

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Capital and Output Trends in Mining Industries, 1870-1948

Volume Author/Editor: Israel Borenstein

Volume Publisher: NBER

Volume ISBN: 0-87014-359-X

Volume URL: <http://www.nber.org/books/bore54-1>

Publication Date: 1954

Chapter Title: Front matter, tables of content

Chapter Author: Israel Borenstein

Chapter URL: <http://www.nber.org/chapters/c4704>

Chapter pages in book: (p. -11 - 0)

Capital and Output
Trends in Mining Industries,
1870–1948

ISRAEL BORENSTEIN

STUDIES IN CAPITAL FORMATION AND FINANCING

OCCASIONAL PAPER 45

NATIONAL BUREAU OF ECONOMIC RESEARCH, INC.

1954

STUDIES IN CAPITAL FORMATION AND FINANCING

These studies have been supported by the Life Insurance Association of America.

The Role of Federal Credit Aids in Residential Construction
Leo Grebler (Occasional Paper 39)

The Volume of Residential Construction, 1889-1950
David M. Blank (Technical Paper 9)

Capital and Output Trends in Manufacturing Industries, 1880-1948
Daniel Creamer (Occasional Paper 41)

The Share of Financial Intermediaries in National Wealth and National Assets, 1900-1949
Raymond W. Goldsmith (Occasional Paper 42)

Trends and Cycles in Capital Formation by United States Railroads, 1870-1950
Melville J. Ulmer (Occasional Paper 43)

The Growth of Physical Capital in Agriculture, 1870-1950
Alvin S. Tostlebe (Occasional Paper 44)

Capital and Output Trends in Mining Industries, 1870-1948
Israel Borenstein (Occasional Paper 45)

COPYRIGHT, 1954, BY
NATIONAL BUREAU OF ECONOMIC RESEARCH, INC.
261 MADISON AVENUE, NEW YORK 16, N.Y.

ALL RIGHTS RESERVED

TYPOGRAPHY BY OSCAR LEVENTHAL, INC.

PRINTING BY THE COMET PRESS, INC.

Library of Congress catalog card number: 54-10868

PRICE: \$1

NATIONAL BUREAU OF ECONOMIC RESEARCH

OFFICERS, 1954

Harry Scherman, *President*
Gottfried Haberler, *Vice President*
George B. Roberts, *Treasurer*
W. J. Carson, *Executive Director*

DIRECTORS AT LARGE

Donald R. Belcher, *Assistant Director, Bureau of the Budget*
Wallace J. Campbell, *Director, Cooperative League of the USA*
Solomon Fabricant, *New York University*
Albert J. Hettinger, Jr., *Lazard Frères and Company*
Oswald W. Knauth, *Beaufort, South Carolina*
H. W. Laidler, *Executive Director, League for Industrial Democracy*
Shepard Morgan, *Norfolk, Connecticut*
George B. Roberts, *Vice President, The National City Bank of New York*
Beardsley Ruml, *New York City*
Harry Scherman, *Chairman, Book-of-the-Month Club*
George Soule, *Bennington College*
N. I. Stone, *Consulting Economist*
J. Raymond Walsh, *New York City*
Leo Wolman, *Columbia University*
Theodore O. Yntema, *Vice President-Finance, Ford Motor Company*

DIRECTORS BY UNIVERSITY APPOINTMENT

| | |
|--------------------------------------|--------------------------------------|
| E. Wight Bakke, <i>Yale</i> | H. M. Groves, <i>Wisconsin</i> |
| Arthur F. Burns, <i>Columbia</i> | Gottfried Haberler, <i>Harvard</i> |
| Melvin G. de Chazeau, <i>Cornell</i> | Clarence Heer, <i>North Carolina</i> |
| G. A. Elliott, <i>Toronto</i> | R. L. Kozelka, <i>Minnesota</i> |
| Frank W. Fetter, <i>Northwestern</i> | T. W. Schultz, <i>Chicago</i> |
| Jacob Viner, <i>Princeton</i> | |

DIRECTORS APPOINTED BY OTHER ORGANIZATIONS

Percival F. Brundage, *American Institute of Accountants*
S. H. Ruttenberg, *Congress of Industrial Organizations*
Murray Shields, *American Management Association*
Boris Shishkin, *American Federation of Labor*
W. Allen Wallis, *American Statistical Association*
Frederick V. Waugh, *American Farm Economic Association*
John H. Williams, *American Economic Association*
Harold F. Williamson, *Economic History Association*

RESEARCH STAFF

Solomon Fabricant, *Director of Research*
Geoffrey H. Moore, *Associate Director of Research*
Moses Abramovitz
Harold Barger
Morris A. Copeland
David Durand
Milton Friedman
Raymond W. Goldsmith
Millard Hastay
W. Braddock Hickman
F. F. Hill
Daniel M. Holland
Herbert B. Woolley
Thor Hultgren
John W. Kendrick
Simon Kuznets
Clarence D. Long
Ruth P. Mack
Ilse Mintz
Raymond J. Saulnier
Lawrence H. Seltzer
George J. Stigler
Leo Wolman

RELATION OF THE DIRECTORS
TO THE WORK AND PUBLICATIONS
OF THE NATIONAL BUREAU OF ECONOMIC RESEARCH

1. The object of the National Bureau of Economic Research is to ascertain and to present to the public important economic facts and their interpretation in a scientific and impartial manner. The Board of Directors is charged with the responsibility of ensuring that the work of the National Bureau is carried on in strict conformity with this object.

