ECA RAILWAYS: TRENDS, PROSPECTS, AND CHALLENGES

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ABSTRACT

The purpose of this paper is to identify the problems and potentials of ECA railways by evaluating the past trends and future prospects of a sample of nine railways -- those of Bulgaria, Croatia, Hungary, Kazakhstan, Macedonia, Poland, Romania, Russia, and Turkey -- and comparing them to the railways of France, Germany, and the U.S.A. The evaluation was based on the Bank’s railway data base, the Bank’s World Development Indicators, and various railway reports. It takes account also of European Union railway policies and the experience of reforming Latin American railways.

We evaluated, during the transition period of 1985 through 1996, the changing importance of the railway role in the transport sector, the amount of public expenditures on railways, and the actions already taken by the railways themselves to improve efficiency and service quality. The period was characterized by lower transport volumes and a decline in rail transport intensity (i.e., rail transport volumes relative to GDP). Modal competition increased and the economic importance of railways relative to other modes decreased.

Currently, the nine ECA railways have large amounts of redundant employees, as well as track, locomotives, and rolling stock in excess of future needs. Modernization of railway assets must be preceded by rationalization since it is unrealistic to expect financially stretched Governments to provide the required funding. Moreover, even if this were feasible, it would not be efficient.

Future prospects and challenges will be different for freight and passenger transport. Most ECA railway freight services will be commercial services whose revenue from customers should cover long-run variable cost, including rolling stock and infrastructure replacement cost. In contrast, few if any ECA railway passenger services will be commercial services whose long-run variable cost will be covered by customer fares. Nonetheless, some passenger services will be justified economically and thus will generate public benefits that can be distributed as public subsidies.

In this context ECA railways ought to focus mainly on two strategic objectives:

- meet expected transport demand in commercial markets where they have a comparative economic advantage, and
- minimize their financial losses in non-commercial, economic markets in order to minimize their need for public expenditures.

The Bank through its existing and future railway projects should assist ECA railways to achieve these two objectives.

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Reactions from readers are always welcome and may best be addressed either to the named authors, c/o World Bank, 1818 H Street N.W., Washington, D.C. 20433, or to the Director, ECSIN, at the same address. The Director’s E-Mail address is: RHalperin@Worldbank.org
ECA RAILWAYS: TRENDS, PROSPECTS, AND CHALLENGES

Introduction

The railways of Eastern Europe and Central Asia have been very severely affected by the transition from centrally planned to market economy, but they also continue to account for much higher shares of total traffic than do the railways in the industrialized OECD countries. Their economic significance, combined with the deep transformation required, both argue for a special place for railways in international assistance efforts. The World Bank and EBRD have worked closely together, using their respective comparative advantages: (i) linkage with reforms of national economic policies and structures, and (ii) focus on enterprise restructuring and private-sector investments. The few major loans that the Bank's ECA Region has made for railways in the last few years -- to Bulgaria, Romania and Croatia -- have all accompanied simultaneous loans from EBRD, and EBRD has also been closely informed -- sometimes as a direct participant -- about dialogues between the Bank and other member countries on railway reform issues. In terms of total dollar volume of lending direct to ECA railways, EBRD has been about twice as important as the Bank over the last eight years. (For most of the EU Accession countries, the EIB has been an even more important funding source, focussed, however, on expansion of trans-European networks rather than reform and restructuring.)

The purpose of the present paper is to elucidate the problems and potentials of ECA railways by comparing the performance of a sample of them with that of some OECD country railways. For key problems that the ECA railways face, attention is also given to relevant experience from some of the reforming railways in Latin America and to the railway reform policies of the European Union. Progress under the main railway reform programs recently supported by the Bank in the region is also briefly reviewed. The objective is to develop appropriate priorities for future Bank work with ECA railways -- in the concluding three pages.

International comparisons of railway performance bring out the great differences among countries' economic geographies and political histories. These differences account for many of the contrasts in performance. But equally the contrasts in performance may help to identify priorities for reform in the political and economic environments of railways. This may be especially important in the case of Europe with its steady progression and strong commitment to the achievement of deeper economic union over an increasingly wide area.

These considerations apply with particular force to the countries of the ECA region, involved in transforming railways from a dominant state-controlled means of transport among enterprises spread across the former COMECON area, meeting demands set by central planners -- into just one mode of transport competing to meet increasingly decentralized demand of shippers and travelers, including greatly increased trade with Western Europe. Huge changes in manufacturing and trade patterns have greatly reduced railway traffic, at the very same time as the railways were being required to increasingly earn their own keep, and yet to ease the pain of economic transition for the population by keeping freight and passenger tariffs low. These conflicting pressures have compressed into a very few years needs for change which many of the Western European railways had several decades to meet. It is impressive that several of the Eastern European railways have already achieved the reputation of being more dynamic modernizers and reformers than most of their Western European counterparts.
What is the economic significance of railways?

Because data on traffic volumes handled by other modes is of questionable value in most ECA countries, a good overall indicator of the significance of the railways is passenger and freight revenue as a percent of GDP. Revenue and GDP are measured in current local market prices. Since transport revenue is considered to be the measure of value added by the transport sector, the ratio indicates how the value added of the railway sub-sector is changing relative to GDP.

The table below gives the most recent data (1996 or 1995) for revenues as a percent of GDP. Recent trends for freight revenues as a percent of GDP have been downward, reflecting faster growth in other GDP sectors and modal competition. In a few countries the recent trend of passenger revenue as a percent of GDP has been upward, reflecting the results of efforts to increase passenger revenue by fare increases in real terms.

