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Cost-Benefit Analysis Theory versus Practice at the World Bank 1960 to 2015

Abstract: Two cost-benefit analysis methods developed from differing economic situations and analytical objectives in the 1960s and 1970s. The Trade Policy Approach of Ian Little and James Mirrlees analyzed international competitiveness of projects producing private goods and physical infrastructure in markets severely distorted by trade protectionism; it was adopted in 1975 by the World Bank; the multilateral regional development banks followed suit. The Public Finance Approach of Arnold Harberger developed from comparative statics analyses of public projects and policies in the United States and was adopted at the US Agency for International Development and in several Latin American countries. The original Trade Policy Approach included social analysis too tedious for everyday application, leading an efficiency-only version to emerge and be popularized by teaching materials from Price Gittinger and colleagues in the World Bank's Economic Development Institute. It proved the right method for World Bank use until Washington Consensus reforms, the GATT and WTO reduced price distortions, and slowly restored private international financial flows gave private industry access to international private investment capital. Official Development Assistance (ODA) portfolios responded by refocusing on public goods and market failures, leading to decreased utility of the Trade Policy Approach and decreased use of cost-benefit analysis at the World Bank. A 1990s drive in the World Bank to switch from the Trade Policy Approach to the increasingly relevant Public Finance Approach resulted in an internal manual and operational guidelines, but not a book from a distinguished university press, commonly presumed to signal official Bank policy. It is time for that long-overdue book to be published.

Keywords: cost-benefit analysis; international development; project economics.

JEL classifications: H43; H44; O21; O22; D5.

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Cost-benefit analysis (CBA) was used in investment appraisals by the World Bank as early as the 1960s (Vawda et al., 2001). Early applications involved a two-step process of (a) removing taxes and subsidies from the project financial cash flows, and (b) shadow pricing unskilled labor at zero (sometimes but not always), while also (sometimes) sensitivity testing the project rate of return using a 'black market' exchange rate in cases where an obvious and relatively large informal market for foreign currency was observable (such as at Landi Kotal in the Northwest Frontier Province in Pakistan – per the author's observations as a World Bank economist at the time).

Formal shadow pricing beyond the second step above was not used at the World Bank until the early 1970s, when three approaches to shadow pricing were debated: (a) The *OECD Manual* (1969) approach of Little and Mirrlees, (b) The Harberger (1971, 1972) approach, and (c) The *UNIDO Guidelines* (1972) approach proposed by Dasgupta, Marglin and Sen, shown below to be classifiable under the Harberger approach.

In the mid-1970s, the World Bank standardized its cost-benefit analysis shadow pricing method on the approach proposed by Little and Mirrlees (1974, 1969), restated for World Bank purposes in the book by Squire and van der Tak (1975– eighth printing, 1995) and referred to hereinafter as the Trade Policy Approach. For reasons discussed in following sections and in World Bank Independent Evaluation Group (World Bank IEG, 2010), in Hammer (1997), in Devarajan et al. (1997) and in Belli (1996), the World Bank re-standardized in the late 1990s on the approach proposed by Harberger (Belli et al., 1998/2001) referred to hereinafter as the Public Finance Approach. A summary comparison of the Trade Policy and the Public Finance Approaches is presented in Table 1 below which is built from the end-of-section summaries in the text that follows.

Cost-benefit analysis use at the World Bank peaked in the late-1970s and early 1980s and declined in the late 1980s and the 1990s (Little & Mirrlees, 1990; Devarajan et al., 1995; Belli & Guerrero, 2009; World Bank IEG, 2010). Bahn and Lane (2012) report roughly parallel waxing and waning of its use at the United States Agency for International Development (USAID), though not necessarily for all the same reasons as at the World Bank. Meanwhile, recently renewed USAID (Bahn & Lane, 2012) and World Bank (World Bank IEG, 2010) efforts to bring back cost-benefit analysis use prompt the following discussion of the evolution of cost-benefit analysis use at the World Bank and why it evolved as it did.

Table 1 Summary Comparison of Trade Policy Approach and Public Finance Approach to Cost-Benefit Analysis (CBA) – In Practice.

