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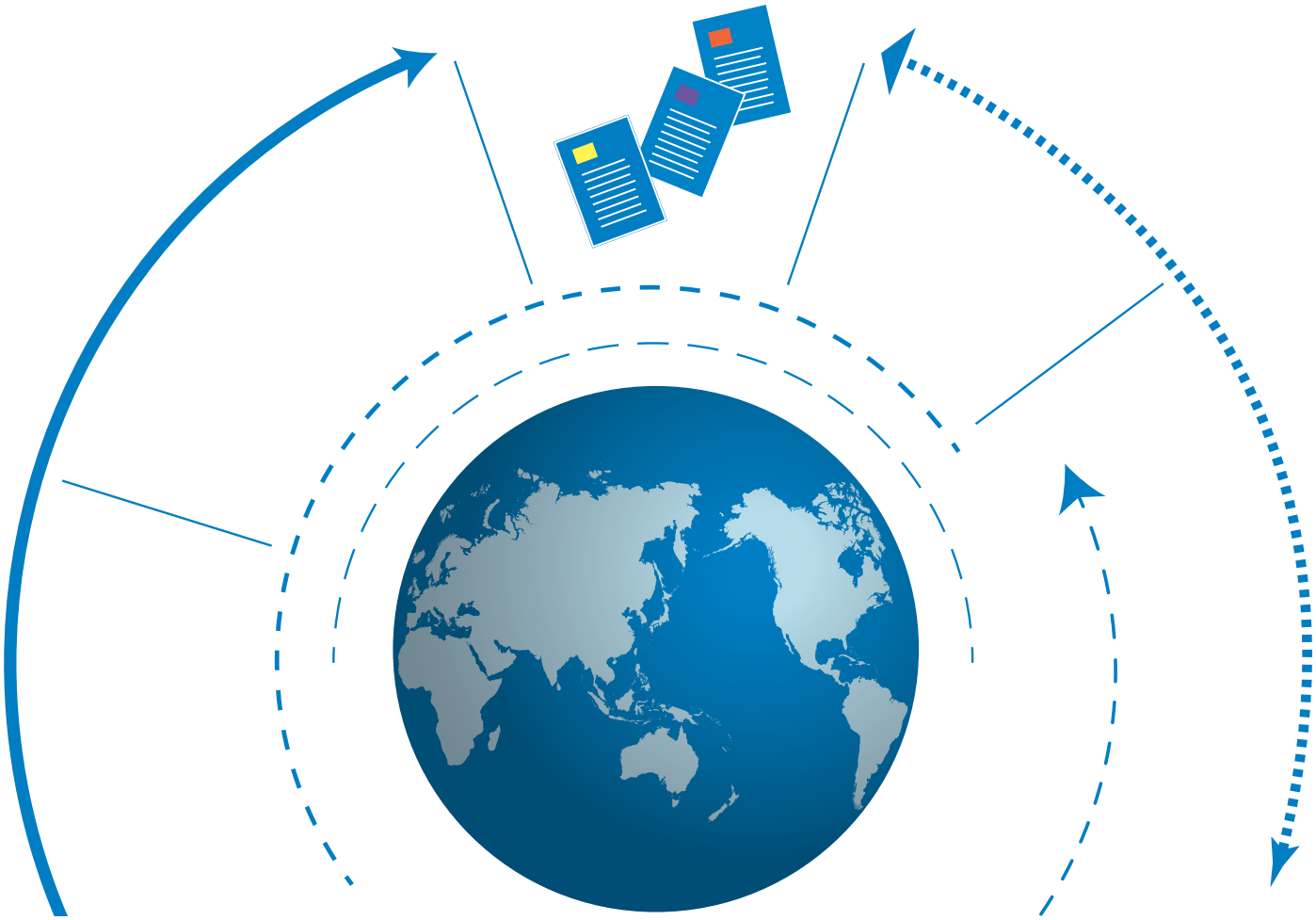
The grant element method of measuring the concessionality of loans and debt relief

Simon Scott



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[1] Simon Scott is Counsellor in the OECD Statistics Directorate.

Preface

This Development Centre working paper fills two important gaps in the public debate about financing development.

The first is a gap in the documentation about how to measure the softness, or concessionality, of aid loans, debt relief and other transactions. The uses of grant elements for these purposes have been growing for nearly half a century, but the public has not been given any general accounting of how they work. Yet, the need for such public accounting has become more acute since the 2014 decision of the OECD's Development Assistance Committee (DAC) to change its method of measuring aid. As of 2019, the DAC's main measure of "official development assistance" (ODA) will move to a "grant equivalent" basis. This means that grant elements will no longer just determine which loans qualify as ODA, but also determine the exact amount of ODA reported for each loan.