<table>
<thead>
<tr>
<th>Country</th>
<th>Combined Freight and Passenger Revenue as % of GDP</th>
<th>Freight Revenue as % of GDP</th>
<th>Passenger Revenue as % of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>3.6</td>
<td>3.1</td>
<td>0.5</td>
</tr>
<tr>
<td>Kazakstan</td>
<td>3.5</td>
<td>3.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Poland</td>
<td>1.9</td>
<td>1.5</td>
<td>0.4</td>
</tr>
<tr>
<td>Romania</td>
<td>1.6</td>
<td>1.2</td>
<td>0.4</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>1.4</td>
<td>1.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Hungary</td>
<td>1.2</td>
<td>0.8</td>
<td>0.4</td>
</tr>
<tr>
<td>Croatia</td>
<td>0.6</td>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td>Turkey</td>
<td>0.1</td>
<td>0.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Germany</td>
<td>0.7</td>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>France</td>
<td>0.5</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>0.4</td>
<td>0.4</td>
<td>---</td>
</tr>
<tr>
<td>(Class I Freight)</td>
<td></td>
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</tbody>
</table>
Relative to GDP, the railways remain far more significant in many ECA countries than in France, Germany, and the U.S.A.
How has the freight transport role of each railway changed?

In absolute terms, an indicator of the railway freight transport role is the output of freight transport services, measured by the number of tons of freight carried one kilometer, or freight ton kilometers (TKM).

Railways of Russia, Kazakstan, Poland, Romania, Hungary, Bulgaria, and Croatia showed a generally flat trend in freight volume prior to 1990 and again starting in 1993 or 1994, with significant traffic declines during the intervening period of their countries’ transition to lower transport intensity and increasing modal competition. Freight traffic of Macedonia Railways has been in a long-term downward trend, with a drop and partial recovery during 1994-96.

Freight volume on the railways of France and Germany has declined at a slower rate, while that of Turkey and the United States has increased (see below).

<table>
<thead>
<tr>
<th>Overall % Change from 1985 to 1996</th>
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<tbody>
<tr>
<td>Railway</td>
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<tr>
<td>Bulgaria</td>
</tr>
<tr>
<td>Croatia</td>
</tr>
<tr>
<td>France</td>
</tr>
<tr>
<td>Germany ³</td>
</tr>
</tbody>
</table>

¹ From 1988 to 1995.
² From 1989 to 1996.
³ From 1991 to 1996.
Freight volumes fell steeply early in transition but recently have leveled off.
How has the freight transport role of each railway changed?

Another indicator of the railway role is the railway freight transport intensity in the country. Trends in this indicator measure the combined effect of: (i) structural changes in the economy (such as different relative growth rates for goods-producing and service sectors, and trends in dispersal or concentration of population and economic activity which influence transport demand); and (ii) traffic diversions between transport modes caused by market decisions.

Railway freight transport intensity is measured by dividing freight ton kilometers by country GDP on a Purchasing Power Parity (PPP) basis, measured in constant terms by U.S. dollars in 1996 prices and denoted here by the term 'PPP-GDP.' Principal findings are:

- Freight intensity declined over the 1985-96 period in all countries in the study except the United States, where it increased by 19% to 0.3.

- Freight intensity in Kazakhstan in 1996 was 1.3 times that in Russia and over ten times that in Poland, Romania, Bulgaria, and the U.S.

- Freight intensities in Croatia and Hungary show the steepest downward trend, to a level that is less than half that of Bulgaria. This suggests the even greater need in those two countries than in the other countries for railway restructuring and adjustment.

- Because of constraints within the railway sub-sector as well as market competition, freight intensities in Poland, Hungary, Romania, Croatia, and Bulgaria may converge at about 0.1. This is still more than double the 1996 freight intensities in France and Germany. Freight intensities in Russia and Kazakhstan are likely to remain at least ten times higher, at 1.0 or more.

4 For comparisons between countries in this study, GDP is computed in U.S. dollars on the basis of Purchasing Power Parity (PPP) indices, rather than official exchange rates. GDP computed on a PPP basis is intended to measure the relative values for a specific basket of goods and services in different countries, unlike GDP computed on the basis of official exchange rates that reflect the relative value in foreign exchange transactions of one country’s currency compared to another. For this study the PPP basis is considered to be a better measure of the relative value of a country’s currency, since it measures relative purchasing power.
Rail freight intensity (freight volume relative to PPP-GDP) has leveled off in many ECA countries, following the earlier transition period, but continues to be much higher than in France and Germany.
**How has the passenger transport role of each railway changed?**

An absolute indicator of the railway passenger transport role is the number of passengers carried one kilometer.

Railways of Russia, Kazakstan, Poland, Romania, Hungary, Bulgaria, and Croatia showed a generally flat trend in passenger volume until the countries began their transition to lower transport intensity and increasing modal competition. This transition began at different times (Poland, Romania, and Hungary in 1990; Bulgaria, Croatia, and Macedonia in 1991; Turkey in 1993; and Russia and Kazakstan in 1994). From 1991 to 1996, passenger volume on the French Railways and German Railways has shown little change.

<table>
<thead>
<tr>
<th>Overall % Change from 1985 to 1996</th>
</tr>
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<tbody>
<tr>
<td>Railway</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>Bulgaria</td>
</tr>
<tr>
<td>Croatia</td>
</tr>
<tr>
<td>France</td>
</tr>
<tr>
<td>Germany $^7$</td>
</tr>
</tbody>
</table>

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$^5$ From 1988 to 1995.
$^6$ From 1989 to 1996.
$^7$ From 1991 to 1996.
Passenger volume also fell during transition but recently has leveled off in many ECA countries.
How has the passenger transport role of each railway changed?

Railway passenger transport intensity, like railway freight transport intensity, measures the combined effect of: (i) structural changes in the economy; and (ii) traffic diversions between transport modes caused by market decisions.

Railway passenger transport intensity is measured by dividing passenger kilometers by country GDP on a PPP basis, measured in constant terms by U.S. dollars in 1996 prices denoted here as PPP-GDP. Principal findings are:

- Passenger intensity in Russia, Kazakstan, Romania, and Bulgaria rose in some years when GDP declined without corresponding drops in rail passenger volume. Passenger intensity in Kazakstan in 1996 was slightly above Russia’s and two to three times that in Poland, Romania, and Bulgaria.