Comparison	Trade Policy Approach (TPA) to CBA	Public Finance Approach (PFA) to CBA
Sectors	Good only for private goods sectors (agriculture, industry, some finance) with delimited applicability to some physical infrastructure	Usable for all sectors but with greatest advantage in Public Goods & Market Failure (missing & incomplete market) applications
Numeraire (Shadow Prices)	Foreign Exchange (border values)	Aggregate Consumption (WTP* values)
Focus/Objectives	1. Getting meaningful prices for investment decision making 2. Appraising international competitiveness	Comparative statics analysis of project or policy alternatives in economic efficiency terms, as in ADM* Social Welfare model
Mundane Question Addressed	Does the project make sense when valued in international prices (aka at international opportunity costs) rather than in highly distorted domestic prices?	Does the consumption value of added (saved) goods and services exceed the consumption value of the goods & services given up by diverting private consumption and private investment to public use?
Shadow Pricing Concept	Direct–indirect gains and losses of foreign exchange, measured using backward and forward value chain tracing, sometimes facilitated by semi input–output models.	Gains and losses in producers' (PS) and consumers' surpluses (CS) from project-induced movements along supply and demand curves
Principal Strengths	1. Identification and preparation of internationally competitive private goods projects in price distorted economies 2. Makes foreign exchange value the (external) final metric rather than an internal shadow price – in other words, the exchange rate does not have to be estimated 3. Supply & demand elasticities are needed only for 'large project' or 'large country' cases in which the project affects the border price	1. Usable in all sectors 2. Numeraire fits missing & incomplete markets applications
Principal Weaknesses	1. Numeraire mismatch with revealed preference & stated preference measures 2. Cannot handle public goods & missing/incomplete markets 3. Not ideal for infrastructure sectors, but can be made to work for some of them	1. Requires transferable domestic price elasticities 2. WTP value of foreign exchange must be explicitly estimated
Most Appropriate Applications	1. Private goods sectors (agriculture & industry) 2. When domestic market prices are severely distorted 3. When commodity concept of foreign exchange cannot be confidently applied and/or uncertainty exists regarding shadow exchange rate estimates 4. Selecting portfolio of private investments that will survive in a policy-reformed economy	1. Public goods & market failure applications 2. When the SER is readily estimable 3. When transferable domestic price elasticities are available

*NIA = National Income Accounts; OER = Official Exchange Rate; SER = Shadow Exchange Rate; MPP = Marginal Physical Product; ADM = Arrow–Debreu Model; WTP = Willingness to Pay

1 CBA methods in international development: 1960–1997

The two most prominent forms of cost-benefit analysis in international development project and policy analysis in the English-language tradition[1] during the past half century have been the Trade Policy Approach associated with Ian Little and James Mirrlees (1974, and OECD 1969) and the Public Finance Approach associated with Arnold Harberger, 1972; and Jenkins et al., 2012). (The now-little-known *UNIDO Guidelines* (1972) is classifiable as a Public Finance Approach.)

The Trade Policy and Public Finance Approaches arose from differing backgrounds and circumstances in the middle decades of the 20th Century and, as discussed below, were originally used for different purposes. The Trade Policy Approach was the World Bank's officially sanctioned method from 1975 to 1997, before its *de facto*, if not official, replacement by the Public Finance Approach in 1998. The textbook/guidelines version of the revised cost-benefit analysis approach is (Belli et al., 1998/2001), updated 2001 with a different ordering of author and co-authors and reissued by the World Bank Institute (which replaced the Economic Development Institute discussed below). Meanwhile, with each passing year the argument is less frequently heard that Belli et al. (1998/2001) is not an official World Bank document, since it has not been jointly published by the World Bank and Johns Hopkins University Press or Oxford University Press – as with Squire and van der Tak (1975, eighth edition 1995), Gittinger (1972, 1982), and Ray (1984). However, this author judges current official World Bank Operational Manual Statements on economic analysis to be tersely written reflections of Belli, et al. Thus, Harberger's Public Finance Approach is now the World Bank's *de facto* cost-benefit analysis method.

Meanwhile, parallel cost-benefit analysis guidelines revisions at Asian Development Bank (1997, 2013) pay homage to the substitutability, in theory, between the Trade Policy and Public Finance Approaches as per Ray (1984). A central argument of the present article is that they are not universally substitutable, in practice, and that the Public Finance Approach is now the more appropriate method for international development project analyses, just as the Trade Policy Approach was more appropriate for the milieu and objectives facing official development assistance (ODA) in the 1970s.

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[1] The 'method of effects' developed and promoted by Prou and Chervel (1970) was used in former French colonies to analyze project impacts on each stakeholder rather than on aggregate social welfare. See the English-language description of the method by Bussery (1973) and the critique in Balassa (1976).

