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The Price of Capital: Evidence from Trade Data

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Abstract

In this paper we use highly disaggregated data on trade in capital goods to study differences in the price of capital across countries. Our strategy is motivated by the fact that most countries import the bulk of machinery equipment (from a small number of industrialized countries). We find the price of imported capital goods to be negatively and significantly correlated with the income of the importing country. Because most low-income countries import the bulk of capital goods, our results provide suggestive evidence that capital goods are more expensive in poor countries, consistent with the conventional explanation regarding the low real investment rates in poor countries.

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1 Introduction

The empirical literature has documented important differences in the relative price of capital goods across countries which have been linked to lower levels of investment, income and growth.[1] How much capital is accumulated in an economy hinges on a comparison between the capital's user cost with its marginal product. The conventional wisdom is that user cost of capital is higher in developing countries.[2] Yet, in a recent paper, Hsieh and Klenow (2006) find the *absolute* price of capital goods to be no higher in poor countries than in rich countries. Using data from the Penn World Tables (PWT), the authors' positive and mostly significant results suggest, if anything, higher investment price in rich countries.[3] This result contradicts the common view that investment goods are more expensive in poor countries, and further suggests that investment distortions can account for only a small part of the observed differences in physical capital intensity across countries.

The finding that the price of capital is not higher in poor countries might be attributable to, and might in fact "hinge" on (Hsieh and Klenow, 2006), the quality of the underlying data, namely the United Nations International Comparison Program (UN ICP), which collects the price series used in the PWT. By the PWT's own documentation, the accuracy and quality of the data for most developing countries included in the benchmark surveys is low, and many countries have not been part of benchmark surveys in as many as 30 years.[4] Beyond the coverage and quality of the data, the methodology used to collect prices in surveyed countries raises concerns. As we discuss later, reported prices might be biased by the variety of methods countries use to collect prices including catalogs and reliance on vendors and distributors.[5]

This paper makes two contributions to this literature. First, we use an alternative source of data to capture differences in the price of capital goods. We construct unit prices of capital goods using disaggregated information from trade statistics, a strategy motivated by the fact that most countries tend to import the bulk of capital goods (from a small number of industrialized

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[1] Collins and Williamson (2001), De Long and Summers (1991, 1993), and Restuccia and Urrutia (2001).

[2] See Chari, Kehoe and McGrattan (1996), Eaton and Kortum (2001), Jones (1994), Lee (1995), and Taylor (1998a, b) among others. These papers argue that different policies (e.g., taxes, import barriers) might drive up the price of capital in poor countries relative to rich ones.

[3] Hsieh and Klenow (2006) run the log of the dollar price of investment goods on the log of purchasing power parity GDP per worker for the benchmark years of 1980, 1985, and 1996. The authors attribute cross country differences in the relative price of capital goods to the low price of consumption goods.

[4] Although the typical country receives a passing grade of C (based on average over all countries), there is considerable variation by region. The average grade for surveyed countries in Africa and the Middle East is D, for Western Europe B+; see Table A.1.

[5] We consulted World Bank officials for further information on collection methods; due to "confidentiality" issues, this information was not released to us.

countries). Imports of capital goods constitute nearly 100 percent of Malawi's machinery and equipment, for example, and more than 75 percent of the domestic supply in Bangladesh, Denmark, Mauritius, Portugal, Sri Lanka, and Sweden. Such imports are thus a good proxy for equipment investment for many countries.[6]

Second, using these prices we find suggestive evidence that capital goods are more expensive in poor countries. Using, specifically, U.S. export data on capital goods measured at the 10-digit harmonized standard (HS) level over the period 1978-2001 to derive unit prices, we find that the price of equipment goods exhibits a negative and significant (at the 1 percent level) relationship with the income of the importer country. These results are robust to different specifications and sample restrictions (e.g., trimmed samples to reduce potential noise in the data, regressions by income group). Because not all countries import the bulk of machinery from the United States, we complement our analysis with world import data compiled by Feenstra et al. (2005) for the period 1984-2000. Using this trade data to calculate unit prices for goods at the 4-digit SITC level, we find a negative and significant correlation between equipment prices and average income of the importer country. Although the results exhibit this negative relationship, their interpretation requires some caution; as Schott (2004) observes, units might vary by products within industries (even at the 4-digit SITC classification). Our results are nevertheless consistent with previous findings that the price of imported capital seems to be higher in poor countries.

Given data limitations, to fully explain why our results differ from those presented in the PWT tables is beyond the scope of this paper. But we do advance several hypotheses including mis-measured prices in the PTW data set, possible price discrimination, and the volume of trade (i.e., scale effects).[7]

With respect to the present study, we acknowledge that unit values might not fully capture the final user price of the imported capital good. Our trade data, for example, does not include import taxes such as tariffs, and our U.S. export data does not include transportation costs. Including both, however, would likely strengthen our results. For many developing countries, for example, tariffs can be quite high, which would likely drive up the price of imported capital goods. In a recent survey, Anderson and van Wincoop (2004) conclude that trade costs vary widely across countries by factors of as much as 10 or more. Our analysis could be more complete if we considered the price of locally produced capital goods. But this information

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[6] See Eaton and Kortum (2001), Caselli and Wilson (2004), and De Long and Summer (1993). There is nevertheless a strong bias towards domestic producers in some countries, see Eaton and Kortum (2001).

[7] Alternatively, as Eaton and Kortum (2001) note, ICP prices might consider wholesale and retail activities which may cost less in developing countries, see Kravis and Lipsey (1988).

(as other scholars have noted) is difficult to assemble, especially for poorer countries (Eaton and Kortum, 2001; Caselli and Wilson, 2004).

The rest of the paper is organized as follows. Section 2 describes existing sources of data for prices of capital goods. Section 3 presents the empirical results using trade data. The results are discussed in section 4. The last section concludes.

2 The Price of Capital Goods: Sources and Limitations

2.1 Penn World Tables and the International Comparison Program

The Penn World Tables (PWT) present national accounts time series data for many countries (Summers and Heston, 1991). The current version contains data on approximately 30 variables (e.g., national accounts, exchange rate, etc.) for 167 countries for some or all of the years 1950-2000. The tables also provide information about relative prices within and between countries. This comprehensive and relatively continuous data set has been used extensively in numerous cross-country studies, for example, in various empirical analyses of economic growth (e.g., Mankiw et al., 1992; Levine and Renelt, 1992) and, more recently, as the common source for pricing capital goods across countries (Restuccia and Urrutia, 2001; Hsieh and Klenow, 2006).

The PWT uses capital price data collected by the UN ICP as the basis for its investment price series.[8] The World Bank is responsible for collecting the prices of between 500 and 1,500 individual goods and services in selected countries. For a given year, countries in which the ICP have price data are "benchmark" countries for the PWT tables. The number of benchmark countries has increased from 16 in 1970 to 115 in the latest version of the PWT.