- Passenger intensity in Turkey is less than one-third that of France. Passenger fares in Turkey are among the lowest of the 12 countries (page 17), which suggests the need for restructuring to reduce the freight to passenger cross subsidy.

- However, as passenger fares in real terms have increased (page 17), passenger intensity has dropped, since demand is price-elastic. For example, in Poland passenger intensity dropped from .256 in 1989 to .087 in 1996 while passenger fares in real terms rose from .80 to 3.81 U.S. cents per passenger kilometer. Passenger intensities in Romania, Hungary, Bulgaria likewise will fall if passenger fares are increased substantially to reduce the freight to passenger cross subsidy.

- Because of constraints within the railway sub-sector as well as market competition, passenger intensities in France, Germany, Poland, Hungary, Romania, Croatia, and Bulgaria may converge at .04 to .05. This implies that passenger intensities in France and Germany would remain little changed while intensities in the other countries would continue to fall. Russia and Kazakstan will continue to have much higher passenger intensities, about 0.2.

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8 See footnote 4 on page 6 above.
Rail passenger intensity in many ECA countries (passenger volume relative to PPP-GDP) is much higher than in France and Germany. But it declined throughout the period as fares were raised to improve cost recovery.
To what extent have government subsidies covered railway costs?

Government subsidies include operating and capital grants paid by the government to railways, but complete data was not available for most ECA railways, even for direct subsidies. Principal findings are:

- **Croatia and Hungary** had the highest 1996 percentages, 1.2 % and .9 % of GDP, respectively.

- **Bulgaria, Poland, Romania, and Russia** were .3 to .4 % of GDP.

- Recent data for France and Germany were not available, but Germany’s subsidy as a percent of GDP appears to have fallen from .7 % in the 1991-93 period.

*Ratios of the revenue received from customers to the subsidies received from government* range from a high of over 11 for Russia to a low of one for Croatia and Hungary. (A ratio of one means that half the costs of the railway are being paid by freight customers and passengers and half by the government.)

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9 Two other kinds of subsidies not measured in this study are:

- **Cross subsidies.** A cross subsidy from users of freight services to passengers is defined if passenger services have an overall negative contribution to overhead and profit, based on the avoidable cost of passenger services. Cross subsidy estimates were available only for Russia and Hungary and were apparently based on fully-allocated costs, which usually overstate the amount of cross subsidy.

- **Deferred subsidies.** Current users of some railways that are deferring essential maintenance and capital expenditures receive a deferred subsidy from future users who will be forced to pay more to catch up the deferred maintenance and capital expenditures. To estimate deferred subsidy, the first step would be to identify the rationalized railway infrastructure and rolling stock required to meet economic demand. Second, the deferred maintenance and capital expenditures for the rationalized railway would be estimated.
Government subsidies as a % of GDP have declined in many ECA countries during the period, but still represent a serious fiscal burden, especially in Croatia and Hungary.
What self-help measures has the railway already carried out?

To reduce their fiscal impact while adjusting to the reduced demand for freight services, ECA railways have, as a form of self-help, generally raised the level of freight tariffs selectively and across-the-board. At the same time, some traffic – especially traffic with higher revenue per ton kilometer -- has been diverted to other modes. Also, in some countries movements of low-rated freight traffic have decreased as commodity producing sectors restructured. Finally, there has been an expansion of the percentage of freight traffic moving under contracts negotiated with shippers, and these markets have become increasingly competitive.

The net result of these changes measured in constant terms on a PPP basis is indicated by generally downward trends in real freight revenue yield per ton kilometer. Principal findings are:

- The railways of Hungary, Croatia, Poland, Germany, France, and Romania have the highest freight revenue yield (i.e. average gross revenue per ton-kilometer) – 5 cents to 8 cents in 1996 U.S. dollars. Croatia has relatively short hauls, which usually means a higher freight revenue yield. These railways also may have been more successful in the past at maintaining prices in the face of weak competition from other modes. However, a higher freight revenue yield – usually accompanied by cross subsidies to passenger traffic – may mean the railway and the goods-producing sectors of its economy were less competitive than they might have been.

- Russia (1.8 cents) and Kazakstan (1.0 cent) had 1996 freight revenue yields closer to that of the U.S. Class I freight railways (1.4 cents).
Freight revenue yield per ton-km, computed on a Purchasing Power Parity (PPP) basis in real terms, is much higher in many ECA countries than in the U.S., Kazakhstan, and Russia. While this differential reflects those ECA countries’ traditionally weak modal competition and shorter average hauls, it also is a drag on their country’s trade competitiveness.

![Graph showing constant US cents freight revenue per TKM from 1985 to 1996 for various countries including Bulgaria, Croatia, Germany, Hungary, Macedonia, Poland, Romania, Russia, Turkey, and United States Class I.]
What self-help measures has the railway already carried out?

ECA railways have, as a form of self-help, generally raised the level of passenger tariffs selectively and across-the-board. The result has been that the higher-rated traffic (with higher revenue per passenger kilometer) has been diverted to other modes. In most countries tariff increases on commuter and other local passenger transport have not been as much as those for long-distance travel. The net result of these changes measured in constant terms on a PPP basis is indicated for most railways by generally downward trends in real passenger revenue yield per passenger kilometer. Principal findings are:

- Several railways have shown recent improvement in real passenger revenue yield (i.e. average gross revenue per passenger-kilometer). Poland (earlier) and Russia (more recently) have shown commendable long-term improvements. Germany had a large gain in real passenger revenue yield from 1993 to 1994, mainly due to reform of the formerly depressed East German passenger tariffs.

- In most other cases, the frequent nominal increases still have not been sufficient to increase yield in real terms.