As the intellectual leader in international development cost-benefit analysis practice in the final decades of the 20th Century, the World Bank saw its CBA methods emulated by other international development organizations and taught to developing country officials:

Those adopting in the mid-1970s a limited version of Little–Mirrlees [referred to herein as the Trade Policy Approach]*, whether directly or following the World Bank, include the Asian Development Bank (ADB), the Inter-American Development Bank (IDB), the Overseas Development Administration . . . in the United Kingdom, and the Kreditanstalt fur Wiederaufbau in Germany. Japan also claims to follow the World Bank. France and the European Commission still use the"effects method," despite its errors, as pointed out by Balassa (1976). Other countries seem to follow no particular methodology, or hardly use cost-benefit analysis at all. The Canadians and the British agree, however, that most consultants are familiar with the World Bank methodology and use it (and the British add that they are required to do so).* Little and Mirrlees (1990, p. 361)[2]

Following its adoption by the World Bank, the Public Finance Approach has dominated international development applications – that is, when cost-benefit analyses are actually done. Actual use is the subject of the section below titled "The Wax and Wane of International Development CBA".[3]

2 Project portfolios and the two competing CBA methods

2.1 The trade policy approach to cost-benefit analysis

International development project analyses in the 1960s and 1970s were concerned with getting the right investments made in infrastructure, industry, and agriculture in the face of severe price distortions. Private finance had not yet been re-globalized, leaving ODA as the primary way major fixed asset investments were made in developing countries. Meanwhile, heavy protection of domestic industry (aka trade policy-induced price distortions) made it difficult for ODA analysts to determine

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2 The author thanks an anonymous reviewer for noting that "The . . . Little and Mirrlees. . . reference to Canada following the World Bank methodology is clearly in error. Since the first Treasury Board Guidelines in 1976 for the appraisal of public sector investments the methodology has followed the Harberger approach."

3 The Public Finance Approach already had been adopted in parts of Latin America where the influence of Harberger's students (e.g., Chile – though not at the IDB) was strongest. See the interview of Harberger by Levy (1999).

which investments made economic sense.[4] The parallel debate over whether the cost-benefit analyses should also address the policies that were distorting the investment environment or just the asset investments themselves is addressed below.

Little and Mirrlees (1969 – aka the *OECD Manual*) proposed a foreign exchange metric (unit of account, or numeraire) with border prices as the shadow prices. That way, no investments would be made that could not survive in a trade policy-reformed environment in which international prices would translate directly into domestic prices.[5]

The *UNIDO Guidelines* (1972) arrived three years after the *OECD Manual*. The *Guidelines* authors used Harberger's aggregate consumption numeraire and argued that shadow prices (defined as border prices in the *OECD Manual* approach) should derive from marginal willingness to pay (WTP) values based on the assumption that government's price distorting policies would persist into the future – that is, a constrained optimization approach to shadow pricing, as in linear programming (per Dantzig, 1963).

Dasgupta (1972) pointed out that whichever cost-benefit approach was used – UNIDO or OECD – some of the projects would be wrong for their post-implementation environment; and the winner (loser) categories would switch with cost-benefit analysis method switches. The debate over reformed (that is, border) prices *versus* unreformed (that is, constrained optimization) shadow prices was an important motivation for the Little–Mirrlees revision of 1974.

Little and Mirrlees (OECD, 1969) had initially argued that using border price equivalents as shadow prices made their cost-benefit analyses consistent with the trade policy advice being given to governments. The *UNIDO Guidelines* authors countered that – since governments typically do not follow such policy advice – the *OECD Manual* method would result in the wrong projects being financed. Little and Mirrlees (1974) revised their original work to recognize the reformed/unreformed policy shadow pricing issue. Their border pricing approach was retained, and a distinction between 'tradable' and 'traded' goods emerged; applications of the original *OECD* shadow price concept (reformed policies) based the shadow prices on the 'tradable/non-tradable in principle' definition, while applications of the *UNIDO* shadow price concept (unreformed policies) used the 'traded/non-traded in

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4 The 1969 *OECD Manual* traces its heritage to Bruno (1965) and Corden (1966) who also proposed methods for selecting investments in the economic environment described by Little et al. (1970). The Public Finance Approach, in contrast, came from an entirely different economic environment and had different analytical objectives.

5 It is common for economists to define shadow prices as the prices that would exist in a free market equilibrium – which clearly is incorrect as regards the Public Finance Approach's shadow prices, discussed below. The border pricing approach of the *OECD Manual* is the closest that cost-benefit analysis has come to using policy-reformed market prices as shadow prices.

practice' definition. This yielded different approaches to shadow pricing such things as project inputs and outputs that were "importable in principle but non-traded in practice" (because of unchangeable import restrictions) and those "exported in practice but non-tradable in principle" (because of unchangeable export subsidies).

The central lessons to take from the foregoing section are: (Author's Note: These end-of-section lessons accumulate to explain the derivation of Table 1, above):

(1) In the 1960s–1970s, market prices in many developing countries were so distorted as to be unusable for investment decision making, leading analysts (Bruno, Corden, Little & Mirrlees) to apply international opportunity cost approaches rather than domestic consumer-based valuations in their shadow pricing schemes.