As the ICP data underlies the PWT investment price series, an overview of how the data are collected and assembled seems warranted. The approach taken involves a coordinated but relatively decentralized process whereby the World Bank's Global Office, which coordinates ICP data collection among the regions and countries, creates a set of standard product descriptions, with individual country offices responsible for collecting the prices using any combination of methods they find most "convenient" (World Bank, 2006, p.10), whether personal visit, telephone, letter, or Internet.[9] Regional coordinators can "edit" the prices to ensure that products that share the same technical characteristics are compared. For countries not surveyed in the ICP rounds, PWT prices are inferred from fitted values of price regressions run over the benchmark

[8] See World Bank (2006) and Ahmad (2006) for details.
[9] For the 2005 round, the Global Office even provided a list of suggested websites countries can visit (see Appendix A).

data. The results are interpolated to fill in the years between benchmark surveys, and the price series aggregated using the Geary multilateral method.[10] For both benchmark and non-benchmark countries, price series for investment goods are not adjusted for quality.[11] Appendix A describes in further detail how the series are constructed. T

According to World Bank documentation, there does not seem to be any oversight of the editing at the regional level, or of the data collection process in general. We were unable to obtain through correspondence with individuals at the World Bank (due to confidentiality) details of the methods countries used and the frequency with which they used them to collect the data during the various ICP survey rounds. Because countries are free to collect prices using the methods they find most convenient, it is entirely plausible that country and regional offices are consulting the same catalogs, distributors, and so forth, which report or quote identical prices for the prescribed list of equipment goods.[12] Such a scenario, in fact, seems likely given that in the most recent ICP round the Global Office lists specific models from specific companies for countries to price. Moreover, countries are given contact information (e.g., websites) to consult for prices for these products, which could result in identical prices across countries.[13] Finally, the list of predetermined equipment goods might not be representative (i.e., appropriate) across all countries, a fact acknowledged by the World Bank (World Bank, 2006; Ahmad, 2006).

There are also issues related to the coverage of countries surveyed. As noted above, although the number of countries in each successive ICP round has increased, this trend masks the fact that the countries that participate in ICP surveys tend to be wealthy and under representative of non-industrialized regions. For example, prior to 1975, Kenya was the sole African country and Colombia the sole Latin American country surveyed. Moreover, by the PWT's own account, the quality of the series for most developing countries is low. As reported in Table A1 in Appendix A, Africa, the Middle East, Eastern Europe, and Asia, for example, receive grades ranging from D to D+ (on an A-D scale, A being best).

The previous discussion thus entails that the PWT price series for many countries (in particular developing ones) should be interpreted with some caution and furthers suggests that other sources should be considered.

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[10] See "Part II: Programs and Data" in PWT (2002) for a formal discussion of this method as well as the procedure for estimating values for non-benchmark countries.

[11] In addition, ICP data ignores many components of the cost of equipment (e.g., maintenance, etc.), which are, in fact, higher in low-income countries, and ICP price measures might not properly account for the lower quality of capital goods used in low-income countries; see Eaton and Kortum (2001).

[12] After all, equipment manufacturers might not want to be identified as price discriminating in certain markets or geographical areas.

[13] See Exhibit A.2 in Appendix A for a list of websites for the current ICP round.

2.2 Trade Data

Highly disaggregated trade data provide an alternate source of the price of capital goods. We use trade data for machinery and equipment for a number of reasons. Research by Eaton and Kortum (2001) finds that most of world's capital goods are provided by a small number of R&D intensive countries, and most countries, in particular, developing countries, tend to import a large fraction of their capital goods.

These trends are evident in Table 1. Malawi, for example, imported 99.7 percent of its equipment goods in 1985. The average African and South Asian country purchases nearly 70 percent of its equipment from abroad. By region, African and Asian countries import a large percentage of equipment goods, although many advanced countries also import sizeable percentages (e.g., Australia, Austria, Finland, and Norway). Purchases from the "Big Seven" countries (the United States, Japan, Germany, the United Kingdom, France, Italy, and Sweden) account for 70 percent of these foreign purchases. Imports of capital goods are thus a good proxy for equipment investment for many countries.[14] This stylized fact motivates our empirical approach throughout the paper (although the data are not without issues, as explained below).[15]

2.2.1 U.S. Exports Data

We use product-level U.S. export data from the U.S. Census Bureau and compiled by Feenstra et al. (2005). The data report the value and quantity of U.S. trade identified by the 10-digit harmonized system (HS) numbers as well as the destination country (designated by UN country name and number).[16] The reported data is F.O.B., which excludes transportation costs (e.g., freight costs, customs duties), is measured in current (nominal) U.S. dollars, encompasses the period 1972-2001, and includes exports to approximately 150 countries per year. As HS numbers frequently change over time, Feenstra uses the full alphabetic product descriptions to create a concordance of SITC classifications that is consistent over time (SITC Revision 1 for 1972-1977 and SITC Revision 2 for 1978-2001). We utilize the SITC Revision 2 concordance to

[14] Similarly, Caselli and Wilson (2004) argue that capital goods imports might, hence, be a good proxy for the type of equipment investment that transfers the benefits of advanced technology across borders. See also DeLong and Summers (1991, 1993)

[15] Ideally we would use data on business investment. However, it is difficult to find comparable long-term data across countries. Nevertheless, data on machinery and equipment investment arguably provide a better proxy for true productive investment than do national accounts investment statistics, which include residential and business construction. Construction investment tends to be dominated by domestic production of nontradables which tend to have lower cost in poor countries. However, this does not seem to explain differences with the PWT tables as the result holds for producer durables only.

[16] Because units vary by products within industries, unit values might not be accurately computed at the industry level.

match the U.S. export data to the appropriate 2-digit BEA industry classification. Following De Long and Summers (1991), Eaton and Kortum (2001), and Alfaro and Hammel (2007), we associate capital equipment with the non-electrical equipment, electrical equipment, and instruments industries. We define equipment trade as the sum of BEA industry codes 20-27 and 33 (Farm and Garden Machinery, Construction, Mining, etc.; Computer and Office Equipment; Other Non-Electric Machinery; Electronic Components; Other Electrical Machinery; and Instruments and Apparatus).

An extremely useful feature of these data is that they include both quantity and value information for a large number of products, which allows for the calculation of unit prices. Following Schott (2004), we compute the unit value of capital good p exported to country c, u_{pc}, by dividing the export value (V_{pc}) by export quantity (Q_{pc}) measured in "number" of units, $u_{pc} = V_{pc} / Q_{pc}$.[17]

With the U.S. export data we are able to derive unit values for more than 1.2 million equipment goods from 154 countries between 1978 and 2001. Yet, as can be seen in Table 1, the United States is not the sole exporter of capital goods. Because other industrialized countries export capital goods as well, to capture as much as possible of capital goods trade we complement our analysis with bilateral world trade data on capital goods.