In 1996, Germany at 13 cents had the highest yield. France and Croatia were at 6.0 and 4.7 cents, respectively. Poland and Hungary were at 3.8 and 3.1 cents, respectively. Romania, Turkey, Kazakstan, Russia, and Bulgaria had 1996 passenger revenue yield between 2.2 and 1.6 cents.
Passenger revenue yield per passenger-km, computed on a Purchasing Power Parity (PPP) basis in real terms, is much lower in many ECA countries than in the wealthier countries of France and Germany. However, fuel, materials, and many other costs of passenger services provided are the same or higher in ECA countries.
**What self-help measures has the railway already carried out?**

The ratio of passenger revenue yield to freight revenue yield is an indicator of the presence of a freight to passenger cross subsidy. Each passenger kilometer has a significantly higher variable cost than one ton kilometer. Therefore, if the ratio of passenger revenue yield to freight revenue yield is less than one, it can be safely assumed that freight to passenger cross subsidy is an important issue for that railway. Principal findings are:

- Germany, Kazakstan, France, and Russia (barely) had 1995 or 1996 ratios of 1.0 or above. This indicates that cross subsidy of passenger services by freight services, while still an issue, is likely to be less so for them than for the other railways.

- Railways that appear to have the worst cross subsidy problem are those of Bulgaria, Hungary, and Romania. For this reason, the ongoing Bank railway operations in Bulgaria and Romania have particularly emphasized the need to increase passenger revenue yield in real terms, at the same time that real freight revenue yields have come under increasing competitive pressure.

Cross subsidy is also an important issue for the railways in the middle: Turkey, Croatia, Russia, Kazakstan, and Poland. While the trend in the ratio recently has been upward, this is partly due to a declining freight revenue yield and may not indicate any improvement in the cross subsidy problem.
The ratio of passenger revenue yield to freight revenue yield indicates a severe cross subsidy problem in many ECA countries, since the ratio is less than one while the ratio of passenger to freight variable costs is much higher than one.
**What self-help measures has the railway already carried out?**

Besides self-help efforts to improve their revenue yield, ECA railways’ efforts to improve the utilization of key assets such as freight wagons and main track are of interest.

Freight wagon utilization is measured by dividing ton kilometers by the number of freight wagons *owned* by the railway. From country to country, varying percentages of ton kilometers were produced by privately-owned wagons and wagons owned by other railways. Also, varying percentages of the railway’s owned wagons were on other railways or were unserviceable. Since data for the percentage of wagon ownership serviceable on line that would take these factors into account were not available, the comparisons should be considered approximate. Principal findings are:

- The level of utilization in the U.S. is due to heavier loads more than to faster turnaround times (i.e., cycle times from one load to the next load). For commercial reasons, and because many U.S. freight wagons are used by the chemical industries and others for storage as well as for transport, U.S. freight wagon cycle times from load to load were traditionally below that of the FSU and other Communist countries.

- Freight wagon utilization in Russia, Kazakstan, Croatia, Bulgaria, Hungary, and Romania had not recovered to 1980s levels by 1996. As transport markets in these countries become more commercial and competitive, it is unlikely that wagon utilization will reach former levels.
Many ECA countries produce far less ton-kilometers from each freight wagon than the railways of the U.S., Russia, and Kazakhstan. The resulting poorer asset productivity reduces the profitability of freight services and is a drag on the trade competitiveness of those countries.
What *self-help measures* has the railway already carried out?

Productivity of main track is a density indicator that is measured by the total of passenger and ton kilometers divided by the number of main track kilometers. Track productivity has declined since the mid-1980s on the railways of Russia, Kazakhstan, Romania, Poland, Bulgaria, Hungary, and Croatia. This is mainly because the size of their rail networks has not changed significantly since that time, while traffic volumes have greatly fallen.

ECA railways have significant amounts of their total track, locomotives, wagons, and other assets that are not available for service because they require repairs. Moreover, some unserviceable assets are obsolete and would not be replaced. For these railways, *rationalization has become an issue*. Although the immediate cash benefits from rationalization may be small, failure to undertake it in timely fashion will mean a continuing steady diversion of resources away from the economic (and presumably financially viable) core system where they should be concentrated.

Experience around the world shows that commercial railways, which are both capital and labor intensive, simply cannot afford to replace all of their current assets. The result is *an imperative* for ECA railways to radically rationalize and downsize infrastructure and rolling stock assets.

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10 For measurement of track utilization, passenger kilometers have been weighted at three times the value of ton kilometers since experience has shown that each passenger train operated requires at least the amount of main track capacity required for three freight trains.
Unlike the railways of the U.S., Russia, and Kazakhstan, many ECA railways produce far less freight and passenger transport from each kilometer of main track. Again, the resulting poorer asset productivity reduces the profitability of rail services and is a drag on the trade competitiveness of the country.
What has been the recent experience of U.S. freight railways?

Perhaps the most successful overall experience of railways around the world in recent years has been that of the United States Class I freight railways. Government deregulation of transport prices motivated railway managements to realize a 100% gain in labor productivity between 1987 and 1996. A recent MIT study\(^{11}\) found that nearly all resultant labor cost savings were passed on to customers in the form of lower freight rates, so that average freight revenue yield fell by one-third in real terms and net railway operating income in real terms remained at early 1980s levels.

From the viewpoint of the overall U.S. economy, the reduction in direct rail freight transport costs during the period from 1987 to 1996 allowed a reduction in the delivered cost of goods that may have been on the order of 10 to 15%, considering the value of goods carried by rail. The reduction in delivered cost of goods improved the international trade position of the U.S. and provided income benefits to American consumers.\(^{12}\)

What might have happened to U.S. railways without the labor productivity improvement? Considering that increased truck sizes and weights during the same period led to much tougher competition for U.S. railways, we believe that there would have been a repeat of the financial crisis of the 1970s, when several railways in the Northeast became bankrupt and failed to reorganize. Their essential services were taken over by Conrail, a railway owned by the U.S. Government.\(^{13}\) As part of the nationwide restructuring of U.S. railways, many miles of track were abandoned and removed. We therefore believe that labor productivity improvements on the scale achieved in the United States will be essential over the long term for most other railways of the world to transform them into financially independent and commercially oriented companies.