(2) Trade Policy Approach shadow prices are based on international – aka 'border' – prices, and in the *OECD Manual* (1969) definition of 'tradable/nontradable in principle', they largely reflect market prices that would exist without trade policy distortions.

(3) Public Finance Approach shadow prices reflect constrained optimization values – that is, the marginal reduction in consumption values (WTP) from taking a factor away from its alternative use on the cost side, and the marginal increase in consumption value from adding (avoiding loss of) a consumption unit on the benefit side.

(4) With the Little and Mirrlees (1974) compromise, Trade Policy Approach shadow prices still reflected units of foreign exchange, but when derived using the *UNIDO Guidelines* (1972) approach in which policies affect whether the good is expected to be traded in practice during the project life, the shadow price estimation switches from that good's own border price to the constrained optimization approach to determining the indirect impacts on foreign exchange of using or producing another unit of the good within the prevailing policy constraints.

(5) Whether to use OECD tradable goods definitions in shadow pricing *versus* the UNIDO traded goods definitions largely was decided by the cost-benefit analysts themselves, though a tendency – and related guidelines – developed as follows:

- Industry and development finance project analysts used the tradable goods definitions (easier to estimate, and in a sector where policies could readily be changed – see, for example, the World Bank-issued Development Finance Company (DFC) Guidelines prepared by Duvigneau and Prasad (1984)), and

- Agricultural project analysts used the traded goods definitions (more difficult to estimate, but agricultural policy intransigence was the norm) – see, for example, Gittinger's (1982) *Economic Analysis of Agricultural Projects*.

2.1.1 Trade policy social analysis versus trade policy efficiency-only analysis

Squire and van der Tak worked from the 1974 version of Little–Mirrlees in drafting the series of big memos that circulated around the World Bank and finally resulted in their 1975 book.[6] The core of the Trade Policy Approach described in the previous section was hidden by the book's proposals for handling social analysis issues related to then-prominent work on optimal growth and optimal taxation theory (See Diamond & Mirrlees, 1971). An efficiency analysis-only subcomponent of the Trade Policy Approach was exploited by operational economists at the World Bank and became the operational face of the Trade Policy Approach. The efficiency-only version of the Trade Policy Approach was made teachable and thus more broadly usable by Gittinger (1972, revised 1982) and the World Bank Economic Development Institute (EDI) training materials that lay behind the second edition of the Gittinger book (the two editions became a World Bank all-time bestseller and were used by project analysts in all sectors).

The Squire and van der Tak book (1975) dedicates much of its discussion to Trade Policy Social Analysis. The book was issued as a World Bank–Johns Hopkins University Press publication – typically considered an official statement of World Bank policy. The authors demurred on the policy statement presumption, however:

Although our recommendations do not at this time represent established World Bank practice, the Bank is conducting serious experiments in this area, and its appraisal practices are moving in the general direction advocated in this book. The book therefore is offered as a contribution to the literature on project analysis rather than as an official statement of World Bank policy. (Squire & van der Tak, 1975, "Introduction," p. 3)

Though considerable budget and intellectual resources were spent between 1975 and 1980 on testing and demonstrating its potential for implementation, Trade Policy Social Analysis proved impractical to use on every project. First, the numeraire was not simple: ". . . defined here as uncommitted public income

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6 Herman van der Tak was the World Bank Project Economics Advisor at the time and, thus, responsible for CBA methods and applications. Lyn Squire was an Oxford University Ph.D. who had recently graduated from the World Bank's Young Professionals Program; Squire went on to be an important player in other aspects of policy analysis and formulation at the World Bank in coming decades.

measured in convertible currency, which will be referred to often as 'free foreign exchange'." Squire and van der Tak (1975, p. 57). Second was the need to develop income distribution weights to be applied to all project impacts relative to the numeraire (as per above, uncommitted foreign exchange in the hands of government):

At a general level, nearly all countries may be assumed to have two primary and simultaneous – if not always equally valued objectives: to increase total national income, the growth objective, and to improve the distribution of national income, the equity objective. In general, therefore, projects should be assessed in relation to their net contribution to both of these objectives, but this has not always been the practice of the World Bank or of other lending institutions. Squire and van der Tak (1975, p. 4)

Trade Policy Social Analysis was presented for testing by Bank staff as a means for fixing the longstanding omission of equitability in public investment planning.

The expansive Staff Working Paper 239 prepared by Senior Economist Colin Bruce (1976) demonstrated the calculation of social analysis shadow prices for Thailand, Malaysia and The Philippines and used the Thai data to demonstrate their use in a Trade Policy Social Analysis of the Tha Bo Pump Irrigation Pioneer Project in Northeast Thailand. Further testing by Colin Bruce and Young Kimaro in 1977–78 applied Trade Policy Social Analysis to the analysis of the Chao Phya Irrigation Improvement Project II in Thailand. Outside of a relatively small group of advocates, little observable sympathy developed among operational staff for forcing the use of social analysis across the board, and few applications like the Malaysia, Philippines and Thailand tests followed.