2. To this end the Board of Directors shall appoint one or more Directors of Research.

3. The Director or Directors of Research shall submit to the members of the Board, or to its Executive Committee, for their formal adoption, all specific proposals concerning researches to be instituted.

4. No report shall be published until the Director or Directors of Research shall have submitted to the Board a summary drawing attention to the character of the data and their utilization in the report, the nature and treatment of the problems involved, the main conclusions and such other information as in their opinion would serve to determine the suitability of the report for publication in accordance with the principles of the National Bureau.

5. A copy of any manuscript proposed for publication shall also be submitted to each member of the Board. For each manuscript to be so submitted a special committee shall be appointed by the President, or at his designation by the Executive Director, consisting of three Directors selected as nearly as may be one from each general division of the Board. The names of the special manuscript committee shall be stated to each Director when the summary and report described in paragraph (4) are sent to him. It shall be the duty of each member of the committee to read the manuscript. If each member of the special committee signifies his approval within thirty days, the manuscript may be published. If each member of the special committee has not signified his approval within thirty days of the transmittal of the report and manuscript, the Director of Research shall then notify each member of the Board, requesting approval or disapproval of publication, and thirty additional days shall be granted for this purpose. The manuscript shall then not be published unless at least a majority of the entire Board and a two-thirds majority of those members of the Board who shall have voted on the proposal within the time fixed for the receipt of votes on the publication proposed shall have approved.

6. No manuscript may be published, though approved by each member of the special committee, until forty-five days have elapsed from the transmittal of the summary and report. The interval is allowed for the receipt of any memorandum of dissent or reservation, together with a brief statement of his reasons, that any member may wish to express; and such memorandum of dissent or reservation shall be published with the manuscript if he so desires. Publication does not, however, imply that each member of the Board has read the manuscript, or that either members of the Board in general, or of the special committee, have passed upon its validity in every detail.

7. A copy of this resolution shall, unless otherwise determined by the Board, be printed in each copy of every National Bureau book.

*(Resolution adopted October 25, 1926 and revised February 6, 1933
and February 24, 1941)*

Contents

| | PAGE |
|--|------|
| Introduction | 1 |
| Summary | 5 |
| 1. The Growth Record of the United States Mining Industries, 1870-1948 | 10 |
| Output | 10 |
| Capital | 16 |
| Employment and Hours | 19 |
| Horsepower | 22 |
| Supplies | 23 |
| 2. Long-Term Changes in Total Capital-Product Ratios in Mining, 1870-1948 | 29 |
| Rate of Change in Capital and in Output, by Industries | 29 |
| Capital-Product Ratios, by Industries | 32 |
| Capital-Product Ratios, by Capital Components | 33 |
| Total Capital-Product Ratios, by Industries | 42 |
| Effect of Industry Shifts on the Capital-Product Ratio for All Mining | 46 |
| 3. Some Relationships Bearing on Changes in the Capital-Product Ratios | 53 |
| Capital and Product per Wage Earner and Man-Hour Worked | 53 |
| Factors Contributing to Differences among Major Branches of Mining in the Rate of Change in Their Capital-Product Ratios | 56 |
| Comparison with Manufacturing | 58 |

| APPENDIX | PAGE |
|--|------|
| A. Basic Tables with Notes on Sources and Methods of Estimation | 63 |
| B. Notes on the Statistical Reliability of the Major Findings | 73 |
| C. Notes on the Comparability of the Bench-Mark Years with Regard to Employment Levels | 79 |
| D. Notes on Adjustment of Reported Values of Mineral Land for Comparability over Time | 81 |

TABLE

| | |
|---|-------|
| 1. Mineral Production and Consumption as Percentages of Gross and Net National Product, and Production as a Percentage of Consumption, by Major Mining Industries, Basic Figures on a Decennial Basis, in 1935-1939 Prices, 1870-1949 | 13 |
| 2. Changes in Value of Capital between Selected Years, by Major Mining Industries, 1929 Prices, 1870-1948 | 18 |
| 3. Employment and Hours Worked, by Major Mining Industries, Selected Years, 1870-1948 | 20 |
| 4. Horsepower Rating of Power Equipment and Prime Movers Used, by Major Mining Industries, Selected Years, 1902-1939 | 24-25 |
| 5. Value of Supplies and Materials, Fuel, and Electrical Energy Used, by Major Mining Industries, Selected Years, 1890-1939 | 26-27 |
| 6. Average Annual Percentage Rates of Growth in Capital and in Product between Selected Years, by Major and Minor Mining Industries, Based on Values in 1929 Prices, 1870-1948 | 30 |
| 7. Capital-Product Ratios, by Major Mining Industries, Based on Reported Values and Values in 1929 Prices, Selected Years, 1870-1948 | 34-35 |