2.2.2 World Imports Data

We obtain world import data for capital goods from the World Trade Flows, 1962-2000 database, which reports UN trade data classified by Standard Industrial Trade Class (SITC) Revision 1 for the period 1962-1983 and Revision 2 for the period 1984-2000. The data set includes bilateral trade flows reported in U.S. dollars for a wide range of countries from 1962 to 2000 at the four-digit level.

This bilateral trade data set gives primacy to data as reported by the importer country, whenever this information is available.[18] If the importer data are unavailable for a country-pair, the corresponding exporter report is used.[19] The data reported by the importer is C.I.F. (cost, insurance, freight), which includes transportation costs, and in thousands of current U.S. dollars. The data reported by the exporter is F.O.B. (free on board), which excludes transportation costs. Neither series includes tariffs. Moreover, due to budget constraints, for each bilateral flow (for

[17] We chose "number" of units as this corresponds to the appropriate form of measurement for the types of capital goods surveyed by the ICP (e.g. tractors, jet pumps, etc.).
[18] Approximately 75 percent of our prices are calculated from importer reports.
[19] Feenstra et al. (2005) assume that importer reports are more accurate than reports by the exporter.

each 4-digit SITC commodity), Feenstra et al. (2005) report only values in excess of $100,000.[20] For example, if a country imports two units of a commodity but the total value is less than $100,000, that commodity is not included in the data set. Despite this lower bound, the final data account for 98 percent of world trade.

As with the U.S. export data, the SITC codes are matched to U.S. BEA codes for 34 manufacturing sectors, for which we associate equipment goods with the non-electrical equipment, electrical equipment, and instruments industries (BEA industries 20-27, 33). Similarly, we compute the unit value of capital good *p* imported to country *c*, u_{pc}, by dividing the import value (V_{pc}) by import quantity (Q_{pc}) measured in "number" of units, $u_{pc} = V_{pc} / Q_{pc}$.[21] In this case, as Schott (2004) notes, because units vary by products within industries, unit values might not be accurately computed at the industry level. Results obtained using this data set should thus be interpreted with caution. Our analysis utilizes world import data for the period 1984-2000. Information on trade quantities before 1984 being unavailable, we are only able to derive unit price from 1984 onwards.

3 The Price of Capital Using Trade Data

3.1 Equipment Price and Importer Income

To examine whether the price of traded goods varies with the income of the importer country, we employ a specification analogous to that used by Schott (2004). We regress the unit price on importer characteristics while controlling for various combinations of product and year fixed effects.[22] Our basic specification is:

$$\log(u_{pct}) = \alpha_{pt} + \beta \log(GDP\ per\ capita_{ct}) + \varepsilon_{pct} \quad (1)$$

where $\log(u_{pct})$ is the unit value of imports (in current U.S. dollars) of equipment goods *p* in country *c* in period *t*. For world trade data, the unit price is for goods at the 4-digit SITC level, and for U.S. export data the unit price is for goods at the 10-digit HS level. GDP per capita is for the importing country and is measured in current U.S. dollars using the World Bank's World Development Indicators 2005[23]; α_{pt} refers to product-year fixed effects to control for level

[20] See footnote 1 in Feenstra et al. (2005).
[21] We chose "number" of units as this corresponds to the appropriate form of measurement for the types of capital goods surveyed by the ICP (e.g., tractors, jet pumps, etc.).
[22] Schott (2004) regresses the unit price (of goods exports to the United States) on the exporter characteristics and product-year fixed effects..
[23] As a robustness check, we also consider the per-capita GDP series from the Penn World Tables.

differences in unit values across products and time; ε_{pct} is an error term. The estimation procedure uses White's correction for heteroskedasticity in the error term, and errors are clustered at the country level.

Table 2 reports the coefficient on log per-capita GDP of the importer country. Panels A and B present the results using U.S. export and World Import data, respectively. Column (1) reports the coefficient on the importer's log per-capita GDP, controlling for product and year interaction terms (i.e., product*year dummies). In both panels, the coefficients are negative and significant. The results are also economically significant. The coefficients on column (1) imply that a 10 percent increase in importer country's GDP per capita is associated with a 0.82 and 1.03 percent reduction in the unit values of capital goods when using the US export and the World Import data respectively. Columns (2) and (3) consider product and year effects separately, again finding a negative and significant relationship. The regression in column (4) controls for both product and year effects. In both panels, the coefficient is negative and significant with magnitudes similar to those of column (1). The statistical significance between unit value and average income is particularly strong with U.S. export data. Panel A reports that this negative relationship is statistically significant at the 1 percent level for all four specifications.

3.2 Within-Product Relationship

Looking at individual products, we see that unit values are negatively associated with importer per-capita GDP. Figure 1 plots importer unit value versus importer per-capita GDP for four products at the 10-digit HS level for the year 2000. These products are quite different in function, size, and price, but all seem to display a negative relation between unit price and income of the importer country. To formally assess the within-product relationship between importer unit values and importer income across time, we compute separate OLS estimations of:

$$\log(u_{pct}) = \alpha_{pt} + \beta_{pt} \log(GDP\ per\ capita_{ct}) + \varepsilon_{pct} \quad (2)$$

for each equipment good in each year, where $\log(u_{pct})$ is the importer country c's unit value of product *p* in year *t* and GDP per capita is the importer's per capita GDP in year *t*. We use White's correction for heteroskedasticity in the error term. For each year, we calculate the percentage of these coefficients by their sign (positive or negative) and significance (at the 10 percent level). These results are reported in Table 3. Column (1) reports the percentage of coefficients that are positive and significant, column (2) the percentage of coefficients that are negative and significant. Non-significant results are reported in the last columns. With both world import and

U.S. export data, we find a consistent negative relationship between the unit value of capital goods and importer income.

Panel A tabulates the relationship between unit values and importer income using 10-digit HS U.S. export data. In total, we estimated more than 16,000 product-year regressions. With U.S. export data, the statistical significance of this relationship remains relatively constant over time. In 1978, 17 percent of U.S. exported capital goods exhibited a statistically significant negative relationship with the importer's per-capita GDP. By the late 1990s, about 21 percent of exported capital goods exhibited this relationship. Over the entire sample period, 60 percent of unit values exhibit a negative relationship with the importer's per-capita GDP. In any given year, the percentage of U.S. capital good exports that exhibits a positive and robust relationship with importer average income never exceeds 10 percent.

Panel B reports the relationship using world import data. From 1984 until the mid-1990s, more than 50 percent of imported capital good prices exhibited a negative relationship with importer average income, approximately 30-50 percent of all products exhibiting a statistically significant negative relationship in any given year. After 1998, the percentage of products exhibiting a statistically significant negative relationship with importer average income falls to less than 30 percent. Indeed, until 1993 the percentages in all four columns are relatively stable.