2.1.2 The rescue of the trade policy approach by efficiency-only analyses

The Trade Policy Approach was rescued by a scaled-down version that (a) took advantage of the officially stated separability between an efficiency analysis part and a social analysis part, and (b) greatly simplified the application of the former. In essence, World Bank staff retreated to conducting growth-only CBA, leaving out the equity issues they considered not only difficult to apply but also subjective. The foreign exchange numeraire and border prices as shadow prices that are central to the Trade Policy Approach were retained.

Replacing income weighting and social analysis were adaptations from Prou and Cherval's Method of Effects for displaying project impacts upon groups of stakeholders, which this author learned from Brenard Chartois who taught project economics courses in French language at the EDI. In the late-1970s, the author and colleagues in the EDI developed materials to demonstrate the use of CBA to

analyze the policy context of the project also. The objective was to teach developing country officials attending EDI courses in Washington and in-country how to show decision makers the effect that specific policies were having on (a) the prices facing domestic businesses and consumers, and (b) the resulting distribution of the benefits and costs of the investment being analyzed. Most prominent were economic analysis case studies by Ward and Burnett (1976*a* and 1976*b*, revised 1986 by Ward and Bazzaz) analyzing a Caribbean glass containers manufacturing operation. A version of the case study by Banerji and Austin (1979) used the Harvard case study approach rather than the EDI case study method; and the original Ward and Burnett case study was reproduced (often without attribution) for use in universities and government training programs throughout the developing world. The Caribe Containers case study was commonly described as the world's most widely taught economic analysis case study during the final quarter of the 20th Century.

Other development economists reached similar conclusions about cost-benefit analysis and the policy environment, as the Bretton Woods era retreated and private international capital flows began to be restored. ODA's focus shifted from making ODA-dominated investments in policy-distorted environments (1970s) to policy reforms that would 'get prices right' and guide private investment as international capital flows were restored (1980s) to institutional reforms to create and/or complete markets (1990s and thereafter). It is worth noting here that by 1993 private capital flows to developing countries exceeded ODA flows for the first time since World War II (with the bulk of the flows going to the most-reformed countries and to those with exploitable minerals, of course).

The central lesson from the foregoing discussion is that Trade Policy Efficiency-Only Analysis was the right cost-benefit analysis approach for the 1970s, decreasingly so for the 1980s, and largely inappropriate for international development investment analyses by the 1990s.

2.1.3 How trade policy efficiency-only analysis was applied, in practice

Trade Policy Efficiency-Only Analysis was applied in three ways, two of which (outlined below) were sometimes called 'complete border pricing'. Complete border pricing uses border prices (CIF and FOB)[7] as shadow prices for tradable

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[7] Cost, Insurance and Freight (CIF), and Free on Board (FOB), respectively. See International Chamber of Commerce INCOTERMS definitions extending point-in-space comparisons used in project economics to international trade contract terms. Import and export parity price guidance was defined both in financial and in economic terms and in both the Public Finance and Trade Policy Analysis approaches by Ward (1977) and Gittinger (1982), as suggested by EDI colleague Walter Schaefer-Kehnert. Elements of the Ward/Schaefer-Kehnert parity pricing approach is reproduced in Mabiso (2008).

(traded) goods and develops border price equivalents for non-tradable (non-traded) goods in one or both of two ways:

(1) By tracing non-tradable (non-traded) inputs and outputs to tradable (traded) goods equivalents using detailed interviews with backward- and forward-linked value chain participants, on a project-by-project basis, and/or

(2) By using (semi) input–output models developed for appraising the entire program of projects in each country (see Powers, 1981; Shiong & MacArthur, 1995).[8]

The Trade Policy Efficiency-Only Approach's foreign exchange metric (as in either of above two versions) involves *tracing* everything to foreign exchange (using input–output relationships – thus, ending up with costs and benefits already expressed in foreign currency equivalents) rather than *converting* everything into a common currency using an externally derived shadow exchange rate. By making foreign exchange the numeraire rather than a price in the CBA, the Trade Policy Analysis Efficiency-Only approach avoids difficulties and disagreements related to shadow pricing foreign exchange.

The third method, referred to by practitioners at the time as 'partial' or 'incomplete' border pricing, uses only a standard conversion factor (SCF) with few or no general or specific conversion factors and with SCF calculations paralleling shadow exchange rate (SER) calculations. Partial border pricing defines the relationship between these two as SCF = OER/SER, where OER = official exchange rate. See Ward and Deren (1991) and Ray (1984).