A second gap this paper fills is in furthering an understanding of the Development Centre's contributions to the history of development assistance. John Pincus of the RAND Corporation first proposed the grant element method in 1963, and others quickly saw its potential applications to policy. But it was two distinguished staff members of the Development Centre that provided the decisive impetus to the method's wider use. First, our then Deputy President, Ian Little, included it in a landmark 1965 book on foreign aid on which he had been working as an academic. This included an insight about the maturities of loans. Then, Göran Ohlin made the most important contribution. He examined grant elements in unparalleled detail, and his 1966 Development Centre study on "Aid and Indebtedness" remains the most thorough mathematical treatment of them ever published. Ohlin also took the decisive step of producing the first grant element tables, which enabled the method to be applied to individual transactions for the first time. Because of this work, the DAC introduced the grant element into its Recommendation on the Terms and Conditions of Aid in 1969, the first of its many uses in international finance.

In short, the grant element is part of the Centre's history, just as the Centre is part of its history. I am grateful to Simon Scott, who worked for many years in the DAC's secretariat, for producing this account, which promises to be useful to both researchers and practitioners in the field of aid and debt.

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Résumé

L'élément-don est la « part offerte » d'une transaction financière. La formule mathématique pour obtenir un pourcentage précis d'élément-don fut proposée pour la première fois par John Pincus de la Corporation RAND en 1963, et affinée par Göran Ohlin, au Centre de développement, en 1966. Pincus a également plaidé pour l'expression de l'aide en termes d'équivalent-don – i.e. l'élément-don exprimé en valeur monétaire en lieu et place d'un pourcentage. La méthodologie de l'élément-don fut officiellement utilisée pour la première fois en 1969, afin de fixer un objectif pour assouplir les conditions de l'aide. Un test d'élément-don fut introduit dans la définition de l'aide publique au développement en 1972. La méthodologie de l'élément-don fut par la suite appliquée pour réguler les termes des crédits à l'exportation, pour aider à estimer la soutenabilité des emprunts d'un pays en développement, ainsi que pour calculer le niveau de remise de dette et s'assurer de la comparabilité des efforts dans les opérations de rééchelonnement de dette au sein du Club de Paris. La sélection d'un taux d'actualisation approprié permettant de refléter les conditions du marché financier est au cœur du calcul de l'élément don. La période actuelle de faibles taux d'intérêts présente à cet égard des problèmes d'une ampleur particulière. Cet article offre au novice une introduction à la nature et aux mécanismes de la méthodologie de l'élément-don, ainsi qu'à l'histoire de son application pratique.

Mots clés : concessionalité, aide au développement, remise de dette, crédits à l'exportation, élément de libéralité, élément-don, équivalent-don, conditions d'aide

Classification JEL : B26, B27, B31, C65, F34, F35, O22

Abstract

The grant element is the "gift portion" of a financial transaction. The mathematical technique for arriving at a precise grant element percentage was first proposed by John Pincus of the RAND Corporation in 1963, and developed mathematically by Göran Ohlin of the Development Centre in 1966. Pincus also advocated expressing foreign aid in terms of its grant equivalent – i.e. the grant element expressed as a monetary value instead of a percentage. Grant element methodology was first used officially in 1969, in a target for softening the terms of aid. A grant element test was then introduced into the definition of official development assistance in 1972. Grant element methodology was subsequently applied to regulate the terms of export credits, to help assess the sustainability of developing country borrowing, and to calculate the level of debt relief and ensure comparability of effort in relevant Paris Club debt rescheduling operations. Central to grant element calculations is the selection of an appropriate discount rate to reflect financial market conditions. The present low interest rate environment raises challenges in this respect. This paper offers a layman's introduction to the nature and mechanics of grant element methodology, and to the history of its application in practice.

