effects: the cost of the joint policy is greater than the sum of costs of the policies individually without a commensurate increase in benefits.

These results, of course, depend too on our rough characterization of polar policies. A higher ELF would increase emission reductions (and increase the cost of these reductions) and a more targeted set of EAR requirements would reduce the cost of these regulations (but allow more emissions). An important message of our work is that, for an economy like Hungary's, aggressive emissions reductions by ELF or EAR will be costly. Subject to limits on the cost of monitoring and enforcement, however, the ELF policy appears much more likely to produce benefit levels from emission reductions and tax reforms that exceed the costs entailed by the ELF policy.

Avoiding health risks from drinking water in Moscow: An empirical analysis

BRUCE A. LARSON AND EKTATERINA D. GNEDENKO

As a way to reduce or avoid risks from tap water, casual observation suggests that many households in Russia boil water, settle water in pans for some period (i.e., over night) before consuming, filter water, and buy bottled water. However, besides casual observation, there have been no systematic data available on avoidance measures used in relation to drinking water and no analysis that helps to explain avoidance decisions. This lack of information and analysis is surprising given concerns over health risks from tap water in most Russian cities. If these avoidance measures are widely used, health risks from drinking water actually consumed may be substantially different from such risks at the tap. As a result, public health concerns based on assessment of tap water quality may substantially overstate health concerns about public water supplies.

To begin to fill this information gap, the main purpose of this paper is to analyze the types and amounts of avoidance measures that are used by households in Moscow based on a recently completed survey of 615 households in Moscow. This example from Moscow can be used as a guide for future studies in other cities in Russia to evaluate opinions of quality and the use of avoidance measures to manage health risks from drinking water.

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The paper is organized into three main sections. After the introduction in section 1, section 2 discusses the basic data obtained as part of the Moscow Drinking Water Survey. After a description of the telephone survey method, information is provided on the types and frequency of use of different avoidance measures, opinions on water quantity issues (consistency of supply), and water quality. The survey data clearly show that Moscow residents regularly undertake measures to manage health risks from the public water supply: over 88 per cent of the sample boil water regularly due to concerns about water quality; 23 per cent filter water regularly; over 30 per cent settle water regularly; and about 13 per cent buy bottled water regularly. On the other hand, residents are generally content with their *cold* water supply and quality of delivery.

Moscow residents receive water from two main sources, the Moscow river and the Volga river. Residents report being satisfied with their water quality (88 per cent for Volga and 82.2 per cent for Moscow), but opinions of quality are lower for the Moscow source and there is more reported annual variation in the Moscow source as well.

Section 3 of the paper develops a simple economic model of avoidance decisions. The model shows how prices, income, and basic water quality should be related to avoidance choices. As reported in section 4, based on logit regression analysis, avoidance decisions reported in the Moscow survey are systematically related to household income and information on initial water quality. The results are consistent with the model of avoidance behavior developed in section 3. As a result, it is concluded that final health risks related to water consumption in Moscow could be substantially less that initial risks at the tap. How much less in Moscow than other Russian cities remains an important empirical question for further exposure assessment research.

Transition to markets and the environment: Effects of the change in the composition of manufacturing output

TOMISLAV VUKINA, JOHN C. BEGHIN AND EBRU C. SOLAKOGLU

This paper analyzes environmental problems in former centrally planned economies (CPE) during their transition from plan to market. The empirical question addressed is whether the transition from a centrally planned

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to a market-driven economy exacerbates environmental degradation, or is it the case that environmental improvements complement economic transition.

Since no reliable statistics exist to monitor trends in pollution emissions in former CPE, in constructing the data set for the purpose of inter-temporal and inter-country comparison, we had to rely on approximations. First, our goal is to quantify the changes in environmental quality that occurred in the early years of transition by measuring the changes in the composition of manufacturing output in the direction of cleaner or dirtier industries. Second, controlling for the overall decline in economic activity, which turned out to be a necessary byproduct of the transition process, we analyze whether changes in the composition of output towards dirtier or cleaner industries can be explained by the relevant institutional changes, i.e., primarily by the degree of the completeness of transition reforms but also by the changes in environmental regulatory regimes.

Using relatively simple techniques we investigated the character of the change in the pollution emissions of 13 pollutants plus energy intensity of value added in 12 former CPE. We found that pollution emissions associated with aggregate manufacturing production have substantially decreased because of the near collapse of manufacturing in many of the former CPE. However, it was more difficult to identify patterns of changes in emissions due to the new composition of manufacturing activities. A diversity of patterns emerge with some cleaner composition for some effluent types and some countries, but also with dirtier composition of other pollutants and countries. Despite these heterogeneous patterns, we were able to identity two recognizable clusters of countries. The first group comprises Azerbaijan, Bulgaria, Kyrgystan, Latvia, Slovakia, and Ukraine. For these countries, the emphasis on chemicals, metallic industries, and plastics seems to have survived transition or even increased. The second group consisting of Armenia, Hungary, Macedonia, Poland, Russia, and to a less extent Slovenia, shows consistent environmental improvements in the composition of manufacturing output with respect to most pollution emission types except for biological oxygen demand and volatile organic compounds.

Finally, we find that price liberalization, trade and foreign exchange system reforms, and enterprise restructuring and privatization resulted in a cleaner composition of manufacturing output and reduced energy consumption per dollar of value added. With available data capturing the degree of environmental policy reforms, we also find that the amplification of the environmental regulatory regime caused a shift towards less-polluting allocation of resources.

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