Because shadow prices (aka border prices) in the Trade Policy Efficiency-Only Approach come from international prices that are determined in a large global marketplace, projects are commonly assumed to not appreciably affect equilibrium prices of project inputs and outputs (Gittinger 1982; Ward & Deren, 1991 – a fortuitous simplification that eased the teaching of this method). Thus, the price elasticities of supply and demand that are important in Public Finance Approach valuations come into play in Trade Policy Efficiency-Only valuations in only two situations: (1) the *large country assumption* in which the country is a large player in global markets for that good or service, or (2) the *large project assumption* in which the project is so large that it affects the country's border prices. In both cases in the Trade Policy Approach, elasticity applications are to border (international) price

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8 Both the Trade Policy Approach and the Public Finance Approach eschew using induced multipliers at national levels (effects from re-spending household income) which semi input–output models do not facilitate. See Boardman et al. (2010), Chapter 4. However, Howe (1972) finds induced multipliers to be legitimate for project analyses based on sub-national accounting stances.

changes that then feed through into domestic price changes.[9] Harberger-tradition-trained analysts encountering Trade Policy Approach analyses for the first time commonly asked, "Where are the elasticities?"

2.1.4 The public finance approach – Harberger's little triangles

In the Public Finance Approach, the WTP measures of benefits and costs include not only the rectangles created by trade tariffs and other policy-induced price distortions but also the triangles that graphically represent consumers' and producers' surplus changes from price adjustments caused by the project or policy. (The little triangles approach is proposed in Harberger (1971) and is based on an insight commonly attributed to Jules Dupuit (1844) and fully developed by Alfred Marshall (1890, 1920).)

The Public Finance Approach's two principal strengths are

 (i) its aggregate consumption numeraire (aka aggregated WTP) specified in the same terms as revealed preference and stated preference models used in estimating missing or incomplete market demand functions,[10] and

(ii) denomination in the same currency and at the same price level as the financial analysis, greatly facilitating the policy and stakeholder distribution analyses.[11]

While the Public Finance Approach can be used in all sectors and even when markets are missing or incomplete, the Trade Policy Approach can be used only for projects involving private goods in policy-distorted markets and sometimes for quasi-private goods. The latter depends upon how much of the utility derived from

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9 OECD (1969) at pp. 108–9. Case studies of variable border prices can be found in Ward and Deren (1991 – Case 11 at pp. 261–4), and Nardi et al. (2007). On constant returns, linearity, and related assumptions leading to tracing all impacts to traded goods or land and labor, see Stewart and Streeten (1972) at pp. 75–6.

10 Flood's (1991) discussion of complete markets is both accessible to non-economists and interesting reading for economists. On revealed preference and stated preference methods, see Hanley and Barbier (2009), Adamowicz et al. (1994), Hyman and Stiftel (1988); and Dixon et al. (2013). For an estimate of demand elasticities using revealed and stated preference data, see Zuo et al. (2016). On the difficulty of applying stated preference methods in developing countries, see Durand-Morat et al. (2016). On more basic problems with contingent valuation, see the "Report of the NOAA Panel on Contingent Valuation" (Arrow et al., 1993), and Kling et al. (2012); also see the symposium on contingent valuation in the *Journal of Economic Perspectives* 8(4): 3–64 (Fall 1994). Additional challenges to these and other applications in CBA come from developments in behavioral economics – reviewed in the Spring 2016 issue of this *Journal*.

11 Currency denomination and domestic/border price level differences are discussed in Ward and Deren (1991), as is the added ease of stakeholder analysis (comparing economic and financial values – based on insights from Prou and Chervel) by denominating benefits and costs at the domestic price level.

the various project attributes can either be marketed as tradable/traded goods or represented by substitutes capable of revealed preference analysis involving directly or indirectly tradable/traded goods. Among these are revealed preference modeling opportunities provided by electric power, where the foregone expenditures for providing equivalent lighting utility include marketed substitutes (lamps, kerosene) with alternative costs readily convertible into foreign exchange.

2.1.5 The commodity concept of foreign exchange

The commodity concept of foreign exchange (as in Arrow–Debreu commodities) provides the economic theory connection between the Trade Policy Approach's foreign exchange numeraire and the welfare theory underlying the Public Finance Approach's aggregate consumption numeraire:

We shall try to measure everything in terms of the 'foreign exchange equivalent' – that is, the amount of foreign exchange that is just as valuable to the economy as having an extra unit of a commodity. OECD (1969, p. 106).