3.3 Robustness Check

Our main result, that unit price of capital goods exhibits a negative and significant relationship with the importing country's average income, is robust to various sample and specification checks. We report results for our regression controlling for the interaction of year and product (i.e., year*product dummies) only. Controlling separately for year, product, and year and product dummies yields similar results.

a. Trimmed Data

Unit values from disaggregated trade data can be noisy.[24] To dampen this effect we trimmed the data following a strategy similar to that used by Schott (2004). We eliminate potentially "unrealistic" values by dropping observations below the 10th percentile and above the 90th percentile. We also consider a 20-80 trim. We report results for each trim in columns (1) and (2) of Table 4. With U.S. export data (panel A), the average income for both trims is negative and significant at the 1 percent level. With world trade data (panel B), the coefficient on average

[24] See U.S. General Accounting Office (1995) for an in-depth study of classification methods and issues.

income for both trims is negative and remains significant at the 5 percent level. These results suggest that the negative relation does not seem to be caused by noise in our dependent variable. In terms of the magnitude of the effects, the coefficients associated with the 10-90 trim are similar to those obtained before in Table 2 column (1). For the 20-80, the estimates in column (2) Table 4, imply that a 10 percent increase in importer country's GDP per capita is associated with a 0.51 and 0.60 percent reduction in the unit values of capital goods when using the US export and the World Import data respectively.

b. Constant Country and Products

We now limit our sample to the countries and products (separately and combined) that are constant throughout the period. These results are reported in columns (3)-(5) in Table 4. Column (3) reports the coefficient on average importer income when the sample is reduced to countries that have observations over the entire sample period. With this reduced sample, the coefficient is negative with both U.S. export (panel A) and world import (panel B) data. For U.S. exports, the coefficient is significant at the 1 percent level. Similarly, when the sample is reduced to products traded in every year, column (4), the coefficient is negative and significant in both panels. Finally, when holding countries and products constant over the sample, column (5), the coefficient is negative for both U.S. exports and world imports, but significant only for U.S. exports.

c. By Income Group

Our analysis thus far suggests that the price of imported machinery and equipment is higher in poorer countries. To test this more explicitly, we re-estimate our basic specification for low- and high-income countries separately. In any given year, a low-income country refers to "low" and "low middle" income countries as defined by the World Bank. Similarly, a high-income country refers to "high" income countries as defined by the World Bank.[25] We report these results in columns (6) and (7) of Table 4.

Dividing the sample into low- and high-income countries highlights the higher cost of imported capital goods in poor countries. With U.S. export data, the coefficient is negative in both the low- and high-income sub-samples, the size of the coefficient in the low-income sample being about double that of the coefficient in the high-income sample. Our results further suggest

[25] Because prior to 1987 the World Bank did not categorize countries by income group, we use for those years the per capita income values in 1987. The income group classification does not change for most countries over the sample period.

that poorer countries are paying more (relative to their income) for imported capital goods. With world import data, the coefficient in the low-income sample is negative and significant, whereas the coefficient on average income is positive but not significant for rich countries.

d. PWT per Capita GDP

Having questioned the quality and accuracy of PWT capital goods data, we have avoided incorporating any series from that data set in our analysis. We do, however, use log of per-capita GDP from the PWT as our independent variable (as opposed to average income from the World Development Indicators) to re-estimate our basic specification. Our results are reported in column (8) of Table 4. Using both world import and U.S. export data, we find a negative and significant relationship between average income and unit price. This should not be surprising as the per-capita GDP series from the PWT and WDI are highly correlated.

4 Discussion

Our findings, using trade data, that the price/cost of capital in poor countries is high are consistent with the conventional wisdom. A large literature emphasizes the role of economic policy and institutions in shaping the incentives to accumulate capital that frequently drive up its cost (Diaz-Alejandro, 1970; Restuccia and Urrutia, 2001; Taylor, 1998a, b). Eaton and Kortum (2001) estimate barriers to trade in equipment to be substantially high. With respect to trade, in their vast survey of "trade costs," Anderson and van Wincoop (2004, p. 847) conclude that, on average, developing countries have significantly larger trade costs "by a factor of two or more in some important categories," and these costs "also vary widely across product lines, by factors as much as 10 or more." But our conclusion differs from Hsieh and Klenow's (2006) recent finding using PWT data that the absolute price of capital is no higher in poor countries.

To fully explain the reasons behind these differences is beyond the scope of this paper.[26] These differences might be due, however, to "measurement" issues related to the data underlying the analysis. As we and others have argued, the Penn World Tables, and the United Nation's International Comparison Program, which collects the raw data, might not be capturing the true costs of equipment goods. If, during the ICP survey rounds, country and regional offices are assigning the same prices to the same goods from the same sources (i.e., vendors, distributors), it should come as no surprise that ICP prices are similar across countries.

[26] A more complete answer to this question would require, in addition to other data, information on individual prices by PWT, which, as noted, is confidential.

More generally the ICP might not be capturing other costs associated with capital. One possibility is that the ICP price measures might not properly account for the lower quality of capital goods used in low-income countries. Barba-Navaretti, Soloaga, and Takacs (2000), for example, find that poorer countries tend to import higher shares of used capital goods. Another possibility is that the ICP ignores many components of the cost of equipment (e.g., learning about it, learning how it works, adapting it to local conditions, maintenance, etc.) that are, in fact, higher in low-income countries. Barba-Navaretti et al. (2000) and Mayer (2000) find that a low level of human capital is associated with barriers to imported capital goods, suggesting that such costs, which are not reflected in prices, could be substantial. In addition, ICP ignores many components of the cost of equipment (e.g. learning about it, learning how it works, adapting it to local conditions, maintenance, etc.) that are in fact higher in low income countries (Eaton and Korum, 2001).

The issues associated with the PWT and ICP data raise questions about the accuracy of capital prices across countries and time. For example, mis-measured aggregate price indices (e.g., price of investment series in the PWT) might not accurately capture the heterogeneity (and quality) of products within the target sector. These factors, however, do not readily explain why the cost of imported equipment goods along individual product lines seems to be high in low-income countries. Higher prices in poor countries might reflect price discrimination. For example, price discrimination has long been a presence in the trade of automobiles (Mertens and Ginsburgh, 1985; Verboven, 1996). In an attempt to illuminate the role of discrimination in bargaining, Ayres and Siegelman (1995) documented how different individuals are often charged different prices for the same product (in their case, automobiles in Chicago). Observing that affluent white males (who have higher reservation prices) are often charged a lower price than blacks and females, Ayres and Siegelman speculate that it might be profitable for firms to charge higher prices to groups of consumers that have a lower average reservation price if the variance of reservation prices within the group is sufficiently large. Within the context of traded capital goods, for example, suppose that a larger proportion of businesses in poor countries (than in rich counties) are willing to pay a high markup even though the mean (or median) firm in a developing country has a lower reservation price than its counterpart in a rich country. A vendor that knows this might rationally charge higher prices to all of its customers in poor countries.