Keywords: concessionality, aid, foreign aid, debt, debt relief, export credits, aid loans, softness of loans, grant element, grant equivalent, aid terms

JEL Classification: B26, B27, B31, C65, F34, F35, O22

Acronyms and abbreviations

DAC	Development Assistance Committee (of the OECD)
DDR	Differentiated Discount Rate
EDA	Effective Development Assistance
EPP	Equal Principal Payments
LDC	Least Developed Country
LIC	Low Income Country
MIC	Middle Income Country
ODA	Official Development Assistance
ODE	Official Development Effort
OECD	Organisation for Economic Co-operation and Development
RAND	Research and Development
UN	United Nations
US	United States (of America)

1. Nature and mechanics of grant elements

1.1. Introduction

In December 2014, a High Level Meeting (HLM) of the OECD's Development Assistance Committee (DAC) decided to introduce a new way of measuring aid loans. Instead of recording the actual flows of cash between lender and borrower, the headline measure of "official development assistance" would instead be based on the loans' "grant equivalents". This change will take effect from 2019 reporting on 2018 flows (OECD, 2014, §§10-12 and Annex 2), though traditional cash-flow figures will also continue to be published. In 2016, the DAC HLM decided also to apply the grant equivalent method to other non-grant instruments such as equities and guarantees (OECD, 2016a, Annex 1).

These moves are only the latest extensions of a mathematical technique first proposed in 1963, and elaborated in detail in two Development Centre publications in 1966. Since that time, grant element methodology has played a crucial role in the creation of the ODA concept (Scott, 2015), and in work on export credits, debt sustainability and multilateral development finance.

This note offers an introduction to grant element methodology, explaining its functioning and implications. The approach is expository, with the mathematical elements simplified where possible. Nevertheless it is hoped that it will be of use to those who need to employ grant element calculations in their work, and as an introduction to the technique for students and researchers.

1.2. What is a grant element?

"A bird in the hand is worth two in the bush", and money now is worth more than the prospect of the same sum in future. For one may not receive all one expects, or it may not buy as much as it does now; and in any case one cannot buy anything today with money one does not have.

So comparing money now and in the future must take account of the rate at which money loses value while one waits for it. Once that rate is identified, a calculation can be performed in either direction. One can start from a given sum now and apply an interest rate to arrive at its equivalent future value. Or one can reduce an assumed future amount to its value now by applying a discount rate. A discount rate is simply an interest rate applied in reverse: instead of multiplying today's money to tomorrow's value, it divides tomorrow's value to today's money.[2]

Grant element calculations use discount rates to reduce the expected future reflows from a financial transaction to the value they would have today – "in the hand". If that value in today's money of expected future reflows is lower than the amount extended today, then the difference represents a "gift". This gift portion is called a grant equivalent if expressed as a monetary value, and a grant element if expressed as a percentage of the amount now extended.

[2] An Austrian reviewer, Ms Hedwig Riegler, points out that the German terms convey this inverse relationship: *Aufzinsung* ("up-interesting") means adding interest to determine the expected value of a future payment; *Abzinsung* ("down-interesting") means discounting to determine the present value of a future payment.

The classic case is that of a loan, and for simplicity this discussion will focus mainly on loan calculations. Nevertheless the technique can be applied to any financial transaction where the dates and amounts of initial outflows or liabilities, and of expected reflows, can be stated.

A loan offered at market terms has a grant element of zero percent. This becomes a positive percentage if the lender adds an element of generosity. But it can never reach 100%, for only grants are pure "gifts".

In principle, a loan could have a negative grant element. This would mean that its terms were harder than market terms. But since market terms represent prices agreed by willing buyers and sellers – including buyers and sellers of credit – a borrower should never have to borrow at harder terms than the market would offer, based on lenders' credit risk assessments.

Grant element measures of aid were developed by John Pincus of the RAND Corporation and others in the 1960s. These researchers were concerned that aid figures on a commitment or gross flow basis were overstating donor effort. By valuing loans only in terms of their grant equivalents, Pincus and his followers aimed to make a more accurate estimate of the financial sacrifice involved.

1.3. How to calculate a grant element

Formulas and automated tools have been available to calculate grant elements for many years. But it is easier to develop an understanding of the method by working out a grant element manually. Table 1 provides an example. It assumes that the market rate of interest is 5%, and presents the case of a loan of a million dollars, extended at 5% interest, with the interest being paid every year, and the principal being repaid in a lump sum after ten years.