The Public Finance Approach generates a WTP value for units of foreign exchange as a commodity and then uses that value along with other shadow prices to estimate the present value of aggregate consumption (aka social welfare) with *versus* without the project or policy intervention. The Trade Policy Approach, on the other hand, converts every project impact to increases or decreases in foreign exchange availability. Common practice was to then convert those foreign exchange values to local currency equivalents at the official exchange rate (OER). One virtue of the Trade Policy Approach is that the exchange rate is not central to the calculations.

From the foregoing discussion, we can derive the following conclusions for Table 1:

(1) The Public Finance Approach can be applied to more sectors than the Trade Policy Approach, in practice.

(2) The exchange rate 'matters' and is a price to be estimated in the Public Finance Approach, while the choice of exchange rate does not affect decisions in the Trade Policy Approach.

(3) Because of its aggregate consumption numeraire and WTP shadow prices, the Public Finance Approach is a better fit with revealed preference and stated preference methods for estimating missing and incomplete market values than the Trade Policy Approach.

(4) Public Finance Approach shadow prices based on domestic consumption values yield an economic analysis at the domestic price level (rather than the

border price level of Trade Policy Approach economic values) making the comparison between financial and economic analyses more direct and more easily explained to decision makers and stakeholders.

(5) Supply and demand elasticities that are central in Public Finance Approach analyses apply only to 'large country' and 'large project' situations in the Trade Policy Approach, since the shadow prices come from international prices (which in small-country/small-project cases graph as horizontal CIF- and FOB-based values).

3 The wax and wane of international development CBA

World Bank and other sources of ODA grew in absolute terms between the 1970s and 2015 but declined relative to private financial flows. With these develop- ments, industry, agriculture and some physical infrastructure in developing coun- tries increasingly could be financed with private international capital that grew from nominally zero in 1970 to five times the size of ODA by 2015. At the same time, Washington Consensus policy reforms, the eight rounds of the General Agree- ment on Tariffs and Trade (GATT) and the arrival of the World Trade Organization (WTO) greatly reduced domestic price distortions in most developing countries. The focus of ODA shifted with changing circumstances, and ODA project port- folios changed with those shifts to more closely reflect the standard public goods and market failure projects and programs of public investment management theory (Musgrave1 (1959); Weimer and Vining (2017), 6th edition). Analyzing the evolv- ing styles of projects increasingly required a different method of cost-benefit anal- ysis from the Trade Policy Efficiency-Only Analysis that had served well when (a) developing country market prices were unfathomable, and (b) ODA was the major source of finance for industry, agriculture and infrastructure investments in highly distorted developing country economies.

Charts 1 and 2 show the World Bank's 1970–2014 shift away from direct lend- ing for agriculture, industry, and physical infrastructure projects and toward greater investment in policy and institutional reform and in public goods and market failure projects. (Charts 1 and 2 are drawn by the author using data in World Bank Annual Reports from 1972 through 2014.)

Drawing upon research by Belli and Guerrero (2009), the World Bank IEG (2010) reported that more than 70% of World Bank project appraisal reports in the 1970s contained economic rate of return (ERR) calculations and that the per- centage of appraisals reporting ERRs had declined to less than 30% by the 1990s.
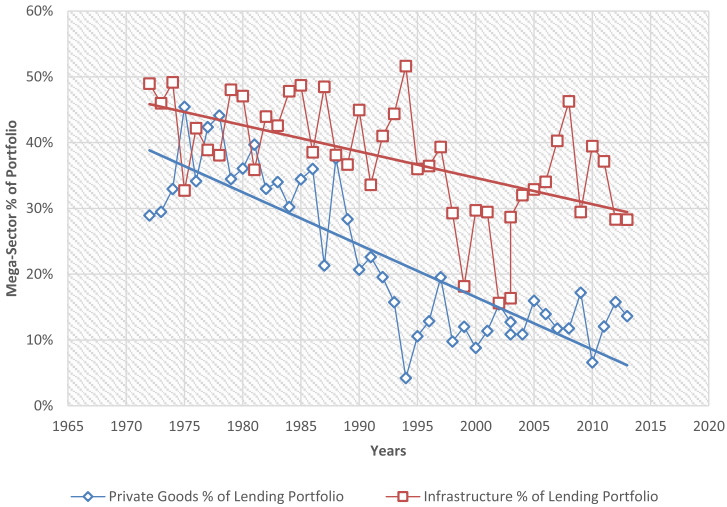
Source: Author calculations from World Bank Annual Reports 1972-2014

Chart 1 Private Goods and Physical Infrastructure as % of World Bank Lending Portfolio 1972 to 2013.
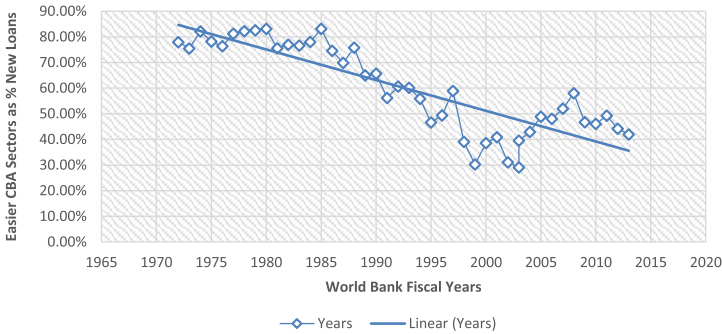
Source: Author calculations using data from World Bank Annual Reports 1972-2014.