Different prices might also reflect differences in information, higher costs being associated with searching for and negotiating (directly or indirectly) foreign purchases, the distribution and maintenance of goods, and conventional "gravity" variables (e.g., distance between countries, common currency, shared characteristics such as common language and border, etc.) as well as the volume of trade (Ayres and Siegelman, 1995; Anderson and van Wincoop, 2004).[27] Low-income countries might also be paying more for capital goods shipped in small quantities. Using our disaggregated 10-digit H.S. U.S. export data, we find that U.S. exports of capital goods in shipments of 1 to 2 units cost about six times more, and in shipments of 1 to 10 units, about 4 times more, for low income than for high-income countries.[28] Exploring these possibilities further is an important topic for future research.

Of course, higher unit prices could reflect higher product quality (Schott, 2004; Hallack, 2006; Hummels and Klenow, 2005). Addressing this issue directly is beyond the scope of this paper, as it is not easy to differentiate quality from other factors across products in our data.[29] But if we do assume this to be so, the negative relationship between average income of the importing country and price of imported equipment implies that poorer countries are importing higher quality capital goods (or, equivalently, that richer countries are importing lower quality capital goods), which contradicts recent findings that suggest that developing countries import older vintage capital goods. Barba-Navaretti and Soloaga (2001), for example, find that eastern European countries import low quality computers (e.g., lower processing speed) relative to their benchmark country, the United States. It somehow seems unlikely that the United States would be exporting its highest quality and technologically advanced products to low-income countries rather than to richer export markets in Western Europe and North America. Testing these hypotheses further would be useful.

Our results could also be related to some systematic biases in the collection of the data in poor countries. Given that we use data collected by U.S. officials (in addition to the World Trade data) this seems less likely. However, an alternative explanation may be related to over-invoicing of machinery exports (contributing to higher prices) in corrupt countries (which tend to be lower income countries). We test for this possibility by re-estimating our basic specification (1) but controlling for corruption in the importing country (using the International Country Risk Guide corruption index).[30] We find a positive relation and significant relation when using the World

[27] Many of the main distributors of machinery and equipment (see footnote 36 for some examples) do not have offices in many developing countries but serve these countries via regional or main headquarters.

[28] For the World Import Data, our analysis is limited by the fact that the data does not include imports valued under $100,000, which likely excludes these small shipments. Using this data set, we found that small shipments of capital good cost about the same in low-income and high-income countries (a result likely due to the limitations of the data).

[29] See Hallack and Schott, 2005; Khandelwal, 2007 for important work in this direction.

[30] The International Country Risk Guide (ICRG) corruption index is an assessment of corruption within the political system. The index is measured on a 0-6 scale, with zero representing the highest level of risk and six representing the lowest level of risk (with respect to corruption). Data is available starting in 1985.

Trade data and positive albeit not significant in the U.S. trade data.[31] However, in terms of our variable of interest, the GDP per capita variable remains negative and significant.

5 Conclusion

In this paper, we use highly disaggregated capital goods trade data to explore differences in the price of capital across countries. Our strategy is motivated by the fact that most countries import the bulk of machinery equipment (from a small number of industrialized countries). We find the price of imported capital goods to be negatively and significantly correlated with the income of the importing country. Because most low-income countries import the bulk of capital goods, our results provide suggestive evidence that capital goods are more expensive in poor countries. This is consistent with the conventional explanation regarding the low real investment rates in poor countries and documented slow diffusion of technologies from rich to poor countries.

Our results should be viewed as suggestive. First, our unit values might not fully capture the final user price of imported capital goods. Our trade data, for example, excludes import taxes such as tariffs and our U.S. export data excludes transportation costs (including both, however, would likely strengthen our findings for developing countries). Furthermore, our analysis could be more complete if we considered the price of locally produced capital goods, but (as other scholars have noted) the necessary data is difficult to assemble, especially for poorer countries. Finally, as is the case with many cross-country studies of traded goods, our results might be sensitive to the method by which we measure our units (e.g., whether we use number of units or weight). Since most of the capital goods surveyed in the ICP rounds are measured in number of units, we use that measure in our analysis.

These limitations notwithstanding, our results might have important implications, as they suggest that investment distortions might, indeed, be a factor in the observed differences in physical capital intensity across countries. That cross-country differences in income per worker are enormous—per capita income in the richest countries exceeds that in the poorest countries by more than a factor of fifty—is widely known. The consensus view in development accounting is that two-thirds of these differences can be attributed to differences in efficiency or total factor productivity (TFP).[32] The traditional approach to trying to fathom this puzzle has been to try to

[31] We regressed log price on log importer per-capita GDP, corruption and year-product interaction dummies. With the U.S. Exports Data, the coefficient on average income was -0.101 (s.e.=0.018); with the World Imports Data, the coefficient on average income was -0.156 (s.e.=0.065).
[32] See Klenow and Rodriguez-Clare (1997) and Hall and Jones (1999).

explain the slow, or lack of, diffusion of technology from rich to poor countries.[33] The findings presented here suggest that higher prices might inhibit technological diffusion.

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Appendix A: Penn World Tables (PWT) and the International Comparison Program (ICP)

a. Construction of the PWT

The Penn World Tables (PWT) present data on national accounts economic time series for many countries (Summers and Heston, 1991.[34] The regionalization of the United Nations International Comparison Project (ICP), beginning with the 1980 benchmark, facilitated estimation of the purchasing power parity (PPP) series for non-benchmark countries and extrapolations backward and forward in time. The PPP estimation typically entails regressing national price indices (developed for setting post-allowances for international employees working abroad) on per capita domestic currency converted to international dollars expressed relative to the United States.

The PWT uses the benchmark data to convert each country's expenditures at domestic prices to a common set of international prices. For benchmark countries, price levels for consumption, government expenditures, investment, and net foreign balances are obtained directly from the aggregation (using the Geary multilateral method) of the appropriate price headings from the ICP survey (there are 32 price heading parities for the various expenditure shares constructed by the World Bank from the various regional UN ICP regional comparisons).

For non-benchmark countries, prices are inferred from fitted values of price regressions run over the benchmark data. There are three potential sources for these international price series: the International Civil Service Commission (ICSC) index published in the Monthly Bulletin of Statistics of the United Nations Statistical Division (usually in September of each year), which covers 105 of the 115 countries in the PWT 1996 benchmark; the Employment Conditions Abroad index, which produces a number of binary price indices (compiled from data from firms, governments, and non-profit international agencies); and a State Department index that includes housing or a separate housing allowance.