Table 1. The grant element of a loan at 5% interest, assuming market terms are also 5% - annual interest payment

A	B	C	D	E	F	G
Date	Amount extended	Amount repaid - principal	Amount paid - interest	Total repaid	Discount factor (1.05 per year, compounded)	Discounted repayments (E/F)
1.1.2018	1 000 000				1.0000	
1.1.2019			50 000	50 000	1.0500	47 619.05
1.1.2020			50 000	50 000	1.1025	45 351.47
1.1.2021			50 000	50 000	1.1576	43 191.88
1.1.2022			50 000	50 000	1.2155	41 135.12
1.1.2023			50 000	50 000	1.2763	39 176.31
1.1.2024			50 000	50 000	1.3401	37 310.77
1.1.2025			50 000	50 000	1.4071	35 534.07
1.1.2026			50 000	50 000	1.4775	33 841.97
1.1.2027			50 000	50 000	1.5513	32 230.45
1.1.2028		1 000 000	50 000	1 050 000	1.6289	644 608.92
Total						1 000 000.00

Note: Grant equivalent = Amount extended (B) minus Total Discounted repayments (G) = Zero.
Grant element = grant equivalent/loan value = 0/1000000 = Zero

Columns B to E set out all the payments to be made on the loan. But the key to understanding the table – and the whole grant element method – is column F, which shows what a dollar now (taken as 1.1.2018) would produce later if invested at 5% interest – USD 1.05 after a year, USD 1.1025 after two years, and so on. These numbers are then used in reverse – as divisors to discount the expected payments on the loan to their equivalent in today's (1.1.2018) money. If total payments in today's money will be less than the loan value, then the difference is a "grant equivalent" embodied in the loan.

Column F thus expresses the ***discount rate***. In this case it is 5% a year – the same as the interest being paid on the loan. So it is not surprising that the discounted sum of expected payments is exactly the same as the loan value, meaning that the loan has a grant equivalent of zero dollars, and a grant element of zero per cent. Loans at market terms have no grant element.

Table 2 shows how a positive grant element emerges when the interest rate on the same loan is reduced below the market rate. With interest of 2%, the sum of all the repayments, discounted to today's money at 5% p.a., is 23.17% less than the value of the loan, so the grant element is 23.17%. Receiving the loan in Table 2 would be equivalent to receiving the loan in Table 1, but with an upfront grant of USD 231 652 to help meet the repayments.

Table 2. The grant element of a loan at 2% interest, assuming market terms are 5% - annual interest payment

A	B	C	D	E	F	G
Date	Amount extended	Amount repaid - principal	Amount paid - interest	Total repaid	Discount factor (1.05 per year, compounded)	Discounted repayments (E/F)
1.1.2018	1 000 000				1.0000	
1.1.2019			20 000	20 000	1.0500	19 047.62
1.1.2020			20 000	20 000	1.1025	18 140.59
1.1.2021			20 000	20 000	1.1576	17 276.75
1.1.2022			20 000	20 000	1.2155	16 454.05
1.1.2023			20 000	20 000	1.2763	15 670.52
1.1.2024			20 000	20 000	1.3401	14 924.31
1.1.2025			20 000	20 000	1.4071	14 213.63
1.1.2026			20 000	20 000	1.4775	13 536.79
1.1.2027			20 000	20 000	1.5513	12 892.18
1.1.2028		1 000 000	20 000	1 020 000	1.6289	626 191.52
Total						768 347.95

Note: Grant equivalent = Amount extended (B) minus Total Discounted repayments (G) = 1000000-768348=231652.
Grant element = Grant equivalent/loan value = 231652/1000000 = 23.17%.

1.4. Key points so far

- The *grant equivalent* is an estimate, at today's value of money, of how much is being given away over the life of a financial transaction, compared with a transaction at market terms.
- The *grant element* is the *grant equivalent* as a percentage of the amount extended.
- Grant element calculations apply to all future payment obligations on a transaction.

- The calculations require the identification of a market rate of interest.
- This market rate is used to discount the future reflows to today's values.
- The grant equivalent equals the amount extended minus the reflows in today's values.

1.5. Grant elements as *estimates* of loan concessionality

The grant elements and grant equivalents of a loan are calculated when it is extended. They are an estimate of the financial sacrifice being made by the lender. The starting date for a DAC grant element calculation has always been the date of commitment. This can overstate the grant element if all or part of the loan is only disbursed later. More accurate starting points, reflecting actual or average dates on which the recipient receives benefits, are used in the OECD Arrangement on Export Credits to calculate the grant element of an offer of tied aid.