| | |
|---|-------|
| 8. Capital-Product Ratios, by Minor Mining Industries, Based on Reported Values and Values in 1929 Prices, Selected Years, 1870-1947 | 36-37 |
| 9. Ratios of Working Capital and Its Components to Product, by Major Mining Industries, Based on Reported Values, Selected Years, 1929-1948 | 41 |
| 10. Percentage Share of Major and Minor Mining Industries in Total Mining, Selected Years, 1870-1947 | 48-49 |
| 11. Average Capital-Product Ratios by Major and Minor Mining Industries, Selected Groups of Years, 1870-1947 | 50 |
| 12. Actual and Hypothetical Capital-Product Ratios in Total Mining and Ratio of Actual to Hypothetical Capital, Based on Values in 1929 Prices, Selected Years, 1870-1948 | 51 |
| 13. Capital and Product per Wage Earner and per Man-Hour, and Capital-Product Ratios, by Major Mining Industries, Based on Values in 1929 Prices, Selected Years, 1870-1948 | 54-55 |
| 14. Percentage Change in the Capital-Product Ratio, Product, and Product per Wage Earner, by Major Mining Industries, Based on Values in 1929 Prices, 1880-1919 and 1919-1948 | 57 |
| 15. Mining Product and Capital as Percentages of Manufacturing Product and Capital, Selected Years, 1880-1948 | 59 |
| 16. Ratio of Capital to Value Added in Manufacturing and Mining, Based on Values in 1929 Prices, Selected Years, 1880-1948 | 60 |
| A-1. Value of Output, by Major Mining Industries, Current Prices, Selected Years, 1870-1948 | 66 |
| A-2. Value of Output, by Major Mining Industries, 1929 Prices, Selected Years, 1870-1948 | 67 |
| A-3. Value of Capital (Including Land), by Major Mining Industries, Reported Values, Selected Years, 1870-1948 | 68 |

| TABLE | PAGE |
|--|------|
| A-4. Value of Capital (Excluding Land), by Major Mining Industries, 1929 Prices, Selected Years, 1870-1948 | 70 |
| C-1. Value of Product in a Given Bench-Mark Year as a Percentage of the Five-Year Average Centered on the Bench-Mark Year, Based on Values in 1929 Prices, by Major and Minor Mining Industries, 1870-1948 | 80 |
| C-2. Ratio of Capital in a Given Bench-Mark Year to the Five-Year Average of Product Centered on the Bench-Mark Year, Based on Values in 1929 Prices, Major Mining Industries, 1870-1948 | 80 |

CHART

| | |
|--|----|
| 1. Indexes of Output, by Major and Minor Mining Industries, and Index of Gross National Product, Based on Values in 1929 Prices, 1870-1948 Nine-Year Moving Averages | 11 |
| 2. Value of Capital Excluding Land, by Major Mining Industries, 1929 Prices, Selected Years, 1870-1948 | 17 |
| 3. Capital-Product Ratios, by Major Mining Industries, Based on Reported Values and Values in 1929 Prices, Selected Years, 1870-1948 | 33 |

Acknowledgment

I am indebted to many persons who helped in the preparation of this manuscript, but above all I wish to express my appreciation to Simon Kuznets and Daniel Creamer. Dr. Kuznets gave me not only the opportunity to work on this paper but also his invaluable counsel and general supervision. Dr. Creamer's guidance and generous encouragement throughout the study helped me immeasurably.

I am grateful to Solomon Fabricant and Geoffrey H. Moore for their careful review of an earlier draft and for their suggestions, which contributed so much to its improvement, and to Elizabeth Jenks for her painstaking reading of the final manuscript. The others to whom I am obliged for their advice and effective criticism are: Harold Barger, Millard Hastay, and Alvin S. Tostlebe of the National Bureau staff, who carefully reviewed a preliminary version; Percival F. Brundage, Albert E. Hunter, Maurice E. Peloubet, and Edward B. Wilcox, who broadened my understanding of the nature of the changes in accounting practices in the valuation of assets; Frank W. Fetter and Oswald W. Knauth, who generously found time for helpful comments; and finally, Frederick T. Moore and Sidney Sonenblum, from whose experience on a related study conducted under the auspices of the Bureau of Mines I have benefited.

Finally, I wish to acknowledge the contribution of Lawrence Bridge of the Office of Business Economics; E. J. Engquist, Jr., and Raymond C. Peacock of the Bureau of Internal Revenue; Arnold C. Harberger of the President's Materials Policy Commission; W. H. Young of the Bureau of Mines; and all the others who made available unpublished data or information relevant to this study, as well as the contribution of Ellen Viner, who edited the manuscript, and H. Irving Forman, who prepared the charts.

