

PORT FACILITIES AND THE INTERNATIONAL COAL MARKET

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Abstract—This study examines the relationship between the increased demand for U.S. coal in the early 1980s, and the coal pier congestion that accompanied and hampered it. We find an export price elasticity for U.S. coal of -16.7 , and a port service price elasticity of -0.8 , suggesting deadweight losses of approximately \$4 million per month. We then separate the short-term from the long-term changes in the demand for U.S. coal exports. The long-term demand estimates predict increases of 77% in U.S. coal exports, compared to the actual 83% increase in shipping capacity provided by coal shippers.

Changes in world energy markets in the late 1970s and early 1980s led to increased demand for U.S. coal. These changes included substitution of coal for oil following the second round of oil price increases, favorable exchange rates (the U.S. dollar was low relative to other currencies), a declining U.S. price relative to the world price, and uncertainty about the coal supplies from the other major world exporters, Australia, Poland, and South Africa.

Transportation problems in the United States hindered responses to the increased demand. The coal and the rail cars to bring it to the ports were apparently available; the port facilities (particularly loading piers) were not, and lines of ships formed at all ports handling U.S. coal. Policy-makers feared that port coal shippers would either react too slowly, or would overbuild in response. The first alternative would hinder foreign trade. The second would result in millions of dollars of wasted investment. This led to calls for national planning policies in an industrial sector that has not traditionally coordinated policies.

The appropriate response to port bottlenecks involved both transportation and trade analyses. The transportation problem was the shortage of facilities that limited trade. The trade analysis required accurate predictions of the international coal market (particularly the U.S. share), since the construction of large single-use facilities could represent very expensive mistakes.

This article evaluates the subsequent construction of facilities (in the context of the demands for national planning) as decentralized responses to both short-run bottlenecks costs and to long-run demand projections. It begins by formulating a model of port services demand and using it to examine the magnitude of the short-run bottleneck costs, separated

into ship-waiting costs and deadweight losses. The former have been estimated at \$6 per ton; we estimate the latter at \$1 per ton (unless otherwise noted, stated tonnages are in short tons). Together they represent an increase of 70% in the port value added per ton. Had capacity existed at the time, port throughput might have been 28% to 33% higher.

Short-term bottleneck costs are not good indicators of the investment necessary to accommodate long-term coal demand. We estimate an international coal demand model to separate short-term from long-term changes in U.S. export demand. The model estimates long-term changes in demand requiring expansion of U.S. coal pier capacity by 77%. These estimates are similar to the increases of 83% in Baltimore and Norfolk, the two ports most affected by the bottlenecks; nowhere else in the United States were large piers brought into use.

1. DEMAND FOR COAL AND PORT SERVICES

The demand for port services can be directly derived from the demands and supplies of goods going through the ports. We focus on coal exports, although bottlenecks have occurred with grain at U.S. Gulf Coast ports, and with other goods elsewhere in the world. Transport costs comprise more than half of coal's delivered price; port costs are a substantial portion of transport costs. For example, in 1981 the minemouth cost of West Virginia steam coal (\$33 per ton) comprised less than half of its Japan **cif** price of \$70.

The analysis assigns transport service demand (including shipment assembly, line-haul, and handling) to brokers who buy coal **fob** minemouth and sell it **cif** abroad (see Harvey, 1981, or Walters, 1968). In