Grant elements can be calculated only of the basis of an explicit repayment schedule. They do not take account of any conditions or possible eventualities not yet expressed in the schedule, such as:

- "Bisque clauses" – rights granted to a borrower to defer payments under certain conditions, for example in case of balance of payments difficulties
- Penalties – Fines in case of late or partial payments
- Penalty interest – increased interest rates or charges in case of late or partial payments
- Rights to terminate the loan conferred on the borrower, the lender, or both
- Options to convert from fixed to floating interest rates, or vice-versa
- Options to refinance the loan, or change the currency of repayment
- Possible reinsurance of the loan repayments
- Associated financing or benefits – i.e. other funds or advantages tied to satisfactory servicing of the loan
- Conditions concerning the use of the loan funds, including, for example, obligations to purchase goods or services from the lending country
- Facilities to sue for relief or arrears in the lender's or the borrower's jurisdiction or elsewhere.

The presence or absence of such conditions may affect the eventual concessionality of a loan, but their effects cannot be reliably foreseen. Grant elements are thus estimates of concessionality based on what is known or expected about repayments at the time the calculation is made. The effects on the calculation of different repayment schedules are discussed in a Technical Note below.

1.6. The centrality of the discount rate

As already explained, all loans offered at an interest rate equal to the discount rate generate a grant element of zero. But when the interest rate is below the market rate, the timing of repayments starts affecting grant elements. This is because, once the interest rate involves a concession, the size of the concession depends on its duration. Early payments offer smaller concessions; later payments offer larger concessions.

Of course the concessionality calculation also depends crucially on the difference between the interest rate and the discount rate. The higher the discount rate, in relation to the interest rate, the higher the grant element.

The choice of discount rate also interacts with loan duration in ways that affect the assessment of *relative* concessionality between different loans. As an example, consider two loans to be repaid in equal annual instalments of principal, with no grace period, where Loan A is for 10 years at 3% and Loan B is for 15 years at 4%. Which loan is more concessional?

The answer depends on the discount rate selected. If this is 3% or less, then neither loan is concessional. If it is 4%, then only Loan A is concessional. If it is 5%, then Loan A has a grant element of 8.3% and Loan B, 5.8% - so Loan A is more concessional than Loan B. If it is 10%, Loan A has a grant element of 24.5%, and Loan B, 27.7% – so Loan B is more concessional than Loan A.

These potentially confusing results arise from the interaction of the loans' different repayment periods with different *relative* interest rate concessions that depend on the discount rate chosen. The specific point to retain is that raising the discount rate increases the grant elements of long-term loans more than it increases those of short-term loans. More generally, the example points up the decisive role of the discount rate in comparative as well as absolute assessments of concessionality.

1.7. Comparing flow and grant equivalent figures

As already mentioned, DAC statistics on the resources flowing to developing countries have traditionally been compiled on a cash basis measuring "capital flows". This derives from the distinction between current and capital accounts in the Balance of Payments. In the case of loans, the capital flow basis means recording first the extension of the loan as an outflow, and later the repayments of principal as negative flows, both amounts being the actual cash values transmitted at the time.

A feature of the capital flow approach is that the expected net capital flow over the life of the loan is zero. This is because interest payments are not taken into account. Deducting interest payments would yield another type of measure, called "net transfers". Expected net transfers over the life of any loan are negative in the amount of the total interest payable (plus any additional fees, commissions etc.).

The grant equivalent approach differs from both net flows and net transfers. It takes account of principal and interest payments, but discounts both to their equivalent in today's money. If the total of the discounted future flows is less than the value of the loan, then a grant equivalent exists.

Grant equivalent figures are quite a different "animal" from flow figures; they relate to a different statistical *quantity*. So grant equivalent and flow figures will show different profiles over time. This will be especially apparent when a donor starts a new loan programme. In the early years, net flow figures will exceed grant equivalents, since the grant equivalent is only a share of the disbursement, and repayments will be zero to start with, and only build up gradually. Over the whole loan term, however, grant equivalents will exceed net flows, since the flows will sum to zero once the entire principal has been repaid.

2. History and uses of grant elements

2.1. Milestones in the use of grant elements for international transactions

This section offers a chronology of major steps in the development and adoption of grant element methodology.

1963: In an article on the "real cost" of foreign aid (Pincus, 1963), John Pincus of the RAND Corporation asserts that "In order to arrive at a method that will allow us to measure the resources cost of aid to the donor, we must reformulate the definition of aid…expressing the value of aid as the combined nominal (or market) value of all forms of aid less the discounted present value of loan repayments…By this definition, all forms of aid are reduced to their value as grant or subsidy." Pincus then works out the grant equivalent of flows in 1961 and 1962 based on discount rates of 5% (an approximation of the domestic cost of capital), 5.75% (the World Bank non-concessional lending rate at that time) and 10% ("a rough approximation of the free market rate – the long-term private lending market to underdeveloped countries"). He then "suggests that DAC reviews would benefit from considering aid contributions on some such basis". He views his results as showing that "all countries tend to overstate the cost of their foreign aid".