\(^{12}\) Similarly, in Argentina freight tariffs in rail competitive markets appear to have fallen in real terms following the transformation of railways.

\(^{13}\) Conrail later was sold by the U.S. Government to private investors, and its network recently was split and acquired by two privately-owned railways in the eastern U.S.
In the United States, government deregulation of transport prices motivated railways to improve labor productivity by 100% from 1987 to 1996.

Nearly all resultant labor cost savings were passed on to customers through lower freight rates, so that freight revenue yield fell by one-third in real terms.
What is the labor productivity issue for ECA railways?

The labor productivity issue is very relevant for ECA railways as modal competition intensifies and traditional railway markets disappear, and as their unit labor costs continue to rise and absorb relatively more of their revenues. To frame the issue we projected into the future to a time when country income levels have reached current U.S. and Western European levels, and when investments have been made to take full advantage of modern railway technologies, including those for heavy haul freight and, on selected routes, even double-stack containers. Six selected ECA railways and the railways of France and Germany were evaluated against a benchmark for efficient labor productivity that we assumed was established by the 1995-96 performance of U.S. Class I freight railways for freight transport and by the Japanese railways for passenger transport. Labor productivity was defined as the weighted sum of passenger kilometers and ton kilometers divided by the number of employees.

The benchmarking measured returns to scale based on the fact that higher main track density would improve labor productivity. In the future scenario the six railways’ labor productivity was assumed to equal the benchmark set by the United States Class I freight railways and the Japanese railways. After assuming various relative weights for passenger and ton kilometers, we found a good fit to the data for the U.S. and Japanese railways could be obtained if each passenger kilometer were assumed to require 10 times as many employees and main track capacity as a freight ton kilometer. The analysis then showed that, at the benchmark level of productivity, the six railways would need only 10 to 15% of the employees they now have. International railway specialists’ judgment and our experience with railways undergoing transformation is that this range of improvement is reasonable to expect.

Of course, achieving such a large increase in labor productivity is not just a matter of cutting back staff. Sufficient financing for investments to make the railways more labor and capital efficient also will be required. Savings in labor and other operating costs and improved asset utilization must justify these investments. As staff become surplus, the railways and their governments will be faced with the problem of how to productively re-employ surplus railway staff in labor markets where there may be high unemployment and where safety nets for unemployed railway staff may be inadequate. Moreover, this will happen over time, since the rate at which these investments are made will depend on the railways’ competition and on how rapidly the railways’ unit labor costs rise.

Today’s European railway network is characterized by high labor inputs. If we envision that sometime in the future the European railway network will have the labor productivity of a U.S.-like scenario, there will be a difficult and involved process over a significant period of time in which the World Bank sees itself as being of some considerable value to its clients in articulating and smoothing the way to speed these welcome changes.

14 The six selected ECA railways were those of Bulgaria, Hungary, Kazakhstan, Poland, Romania, and Russia.
At a level of productivity benchmarked by the performance of U.S.A. and Japanese railways (dashed curve), the six ECA railways would need only 10 to 15% of the employees they now have (solid curve).
How have reforming Latin American railways reduced excess labor?

There are two important lessons for future ECA railway operations that arise from the experiences of Latin American railways and other railways that are undergoing major reform.

The first lesson learned from the Bank’s experiences in Chile and Brasil is that it is possible to negotiate very significant reductions in the workforce that produce improvements in labor productivity without deal-breaking opposition from labor, but private concessioning has been a significant supportive factor.
Chilean railway employment fell 75% between 1973 and 1990 and was more than halved again in the last five years in connection with privatization of most of the system.

In Brasil employment of Federal Railways fell 75% between its peak in 1957 and 1995, partly reflecting separation of suburban passenger services. Since 1995 it fell another 75% with the aid of state-assisted programs for concessioning of all regional freight networks. It is now about 10,000 in total.
How have reforming Latin American railways reduced excess labor?

The social costs of such staff cutbacks, while not insignificant, can be acceptable if carefully handled. In the Brazilian case, for example, a World Bank loan in 1996 helped fund severance payments negotiated between the railway and the labor union for some 20,000 railway staff. About 16,000 staff-members were then able to move onto retirement pension -- from the railways and other earlier employers. Regarding the remaining 4,000 younger staff retrenched, a recent survey, one year after their departure from the railway, showed that, despite the relatively weak employment situation in Brazil in the intervening period, some 85% were employed or self-employed -- a large majority within a few months of leaving the railway -- and some 50% were already earning wages similar to those they had received on the railway.
Of those below retirement age who were declared redundant in Brasil, some 85% found new employment or self-employment within a year – the large majority within a few months of leaving the railway.
How have Latin American railway concessions affected suburban passenger service?

The second lesson learned from the Bank’s experience in Argentina and Brasil is that it is possible to concession suburban passenger services to private investors (e.g., Buenos Aires, Rio de Janeiro) and provide improved services at affordable fares.

For example, the number of passengers on the 900-km Buenos Aires suburban services has doubled over the four years since they were concessioned. Cancelled and delayed trains have fallen by two-thirds, and the annual state subvention has been approximately halved. On the subway, passengers have increased about 50%, and the operating subsidy has been eliminated. These increases reflect recovery of traffic previously lost to buses and cars.
The number of passengers carried on the 900-km Buenos Aires suburban services has doubled since the concession.
How can ECA railways become more competitive?

We share the concern of the European Commission about the urgent need to make not only the ECA railways, but all of Europe’s railways more competitive. This concern led the EC to adopt a policy for access to railway infrastructure for its member states that distinguishes between railway service providers and railway infrastructure providers. The intent is to better promote competition between multiple service providers on a common railway infrastructure.