Prices for non-benchmark countries are estimated, using these international price series, by means of a "short-cut" equation that regresses the log of the per-capita real expenditures of Domestic Absorption (DA) on the log of the nominal expenditures divided by the post-adjustment indices (both relative to the U.S. values), with dummy variables for the Sub-Saharan African countries and Central Asian countries. This serves to verify how closely the benchmark price levels are to the indices, since the nominal per capita DA expenditures enter the equations on both

[34] See PWT 2002 for a more detailed account of how the PWT is constructed.

sides. The coefficients are then applied to the non-benchmark data and the exponent of the result is the short-cut estimate of the real per capita DA.[35]

The price series (both the actual series from benchmark countries and predicted series from non-benchmark countries) are interpolated to fill in the years between benchmark surveys (1970, 1975, 1980, 1985, 1990, 1996) using national accounts data (originally from the World Development Indicators). If actual or predicted prices are unavailable for a country in a benchmark year, the price from the last available benchmark year is extrapolated. Thus, there are several possible price levels: actual prices from the ICP benchmark surveys; predicted price levels from the short-cut regression estimates discussed above; and extrapolated price levels. For both benchmark and non-benchmark countries, price series for investment is not adjusted for quality.

The PWT uses capital price data collected by the UN International Comparison Program (ICP) as the basis for constructing its investment price series. The World Bank is responsible for collecting ICP on the prices of from 500 to 1,500 individual goods and services in selected countries. For a given year, countries in which the ICP has price data are benchmark countries for the PWT tables. The number of benchmark countries has increased from 16 in 1970 to 115 in the latest version of the PWT.

b. Collection of ICP data

Because ICP data underlies the PWT investment price series, it is worthwhile to investigate how these data are collected and assembled (World Bank, 2006; Ahmad, 2006). A coordinated but relatively decentralized process is employed whereby the World Bank's Global Office (which coordinates the ICP data collection process among the regions and countries) creates a set of standard product descriptions (SPDs). Individual country offices are responsible for collecting the prices for these products using any combination of methods they find most "convenient" (World Bank, 2006, 10). By way of example, the SDP form for a "Utility Tractor" issued by the Global Office for the 1993/96 ICP round gives a general description of the piece of equipment, its usual purpose, and its principal specifications. A particularly noteworthy feature of the form is the specification of three utility tractors. The Kubota M6800 is identified as the preferred model, but there are two alternates, a Massey-Fergusson and a Mahindra. A provision is also made for an unspecified alternate in the event that none of the three listed models are available.

[35] Real shares for consumption, investment, and government expenditures are also estimated for non-benchmark countries. These regressions are different from the short-cut estimate discussed in the text.

In the first stage of the collection process, the Global Office decides on a core list of equipment goods for each country to price. For the 2005 ICP survey, the Global Office identified 108 core equipment goods. These include fabricated metal products (5 products), general-purpose machinery (15), special-purpose machinery (39), electrical and optical equipment (29), motor vehicles, trailers, and semi-trailers (11), and software (9), although in practice this number (and type) can be relaxed. Regional offices can draw up their own lists of equipment goods to be priced that they consider representative of their countries. But they are expected to consult the core list of 108 goods first, and to provide prices for at least 80 of the items specified in the core list.

Countries are then required to provide prices for machinery and equipment that are consistent with their valuation as fixed capital assets in the national accounts. This means prices must include trade, transport, delivery and installation costs, all paid by the purchaser (including import duties), and deduct any discounts that are generally made available to producers. Prices can be collected from any of a variety sources, directly from producers, importers, or distributors or from their catalogs. Countries are free to collect prices using whatever method or combination of methods they find most convenient, personal visit, telephone, letter, Internet, and so forth. For the 2005 round, the Global Office even provided a list of websites that countries can visit.[36] Finally, regional coordinators can "edit" the prices to ensure that products that share the same technical characteristics are compared.

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[36] Examples include: Fabricated Metal Products: www.alcoa.com (aluminum extrusions); General Purpose Machinery: www.ingersol-rand.com (cranes, compressors), www.volvo.com (cranes), www.kawasaki.com (gas turbines), www.cat.com (engines, gas turbines), www.johndeere.com (diesel engines), and others; Special Purpose Machinery: www. agcocorp.com (agricultural machinery brands - Challenger, Fendt, Massey-Ferguson, Valtra, Gleaner, Hesston, New Idea, Ideal, Sunflower, White planters, RoGator, TerraGator, Spra-Coupe, Farmhand, Glencoe, Sisu Diesel, TYE, Fieldstar, Loral, Soilteq, Willmar), www.cat.com (earthmoving, mining, quarrying, material handling), www.cnh.com (agricultural machinery brands - CASE IH, New Holland, Steyr), (construction machinery - CASE, New Holland, Kobelco), www.johndeere.com (agricultural, earthmoving, forestry and lawn care), www.ingersol-rand.com (earthmoving), www.volvo.com (earthmoving), www.komatsu.com (earthmoving), www.kawasaki.com (earthmoving), www.jcb.com (earthmoving, agriculture, forklifts), www.makita.com (power woodworking tools), www.black&decker.com (power woodworking tools), and others; Electrical/Optical/Medical Equipment: www.leviton.com (switching devices), www.squared.com (control and switching devices), www.sylvania.com (controls, switching devices, lights), etc.; Motor Vehicles/Trailers/Semi-trailers: www.mack.com (cab/chassis, tractor), www.paccar.com (truck/tractor brands -Kenworth, DAF, Leyland, Peterbilt, Foden), www.navistar.com (cab/chassis, tractors), and others.