1964: American academic Wilson Schmidt, then at George Washington University and Johns Hopkins Bologna Center, publishes a brief article (Schmidt, 1964) propounding and using grant element formulas to compare donor costs and recipient benefits of stylised loans and grants. He provides the first formula for calculating a grant equivalent. This formula works for loans where a single maturity applies to the entire principal, but not where part of the principal is repaid before the end of the loan. Schmidt makes the case that loans are to be preferred to grants where the rate of return on capital is higher for the borrower than the lender.

1965: In a book on aid flows, British academic Ian Little and his research assistant Juliet Clifford include an appendix on "Methods of Estimating the Cost of Aid". This uses discount rates of 6%, 10% and 15% to produce a range of possible grant equivalent estimates. The exceptionally high discount rate of 15% is designed to allow for the possibility of non-repayment, but even the resulting high estimate of aid is lower than the official gross flow figures at the time. Noticing that "maturity is not a precise concept", Little and Clifford take care to make calculations based on three different types of repayment schedule (Little and Clifford, 1965).

American economist Richard Cooper publishes "A Note on Foreign Assistance and the Capital Requirements for Development", conceived as an "exercise in optimization" of foreign aid flows. He refers to grant equivalents as "the amount that the donor in effect actually gives away as pure foreign aid" but then introduces the separate concept of a grant equivalent "defined for the recipient". Observing that donor- and recipient-based discount rates could differ, Cooper points out that "So long as the rate of discount for the recipient exceeds that for the donor, the grant equivalent for a given capital flow will typically be higher for the recipient than it is for the donor." He therefore advocates "optimizing" loans by lengthening their repayment periods but also raising their interest rates, leaving their grant equivalents unchanged when using the donor's discount rate. His idea is to maximise recipient benefit for a given donor effort.

1966: Göran Ohlin of the OECD Development Centre publishes "Foreign Aid Reconsidered" (Ohlin, 1966a) and "Aid and Indebtedness" (Ohlin 1966b), which use formulas to calculate grant elements. In an effort to "simplify matters", the formulas assume a continuous repayment stream, and so yield slightly inaccurate results when applied to actual loans repaid in discrete instalments. Ohlin focuses his analysis on debt sustainability and warns that "if the terms of development loans cannot be softened drastically…then one must probably look forward to an era of consolidation exercises, threats of default, and eventually increasingly insistent demands for moratoria."

The DAC annual report, "Development Assistance Efforts and Policies" (OECD, 1966, p. 54) discusses the grant element methodology for the first time, referring to it as a method of "correcting for differences in terms…[by] adjust[ing] for expected return payments by discounting to a present value. Instead of recording a loan at its face value, it would be included only to the extent that its schedule of payments fell below that of some selected market rate of interest…(The choice of the appropriate rate for discounting presents some difficulty.)" It further comments that "The discounted present value method is entirely a reflection of current policy…In a sense, it endeavours to measure how much the country is giving up as compared with the productivity of investment in its own territory. It is a measure of burden over the long-term rather than in the twelve months of the record. Presumably one could not apply this method to private flows since one has no set of future payments to use as a basis for calculation."

1967: A report of experts to the UN Secretary-General follows some of Cooper's reasoning in his 1965 article, observing that "the burden for the capital exporting country is the opportunity cost of foreign lending, that is, the earnings foregone by not undertaking domestic investment, the next best alternative. This suggests that the appropriate rate of discount to use for grant-element calculations is that equal to the marginal efficiency of domestic investment. Correspondingly, for a recipient country, the appropriate rate is that equal to its marginal efficiency of investment. In so far as the marginal efficiency of investment is lower in the lending country than in the borrowing country, the grant element contained in a particular loan will be lower as calculated by the donor than as calculated by the recipient." (UN, 1967, pp. 125-6).

The DAC publishes a technical volume (OECD, 1967a, pp. 141-6) showcasing grant equivalents of aid using two discount rates: 10%, and the long-term official borrowing rates in each lending country prevailing in the year the loans were made (all of these rates were lower than 10%).