The EC access policy encourages major market extensions of existing railway service providers now operating entirely within a member state by the formation of “international groupings of railway undertakings.” The EC policy also may allow anyone with a “legitimate interest to seek railway capacity” to bid for access to railway infrastructure. Service providers could include purchasers of public passenger services, combined transport operators, and large freight shippers.

The new service providers would operate over the infrastructure of the present national railways. The policy adds to the urgency of fundamental railway reform in the countries aiming at early accession to the European Union, and it eventually will affect other ECA railways.

The EC policies for competitive access to infrastructure -- as well as other policies that encourage reorganization along separate lines of business, greater attention to cost recovery for specific services, and development of new institutions for economic regulation of transport -- are consistent with those of the World Bank, as stated in ECA’s Infrastructure Strategy Paper.

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15 As promulgated in European Council Directives 91/440/EEC, 95/18/EC, and 95/19/EC.
EC policies on railways are both a strong support and an urgent stimulus to reform.

ECA railways must greatly improve competitiveness with strong line-of-business management, supported by appropriate costing and financial controls, or be vulnerable on three counts:

1. EC policies might result over the long term in less opportunities for major market extensions by ECA railways than by railways of Western Europe.

While EC policies encourage reciprocal rights of access, these may have little value to those ECA railways with less internal expertise, less external knowledge of the markets’ needs, less market power in principal western European and trans-European markets, and even a different track gauge, compared to their potential competitors based in Western Europe.

2. EC policies could encourage private or contract railway service providers to selectively divert higher-contribution traffic.

Railway average unit costs exceed variable (marginal) costs. Thus, in order to maximize contribution to overhead and profit, a commercial railway must set prices based on its customers’ different willingness to pay, with variable unit cost (not average unit cost) as a floor. If private or contract railway service providers compete with an ECA railway by “cream-skimming” traffic with the highest revenue and contribution, this will leave a common-carrier ECA railway with mostly low-contribution traffic that would provide, overall, insufficient contribution to cover the profit needs of a viable railway.

3. EC policies create safety and cost issues because the new management interface between the infrastructure manager and the service provider coincides with the critical physical interface between the wheel and rail.

Managements of integrated railways in North America and elsewhere are totally responsible for both sides of the wheel-rail interface, including the design and maintenance of infrastructure, locomotives, and rolling stock, and responsibility for cost recovery. EC policies divide this responsibility. The danger is that an infrastructure manager may be more likely than an integrated railway manager to base decisions at the rail-wheel interface on political rather than on commercial and engineering considerations, thereby creating safety and cost problems. Therefore, special efforts will be required to insure that safety of operations and rail transport costs are not affected adversely.
Is North American practice applicable to ECA railways?

For countries that are not EU accession candidates, other options besides the EC competitive access policies could provide meaningful competition *between* railways if the level of existing competition from other modes is insufficient to stimulate the railways to greater efficiency.

One such option has been adopted recently by Mexico.\(^{16}\) It is an option that is based on over one hundred years’ experience in the U.S. and Canada. Over the long term -- as EU railways implement the policy of separation of infrastructure from operations and open access for qualified service providers -- this may be an option within the EU as well if international groupings of infrastructure owners are formed and competitive railway networks are created.

Each U.S. and Canadian line-haul freight railway is an integrated railway that owns most of the infrastructure over which it provides services. Public regulatory policy is to allow the integrated freight railway to compete with other modes in most markets and to compete with other freight railways in the strategically important markets. Where railways do not own the infrastructure, they compete using line-haul joint facilities that allow a tenant railway to use a railway landlord’s track. Although most line-haul freight joint facilities in the U.S. and Canada involve an owner and only one tenant, the resulting competition usually has been effective. This method of providing competition between railways has allowed government economic regulation to be largely replaced by market regulation in these countries. Under this regime, average U.S. rail freight rates in real terms fell 50% from 1981 to 1996, as discussed above.

Thus, line-haul trackage rights in the U.S., Canada, and now Mexico do not involve separation of infrastructure management from provision of services. Moreover, the tenant railway as well as the owner is involved in some way in infrastructure management. The owner railway -- usually but not always the primary user -- owns and maintains its infrastructure, operates its trains, and dispatches its trains as well as those of the tenant. The tenant usually pays part of infrastructure maintenance and dispatching costs based on use. The tenant usually must approve annual maintenance programs and capital improvements and usually participates in the financing of capital improvements.

If the North American approach for providing competition between railway service providers were to be adopted by one or more ECA railways, the restructuring would be done with the objective of promoting effective competition between two integrated railways in the most important national and international markets and effective rail vs. road competition in other markets, just as it is being done in Mexico.

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\(^{16}\) With the concession of the Ferrocarril Sureste in July, 1998, the Mexican Government has now transferred most railway freight traffic to private control.
Restructuring of the national rail network into two or more competitive, integrated railways, *either within its own borders or internationally* in concert with adjacent countries, is illustrated on the “before and after” maps of the railway network of an “Imaginary Country” below.
How has the Bank assisted with transformation of ECA railways?

There have been three recent World Bank loans for ECA railway projects, each accompanied by a simultaneous loan from EBRD. The objective of all three projects has been to ‘support and deepen the restructuring process which the Railways and the Government have initiated.’ Project particulars and components are shown below:

<table>
<thead>
<tr>
<th></th>
<th>BULGARIA</th>
<th>ROMANIA</th>
<th>CROATIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loan</td>
<td>Loan 3922</td>
<td>Loan 3976</td>
<td>Loan 4433</td>
</tr>
<tr>
<td><strong>Project Particulars:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loan Amount, million</td>
<td>US$ 95</td>
<td>US$ 120</td>
<td>EUR 85.4</td>
</tr>
<tr>
<td>Disbursed through April 30, 1999, million</td>
<td>US$ 61</td>
<td>US$ 26</td>
<td>EUR 0</td>
</tr>
<tr>
<td>Approved by Board of Executive Directors</td>
<td>July 1995</td>
<td>January 1996</td>
<td>January 1999</td>
</tr>
<tr>
<td>Planned Loan Closing Date</td>
<td>6/30/2000</td>
<td>12/31/2001</td>
<td>6/30/2003</td>
</tr>
<tr>
<td>Rating of Project Development Objectives</td>
<td>Satisfactory</td>
<td>Satisfactory</td>
<td>Not rated</td>
</tr>
<tr>
<td>Rating of Implementation</td>
<td>Satisfactory</td>
<td>Satisfactory</td>
<td>Loan not yet effective</td>
</tr>
<tr>
<td><strong>Project Components:</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Restructuring Action Plan and technical assistance</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Management information systems</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Signaling and telecommunications</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Track maintenance equipment and components</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Locomotive and rolling stock maintenance equipment and components</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Environmental protection</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Labor redundancy severance payments</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
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</tbody>
</table>
**How has the Bank assisted with transformation of ECA railways?**

**PROGRESS OF RAILWAY REFORM**

<table>
<thead>
<tr>
<th>Bulgaria (BDZ)</th>
<th>Romania (SNCFR)</th>
<th>Croatia (HZ)</th>
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</thead>
<tbody>
<tr>
<td>During 1998 BDZ eliminated the regional layer of management, reduced staff by 6,100 (12%), and strengthened marketing and business planning.</td>
<td>In October 1998 SNCFR was divided into five companies under the Minister of Transport, and staff was reduced by 28,200 (21%) by year-end.</td>
<td>On January 1, 1999, HZ was divided into two companies, one for infrastructure and the other for transport, and staff was reduced by 1,303 in 1998 (5.7%).</td>
</tr>
<tr>
<td>Agreement with the Bank required closure of four lines totaling 151 km in the first phase and 15 additional lines totaling 153 km later. However, an Interministerial Committee has not approved any line closures.</td>
<td>Except for staff reductions, the reduction in rolling stock, and an improvement in its availability, the original Restructuring Action Plan goals have not yet been met.</td>
<td>Staff reduction planned in 1999 is 1,342 (6.2%), leaving 20,300 at end-1999.</td>
</tr>
<tr>
<td>Bids were solicited to privatize six subsidiaries, but no bids were received. The six are now being offered a second time. Bids for seven other subsidiaries will be solicited later in 1999.</td>
<td>Technical assistance financed by $1.5 million of the EBRD loan will implement changes decided after the October restructuring.</td>
<td>The project includes $3 million for technical assistance for restructuring, and selection of the consultants should occur by end-1999.</td>
</tr>
<tr>
<td>Government budget support rose from $16.8 million in 1997 to $32.8 million in 1998 and is planned to be $34.3 million in 1999.</td>
<td>Starting in 1999 the State will make larger PSO payments to the passenger company, and access charges will be paid by the freight and passenger companies to the infrastructure company.</td>
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<tr>
<td>A new railway organization with separate lines of business for infrastructure, freight services, and passenger services was set up on January 1, 1999.</td>
<td>The infrastructure company is the new Borrower, but the project Restructuring Action Plan will continue to cover all successor companies.</td>
<td></td>
</tr>
<tr>
<td>A draft railway law to be submitted to Parliament in 1999 will allow access to infrastructure by operators other than BDZ.</td>
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</table>
### How has the Bank assisted with transformation of ECA railways?

#### FINANCIAL PERFORMANCE

<table>
<thead>
<tr>
<th>Bulgaria</th>
<th>Romania</th>
<th>Croatia</th>
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<tbody>
<tr>
<td>In 1998 after large passenger tariff increases and staff cuts, the financial situation deteriorated due mainly to a sharp decline in traffic volume.</td>
<td>In 1998 despite sharp declines in traffic, the improvement in cost recovery achieved in 1997 was maintained by higher tariffs in real terms, reduced staff levels, and Government budget support of $47 million for passenger public service obligations (PSO).</td>
<td>The financial situation in 1998 deteriorated despite increased freight traffic, due to higher wage costs and the failure of tariff increases to match inflation. Government budget support was $270 million, or 1.3% of GDP.</td>
</tr>
<tr>
<td>Average unit revenue increased from 1997 by 40% from $0.014 to $0.019 per ton-km and 100% from $0.004 to $0.008 per passenger-km. Volumes fell 17% for freight traffic and 19% for passenger services.</td>
<td>Overall 1998 working ratio for the five companies was 101%, vs. the 110% target in the Restructuring Action Plan. The targeted debt service coverage ratio of 1.5 was met.</td>
<td>Average unit revenue was unchanged from 1997 at $0.038 per ton-km and $0.033 per passenger-km. Volumes rose 8% for freight traffic and fell 10% for passenger services.</td>
</tr>
<tr>
<td>Operating costs in 1998 exceeded projections due to a 20% salary increase, severance paid to staff, and increased material costs.</td>
<td>In 1999 the financial situation of the infrastructure company (the new Borrower) and the other four companies could improve despite a continuing traffic decrease.</td>
<td>The 1998 working ratio was 203%, before budget support.</td>
</tr>
<tr>
<td>The 1998 cash shortage was $13 million, including $11 million of losses from subsidiaries. This was covered by accumulating arrears, mostly in taxes owed the Government. The working ratio was 101 excluding subsidiaries.</td>
<td>Projected 1999 improvement is partly due to planned government budget support of $294 million (1.2% of estimated GDP), including: (i) $214 million for passenger PSO; (ii) $6 million for subsidized passenger tickets; (iii) $63 million for overhauls, project counterpart funds, and debt service; and (iv) $11 million for staff severance payments.</td>
<td>In 1999 the financial situation is likely to deteriorate much further due to the Kosovo war, so the earlier business plan is being revised.</td>
</tr>
<tr>
<td>In 1999 a cash deficit of at least $22 million is expected due to traffic declines, higher material costs for increased maintenance programs, and the first principal repayment of the EBRD loan.</td>
<td>The projected 1999 working ratio is 96%, an improvement from 101% in 1998 and 110% in 1997, and targeted debt service coverage is also expected to be met.</td>
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</table>
**How has the Bank assisted with transformation of ECA railways?**