Table 1: Production and Trade of Capital Goods

Importing Country	GDP per Capita	Equipment Production (% of GDP)	Source of Equipment Purchase (% of Absorption)							
			Home	U.S.	Japan	Germany	U.K.	France	Italy	Sweden
Europe:										
Austria	11131	4.5	37.7	3.2	3.6	33.0	2.7	2.4	2.9	1.5
Denmark	12969	4.0	8.0	7.9	6.8	28.0	10.3	4.6	4.7	10.2
Finland	12051	4.7	42.8	4.7	5.7	13.8	5.1	2.7	2.8	10.0
France	12206	4.9	59.7	7.0	3.2	10.7	3.9	--	4.6	0.9
Germany	12535	10.5	65.9	5.2	5.1	--	3.6	3.5	3.0	0.9
Greece	6224	0.9	32.3	3.8	3.8	18.7	5.3	5.2	13.4	1.3
Hungary	5278	8.6	47.0	1.6	2.1	10.9	1.4	1.6	1.6	1.1
Italy	10808	3.6	45.1	6.6	3.7	16.6	5.6	6.2	--	1.4
Norway	14144	2.8	50.1	6.1	3.7	9.9	6.1	2.0	2.3	8.5
Portugal	5070	1.8	25.9	5.0	5.9	18.8	8.5	7.3	9.3	2.1
Spain	7536	2.7	54.0	6.5	5.2	10.9	4.2	5.4	5.4	1.2
Sweden	13451	5.7	19.5	10.3	8.0	20.7	9.4	4.7	3.3	--
Turkey	3077	1.9	46.8	7.1	6.7	14.0	4.5	2.0	4.9	0.8
U.K.	11237	6.4	53.9	11.0	5.3	8.5	--	3.4	2.8	1.3
Yugoslavia	5172	6.6	68.6	2.9	0.6	8.2	1.6	1.5	4.0	1.2
Pacific:										
Australia	13583	2.0	42.0	15.9	16.3	5.5	4.5	1.2	2.1	1.5
Canada	15589	2.9	37.4	45.7	5.8	2.1	1.8	0.8	0.7	0.6
Japan	11771	9.3	95.3	2.7	--	0.4	0.0	0.0	0.1	0.1
Korea	4217	6.3	52.1	12.9	23.9	2.5	1.0	1.5	0.4	0.8
New Zealand	11443	2.2	42.9	11.6	15.6	4.8	6.7	1.5	1.7	1.0
Philippines	1542	0.6	27.7	26.0	18.1	5.3	2.2	1.7	0.9	0.5
U.S.	16570	6.8	83.4	--	6.4	1.3	0.9	0.5	0.4	0.2
South Asia:										
Bangladesh	1216	0.2	19.1	5.7	14.9	6.6	6.7	4.0	1.6	0.3
India	1050	1.3	75.7	3.7	4.0	4.5	2.9	1.9	0.8	0.3
Iran	4043	0.9	54.3	0.9	7.2	13.4	4.9	0.9	5.6	1.1
Pakistan	1262	0.6	33.6	11.5	12.2	9.7	8.5	2.5	3.9	1.2
Sri Lanka	2045	0.3	6.0	8.9	27.8	10.0	12.9	3.9	2.5	2.2
Africa:										
Egypt	1953	1.0	35.4	10.0	8.0	10.7	5.3	6.3	10.2	0.9
Kenya	794	0.7	40.0	4.0	7.4	7.4	17.4	3.3	3.7	1.4
Malawi	518	0.1	0.7	8.0	5.6	7.0	26.9	8.7	6.3	1.3
Mauritius	4226	0.6	12.4	1.2	12.0	5.3	8.4	23.3	3.2	0.3
Morocco	1956	0.5	34.0	3.2	2.7	7.5	3.7	27.7	7.0	2.4
Nigeria	1062	0.3	27.0	8.1	8.0	8.8	16.7	5.5	5.5	0.5
Zimbabwe	1216	1.2	35.3	9.1	2.3	7.0	14.7	4.9	6.7	2.1

NOTES: The table corresponds to Table 1 and Table 3 from Eaton & Kortum (2001). Data corresponds to 1985. Population and GDP per capita in international dollars are from Summers & Heston (1991). The share of equipment producing industries (non-electrical machinery, electrical equipment, and instruments) was calculated as the sum of the value added of these industries as a share of GDP. Absorption of equipment is calculated as the gross production of equipment producing industries plus imports less exports. The trade data are from Feenstra et al. (1997) and the production data from UNIDO (1999).

Table 2: Unit Values of Capital Goods and Importer Characteristics

Panel A: U.S. Exports

	(1)	(2)	(3)	(4)
Log GDP per capita (WDI)	-0.082	-0.058	-0.14	-0.080
	[0.015]***	[0.015]***	[0.017]***	[0.014]***
Product*Year Dummies	Y			
Product Dummies		Y		Y
Year Dummies			Y	Y
R^2	0.76	0.73	0.01	0.74
# Observations	1273536	1273536	1273536	1273536

Panel B: World Imports

	(1)	(2)	(3)	(4)
Log GDP per capita (WDI)	-0.103	-0.102	-0.156	-0.099
	[0.044]**	[0.047]**	[0.072]**	[0.045]**
Product*Year Dummies	Y			
Product Dummies		Y		Y
Year Dummies			Y	Y
R^2	0.69	0.68	0.01	0.68
Observations	217104	217104	217104	217104

NOTES: * significant at 10%; ** significant at 5%; *** significant at 1%. Panel A displays OLS coefficients from a panel regression of importer-unit values of capital goods (at the 10-digit product level) on log importer GDP per capita from 1978 to 2001. Panel B displays OLS coefficients from a panel regression of importer-unit values of capital goods (at the 4-digit SITC product level) on log importer GDP per capita from 1984 to 2000. Robust standard errors adjusted for importer clustering are listed below each coefficient.

Table 3: Relationship between Unit Values of Capital Goods and Importer Income

Panel A: Unit Value of Capital Goods and Importer Country GDP per Capita (by year and product), 10-digit HS U.S. Export Data

Year	% Positive & Significant	% Negative & Significant	% Positive & Non-Significant	% Negative & Non-Significant
	(1)	(2)	(3)	(4)
1978	9%	17%	29%	45%
1979	9%	16%	31%	45%
1980	10%	17%	33%	40%
1981	8%	15%	33%	44%
1982	6%	17%	31%	45%
1983	6%	16%	35%	42%
1984	5%	17%	32%	46%
1985	5%	18%	33%	45%
1986	9%	14%	35%	41%
1987	8%	17%	37%	38%
1988	6%	17%	31%	46%
1989	6%	21%	30%	43%
1990	8%	19%	30%	43%
1991	8%	18%	32%	41%
1992	6%	20%	32%	42%
1993	6%	21%	29%	44%
1994	6%	22%	30%	42%
1995	7%	22%	32%	39%
1996	6%	23%	31%	40%
1997	6%	23%	32%	39%
1998	6%	22%	31%	41%
1999	6%	20%	32%	41%
2000	7%	22%	31%	40%
2001	9%	21%	29%	41%

NOTES: Panel A reports the distribution of signs (and their significance) from product-level regressions by year for U.S. export data at the 10-digit HS level. The regression specification is of the form: log(price) = a + b* log(importer GDP per capita). The first column reports the percentage of capital goods that exhibits a positive and significant (at the 10 percent level) relationship with importer per-capita GDP. Column 2 reports the percentage of capital goods that exhibits a negative and significant relationship with importer per-capita GDP. Column 3 reports the percentage of capital goods that exhibits a positive and non-significant relationship with importer per-capita GDP. Column 4 reports the percentage of capital goods that exhibits a negative and non-significant relationship with importer per-capita GDP. For all four columns, significance is at the 10 percent level, based on robust standard errors.