The year's DAC annual report points to limitations of grant equivalent figures: "It must be emphasised that while it is possible to express the grant element in terms of absolute amounts, this is an entirely notional figure. It does not correspond to an actual flow of funds or of goods and services nor is it in any way related to the net benefit of aid to the recipients. The grant element concept cannot be applied to private capital flows. For equity investment, future rates of return are not known." (OECD, 1967b, p. 78).

1969: Grant elements are introduced in a Supplement the DAC's "Recommendation on Terms and Conditions". This now enjoins members to provide, in 85% of their aid programmes, either (A) a grant element of at least 61% in every transaction, or (B) a weighted average grant element of 85%. These options apply to a new statistical category called "official development assistance" (ODA), which at this stage does not require a specific minimum grant element for each transaction.

1972: In a further revision of the Recommendation, a grant element test is introduced into the ODA definition. To qualify as ODA, loans will have to embody a grant element of at least 25%, calculated at a 10% discount rate. This grant element floor on individual ODA loan transactions allows the suppression of Option A of the 1969 Recommendation and the recasting of Option B to require that a member's total ODA programme convey a minimum grant element of 84%.

1978: The Recommendation is revised again, raising the target grant element to 86%.

An Arrangement on Guidelines for Officially Supported Export Credits is agreed among countries to prevent export subsidisation that would undermine competitive markets in developing countries. It provides for notification by participating countries of tied aid credits with a grant element of less than 15%, calculated at a 10% discount rate. In **1982** the participating countries pledge not to grant such financing, whether provided solely by a public source such as an aid agency or mixed with private finance, and raise the minimum allowable grant element to 20%.

1983: Consistent with the 1982 changes to the Arrangement, the DAC agrees Guiding Principles for the use of Aid in Association with Export Credits and Other Market Funds, under which its members agree not to offer Associated Financing packages with a combined grant element of below 20% (raised to 25% in 1985), still using a 10% discount rate.

1987: A revision of the Arrangement introduces a new form of grant element calculation, called the "concessionality level". This is calculated not with a 10% discount rate but with Differentiated Discount Rates (DDRs) established annually for each currency based on long-term lending-country bond rates. The Participants agree not to offer export credits below specified concessionality levels: 50% if the borrower is a Least Developed Country, and otherwise, 35%. The DAC then extends these provisions to cover tied aid. The new thresholds are now generally more stringent than those of the 1972 ODA definition, which itself does not change. The result is that DAC members agree to "refrain" from extending loans that meet the grant element test in the ODA definition but do not meet the new minimum concessionality levels. Similar concessionality thresholds are later adopted by the IMF and the World Bank to distinguish concessional from non-concessional loans in the context of debt management policies and debt reduction initiatives.

1988: The Group of Seven (G7) industrialised countries, meeting at Toronto, announce that they "have achieved consensus on rescheduling official debt of these countries [the poorest countries that are undertaking internationally approved adjustment programs] within a framework of comparability that allows official creditors to choose among concessional interest rates usually on shorter maturities, longer repayment periods at commercial rates, partial writeoffs of debt service obligations during the consolidation period, or a combination of these options." The Paris Club implements this and subsequent agreements through a menu of debt relief options that involve debt cancellation, reduced interest, new grace periods, or longer maturities. The Club agrees that creditors choosing each option should offer the same reduction in the net present value (NPV) of the debt. As the targeted NPV reduction percentage (initially 33%, later raised to 50% and then 67% and to 90% in the case of Heavily Indebted Poor Countries) represents the grant element that must be achieved in the new repayment schedule with respect to the old one, the Paris Club in effect uses grant element methodology to ensure comparability of creditor effort under the different options.

1998: Three economists, Charles Chang and Luis Servén of the World Bank and Eduardo Fernandez Arias of the Inter-American Development Bank, propose a new measure of "Effective Development Assistance" (EDA), which includes grant equivalents based on discount rates that reflect market conditions in the lending country in the year of the loan (Chang et al., 1998). In effect, EDA would measure aid as the grant equivalent of flows, using donor-based discount rates similar to DDRs.

2013: William Hynes and the present author, both at the OECD, propose a new measure of "Official Development Effort" (ODE), which among other features proposes measuring loans on a grant equivalent basis (Hynes and Scott, 2013). The suggested discount rates are based on recipients' borrowing costs, as advanced in a proposal made to the DAC by four of its members – Canada, France, Germany and Spain. The authors observe that these discount rates reflect default risk, so that reporting grant equivalents based on them would obviate the need for ODA reporting of relief granted in case of default.