**PHYSICAL IMPLEMENTATION**

<table>
<thead>
<tr>
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<th>Bulgaria</th>
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<td></td>
<td>By end-April, contracts totaling $85 million had been signed, $61 million had been disbursed, and only $10 million remained to be committed.</td>
<td>By end-April, contracts totaling $52 million had been signed, $26 million had been disbursed, and $21 million of bids had been called or were under evaluation. By June 30, 1999, about $100 million, or 83% of the total loan amount, should be committed.</td>
<td>Pending submission to the Bank of satisfactory business plans, the loan is not effective, and physical implementation has not begun.</td>
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<td></td>
<td>Only 4 km of track renewals were carried out during 1998, relative to the plan of 121 km, due to delays in commissioning a new concrete sleeper factory, the cash crisis, and inability to use EU-PHARE grant financing of ECU 20 million which became available late in 1998.</td>
<td>The $30 million contract for the management information system was signed in April 1999.</td>
<td></td>
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<tr>
<td></td>
<td>Contracts were signed to develop the passenger information system in October 1998 and freight and financial information systems in January 1999.</td>
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</table>
How can the Bank further assist ECA railways?

The Bank should continue actively to promote adjustment of ECA railways to the new situations confronting them, and it should offer strong support to those ready to act decisively. An increasing number of governments are now deciding in favor of fundamental railway reform with a view to gradual privatization. The Bank should be prepared to play a major part in assisting this process through advice and financing, normally jointly with EBRD, especially in the case of the largest railways. Bank assistance should focus on the design and implementation of comprehensive restructuring options that address the root causes of the problems described in this note. Bank financing can be used to help fund staff redundancy payments, as done in Brazil and committed in Croatia. However, a large improvement in labor productivity is only one key to the transformation: it is not the only requirement. ECA countries also will need assistance – which the Bank is qualified to provide based on its experience elsewhere in the world – in several other aspects of the railway transformation:

Re-orient railway services and marketing policies to satisfy commercial demand.

Many ECA railways already are involved in shipper contracts for rail services and are meeting the challenge of negotiated contract prices in a competitive market. How much different it is to negotiate contract prices, compared to setting tariffs in a government-regulated environment! Both for negotiation of commercial prices and public service obligation contracts, ECA railways need to sharpen their ability to estimate the relevant variable cost of these services. They need to install management systems to better control costs. They especially need to reduce overhead costs that do not vary with traffic, in order to lower the “break-even” volume and allow more contribution to flow to profit instead of being absorbed by overhead.

Moreover, the commercial railway manager must understand that a freight shipper’s choice of transport mode is governed not only by tariffs or contract charges, but also by quality of service. Service quality is measured by the customer’s costs of storage and inventory, material handling, late or unpredictable delivery, and lost or damaged goods. The freight transport market is highly segmented, and coal shippers choose their transport mode differently than computer shippers. Merely reducing tariffs or contract charges to ‘buy’ traffic without improving service may mean that the contribution to profits will be less than if service better matched customer needs.

Reduce variable costs of commercial freight services and eliminate the burden of cross subsidy of non-economic, money-losing passenger services.

The commercial railway cannot afford to have its commercial freight service profits absorbed by passenger losses, as is now the case on ECA railways. This isn’t just a financial issue. It is not
feasible for railway management to achieve a commercial orientation while it is distracted by the need to cross-subsidize non-commercial passenger services and bear the burden of their losses.

**Establish the minimum government regulatory framework necessary to complement market regulation of transport prices and services.**

A government framework for economic regulation of transport must be defined that protects users of rail transport from unfair charges and practices without restricting the railways’ ability to compete. Even in rail-dominant markets where there may be little effective competition, the availability of substitute goods (source and product competition) may mean that government regulation is not required. In any case, rail-dominant markets should become less significant as ECA countries develop their other modes of transport.

**Prepare for EU accession.**

To encourage more effective competition, the EU policy discussed above requires separation of infrastructure from operations, as well as shared access by competitive operators to the railway infrastructure. The railways in the EU accession countries have also to confront other major issues. For example, the EU emphasis is on European integration, which means that large investments are being planned for the rail corridors that are the most important for international traffic. The Bank can help the railways in EU accession countries to strive for a balance in the development of the international routes and other routes that are more important for local traffic.

**Prepare for larger role for private sector.**

Privatization or a larger role for the private sector is a stated objective in Estonia and Romania and is a topic for discussion in many other ECA countries. As shown in the earlier productivity comparisons, the best-practice models are the privately-owned railways, a fact that is becoming increasingly recognized by European state-owned railways. But in many countries the private sector will not be willing to invest the amounts required over the long term unless changes are made in the laws that regulate and promote transport.

Bank experience has shown that plans for greater private sector participation are not always realistic. The worldwide over-capacity in the railway supply industry has meant that efforts to attract private participation (for example, in Bulgaria) either have failed or have taken much longer than anticipated to produce expected results. Even when privatization does occur, the national government may be faced with ongoing obligations for money-losing services which previously were cross-subsidized by the profitable services being assumed by the private sector.
IN SUMMARY

A model project design for World Bank assistance to ECA railways would therefore contain the following components, depending on the Borrower’s needs:

- Institutional development to re-orient services and marketing policies to satisfy commercial demand.
- Implementation of appropriate railway costing systems for the management of freight and passenger services (including pricing decisions), as well as for investment analysis and other purposes.
- Implementation of a new government framework for economic regulation of transport, including institutional development and new legislation.
- Finance and implementation of staff redundancy program.
- Finance of infrastructure modernization investments, conditional on their prior rationalization.
- Provision of guarantees for loans from private-sector sources to private operators for purchase of rolling stock.