Table 3, continued

Panel B: Unit Value of Capital Goods and Importer Country GDP per Capita (by year and product), 4-digit SITC World Import Data

Year	% Positive & Significant (1)	% Negative & Significant (2)	% Positive & Non-Significant (3)	% Negative & Non-Significant (4)
1984	16%	30%	25%	30%
1985	13%	27%	23%	36%
1986	13%	39%	21%	27%
1987	19%	27%	28%	26%
1988	11%	45%	22%	23%
1989	11%	43%	19%	27%
1990	15%	41%	16%	28%
1991	16%	43%	14%	27%
1992	16%	49%	16%	19%
1993	15%	43%	16%	26%
1994	21%	34%	26%	19%
1995	22%	36%	18%	24%
1996	24%	43%	15%	19%
1997	25%	32%	23%	20%
1998	21%	27%	24%	28%
1999	24%	24%	29%	24%
2000	45%	23%	19%	13%

NOTES: Panel B reports the distribution of signs (and their significance) from product-level regressions by year for world import data at the 4-digit SITC2 level. The regression specification is of the form: log(price) = a + b* log(importer GDP per capita). The first column reports the percentage of capital goods that exhibits a positive and significant (at the 10 percent level) relationship with importer per-capita GDP. Column 2 reports the percentage of capital goods that exhibits a negative and significant relationship with importer per-capita GDP. Column 3 reports the percentage of capital goods that exhibits a positive and non-significant relationship with importer per-capita GDP. Column 4 reports the percentage of capital goods that exhibits a negative and non-significant relationship with importer per-capita GDP. For all four columns, significance is at the 10 percent level, based on robust standard errors.

Table 4: Robustness—Unit Values of Capital Goods and Importer Characteristics

Panel A: U.S. Exports	90-10 trim	80-20 trim	Countries constant	Products constant	Countries & Products cte.	Low income	High income	PWT Per-capita GDP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log GDP per capita (WDI)	-0.070	-0.051	-0.077	-0.081	-0.047	-0.210	-0.094	-0.121
	[0.010]***	[0.007]***	[0.015]***	[.016]***	[0.020]**	[0.037]***	[0.065]	[0.024]***
Product*Year Dummies	Y	Y	Y	Y	Y	Y	Y	Y
R^2	0.62	0.48	0.76	0.77	0.79	0.73	0.80	0.77
Observations	1026756	783929	1240758	542780	405814	464860	523710	994152

Panel B: World Imports								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log GDP per capita (WDI)	-0.085	-0.060	-0.083	-0.102	-0.113	-0.253	0.025	-0.148
	[0.039]**	[0.028]**	[0.056]	[0.044]**	[0.100]	[0.127]**	[0.129]	[0.073]**
Product*Year Dummies	Y	Y	Y	Y	Y	Y	Y	y
R^2	0.57	0.46	0.69	0.68	0.71	0.68	0.75	0.69
Observations	177119	134378	135319	201548	56330	90094	90052	175620

NOTES: * significant at 10%; ** significant at 5%; *** significant at 1%Panel A displays OLS coefficients from a panel regression of importer-unit values of capital goods (at the 10-digit product level) on log importer GDP per capita from 1978 to 2001. Panel B displays OLS coefficients from a panel regression of importer-unit values of capital goods (at the 4-digit SITC product level) on log importer GDP per capita from 1984 to 2000. Robust standard errors adjusted for importer clustering are listed below each coefficient. Column 1: Countries held constant throughout the sample; Column 2: Products held constant throughout the sample; Column 3: Countries and products held constant throughout the sample; Column 4: Prices in the top 10% and bottom 10% dropped from the sample; Column 5: Prices in the top 20% and bottom 20% dropped from the sample; Column 6: Sample restricted to low and lower middle income countries, as defined by the World Bank; Column 7: Sample restricted to high income countries, as defined by the World Bank; Column 8: Dependent variable is per-capita GDP from the Penn World Tables.

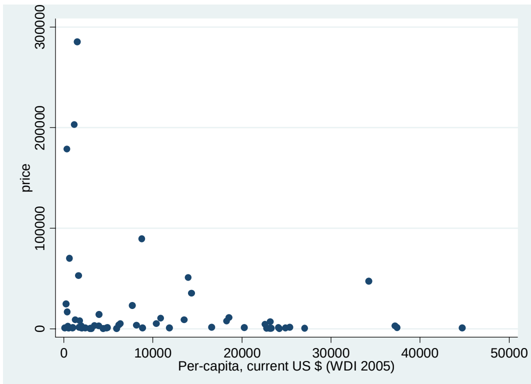
Table A1. Average "Grade" of PWT Data, by Region

Region	Average Grade	Letter Grade
Africa	1.56	D
N. Africa & Middle East	1.71	D
North America	2.44	C
South America	2.08	C-
Caribbean	1.81	D+
Asia	1.91	D+
Eastern Europe	1.60	D
Western Europe	2.77	B+
Oceania	2.50	C

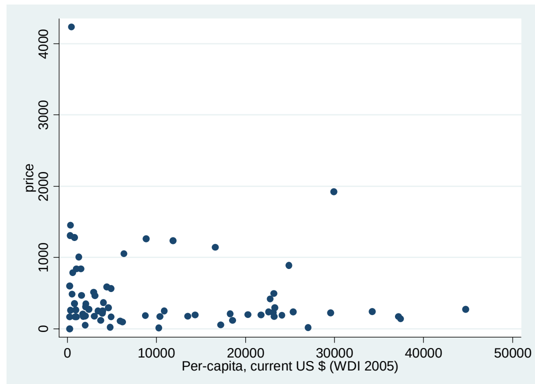
Source: Penn World Tables 6.1
Notes: To compute regional grades, we averaged the Penn World Table's self-reported country grades. To calculate this average, we used the following numeric scoring: A=4, B=3, C=2, D=1.

Figure 1: Unit Values versus Importer per-capita GDP for Four Types of Equipment Goods Exported from the United States.

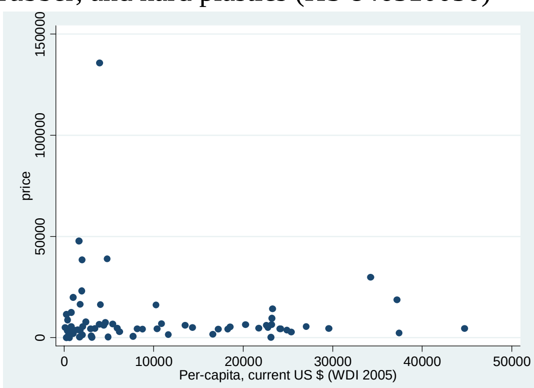
Radio transmitters for frequencies up to 30 MHz (HS 8525106030)



Time registers and recorders HS (9106100000)



Machine tools for working cork, bone, hard rubber, and hard plastics (HS 846510050)



Machine tools for working stone or mineral like materials (HS 8464909090)