Chart 2 Decrease in Easier-CBA Sectors as % of World Bank Lending by Year – 1972 to 2013.

The Independent Evaluation Group (IEG) concluded that more than half of the decline was due to the World Bank portfolio shift to sectors where cost-benefit analysis is more difficult – the public goods and the missing and incomplete market applications indicated in Charts 1 and 2. This article argues that – not only were those project types inherently more difficult to appraise – they also required a cost-benefit

Table 2 When Trade Policy (TPA) and Public Finance (PFA) Approaches are and are not substitutable.

When TPA works better	*Project involves private goods (industry, agriculture) *International competitiveness of project or enterprise is the primary objective *Survivability of the project in a policy-reformed price environment is being tested *Some issue complicates the calculation or acceptance of a Shadow Exchange Rate (SER)
When TPA & PFA are substitutable	*Project is in private goods sector or in some physical infrastructure sector (power, transport) where TPA can be forced to work *Policy-induced price distortions are minor, and constrained optimization shadow pricing concepts fit the project context just as well as policy-reform-based shadow prices
When PFA works better	*Project addresses public goods, missing or incomplete markets * Any issues regarding SER concept or calculation are minor

analysis method different from the cost-benefit analysis method officially sanctioned in World Bank Operational Manual Statements from 1975 through 1997.

Though the Trade Policy Efficiency-Only approach is much more limited in its applicability than the Public Finance Approach, 70% of World Bank project appraisal reports in the 1970s nevertheless presented ERR calculations. Chart 2 indicates that 75–85% of the World Bank's project portfolio in the 1975–1985 period was in sectors amenable to appraisal using Trade Policy Efficiency-Only Analysis, leaving only 15–25% of the portfolio at that time that might have benefited from the Public Finance Approach's broader capabilities. The match between portfolio composition and cost-benefit analysis method largely explains why 70+% of appraisal reports at that time presented ERR estimates.

Charts 1 and 2 show that the portfolio composition had changed substantially by the mid-1990s so that in the period immediately after 1997 only 30–40% of the projects could have been appraised using the Trade Policy Efficiency-Only method – though it is questionable whether they *should* have been, given the changed circumstances and objectives discussed here. From 1998 onwards, the Belli, et al. guidelines provided the World Bank with a more broadly applicable approach to cost-benefit analysis (the Public Finance Approach), after which the argument of greater appraisal difficulty becomes more relevant than does the lack of an appropriate cost-benefit analysis method.

4 Conclusions and recommendations

With the *de facto* if not official adoption of the Public Finance Approach in 1998, World Bank staff gained a broadly applicable method for analyzing projects in the

global economy of that day – though other impediments (insufficient appraisal budgets, inadequate staff training, etc.) remained. The perceived official (that is, publication in a book *via* a distinguished university press) World Bank cost-benefit analysis statement continues to be Squire-Tak (Squire and van der Tak 1975, reissued 1995) and Ray (1985) indicating equivalence and substitutability of the Public Finance and Trade Policy Approaches. As analyzed above and summarized in Tables 1 and 2, these two cost-benefit analysis methods are not universally substitutable – not in practice.

Three overall conclusions and recommendations follow from the foregoing analysis:

(1) The pragmatic objective behind Trade Policy Efficiency-Only Analysis was to make rational investments in industry, agriculture and infrastructure when financial prices were seriously distorted by government policies – particularly protectionist trade policies. When private international capital flows were restored post-Bretton Woods, when price distortions were reduced by reform programs, and when the sector composition of Official Development Assistance project portfolios shifted, variations on the Trade Policy Approach were no longer needed, would not work for more than half the projects, and were not appropriate CBA methods for those projects and those objectives. In its day, however – that is, during the Bretton Woods years and shortly thereafter – the Trade Policy Efficiency-Only Approach was the right method for analyzing projects at the World Bank.

(2) Times change. The Public Finance Approach with its aggregate consumption numeraire and constrained optimization shadow pricing system has become the more appropriate cost-benefit analysis method for analyzing post-1990 project types being financed by the World Bank.

(3) The World Bank should now publish *via* a distinguished university press the long-overdue book from the work of the Pedro Belli-led team.

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