2014: The DAC High Level Meeting agrees to change the recording of loans as ODA to a grant equivalent basis, using simplified recipient-based discount rates – 6% for Upper-Middle Income Countries (UMICs), 7% for Lower Middle-Income Countries (LMICs), and 9% for Low Income Countries (also including all Least Developed Countries regardless of income level; LDCs-LICs). The decision includes minimum grant equivalent thresholds to qualify for ODA recording: 10% for UMICs, 15% for LMICs, 45% for LDCs-LICs. The meeting also agrees that "the cost of risk should not be double counted" so that changing "the measurement system from net flows to risk-adjusted grant equivalents will… change the basis on which we report on debt relief of ODA loans." The changes become effective from 2019 reporting on 2018 flows. Their rationale is to make the ODA measure more "instrument-neutral", i.e. to remove the disincentives for using non-grant instruments in development co-operation.

2.2. Roundup of main current and projected applications of grant elements (as of March 2016)

- ***Determine which official loans qualify as ODA flows.*** For this purpose, the grant element is calculated using a 10% discount rate, and loan flows qualify as ODA if their grant elements exceed 25%. This current system of ODA recording of loans will continue to be the headline measure of ODA until and including 2018 reporting on 2017 flows, and flow figures will continue to be recorded thereafter.
- ***Determine eligibility for tied aid and subsidised export credits.*** For this purpose, the grant element is calculated using Differentiated Discount Rates (DDR), which are determined annually for each currency based on long-term bond rates, with margins. For 2016, the lowest DDR was 1.3% for a credit of less than 15 years extended in Swiss francs, and the highest was 5.1% for a credit of 30 years or longer extended in New Zealand dollars. Participants in the Arrangement agree not to offer credits with concessionality levels (grant elements) less than 35% (50% for Least Developed Countries) using these discount rates. Credits with grant elements of 80% or higher are exempt, and some special provisions apply to credits in particular sectors.
- ***Determine which loans are non-concessional as part of the IMF's Policy on Public Debt Limits in Fund-Supported Programs and the World Bank's Non-Concessional Borrowing Policy.*** For these purposes, the discount rate is 5% and

the minimum grant element is 35% for a loan to qualify as concessional and thus be exempted from ceilings on non-concessional borrowing.

- ***Will determine the ODA grant equivalent of some loans.*** For this purpose, the grant equivalent will be calculated using three different discount rate and grant element pairs. For low income and least developed countries, the discount rate will be 9% and the resulting grant equivalent will be reportable as ODA if it is 45% or higher. For lower-middle income countries, the discount rate will be 7% and the resulting grant equivalent will be reportable as ODA if it is 15% or higher. For upper-middle income countries, the discount rate will be 6% and the resulting grant equivalent will be reportable as ODA if it is 10% or higher. The grant equivalent of the loan will be recorded as of each disbursement, so that if disbursements span more than one year, the amount reported for each year will be the grant element of the loan as calculated when the loan is committed multiplied by the amount disbursed on the loan in that year (OECD, 2016b, paragraph 62). The rules apply to bilateral loans to the official sector (ibid., paragraph 60). This system will become part of the standard DAC measure of ODA from 2019 reporting on 2018 flows, but figures on gross and net cash flows of ODA will also continue to be published.
- ***Will determine the grant equivalent reportable as ODA in respect of equity investment and other "private sector instruments".*** The 2016 DAC High Level Meeting agreed that in respect of these instruments, "the measurement of donor effort will be based on the system of risk-adjusted grant equivalents". Discount rates and thresholds are yet to be agreed.

2.3. The future of grant elements

The decisions of the 2014 and 2016 DAC High Level Meetings mean that the future of the grant equivalent method in DAC statistics is assured. Grant elements are now also well-established in the work of international financial institutions and export credit agencies.

The decisive element in each application of the method will always be the discount rate. As already mentioned, this must take account of three main factors:

- *Time preference:* having money now is more valuable than the prospect of having it in future
- *Inflation:* money itself may not buy as much in future as it does now, so that more money will be needed then than now to purchase the same goods or services
- *Risk:* there must always be some level of doubt as to whether a future payment will occur. The borrower or the lender might cease to exist; all debts might be cancelled by a higher authority; or the borrower might not have the money to pay, or might refuse to pay.

It is often relatively easy to find discount rates that incorporate all three factors. For example, if the borrower and the lender are also involved in free-market transactions, then the interest rate paid on those transactions could be taken as expressing the transactors' free judgment of the combined effects of these factors. Most discount rates proposed for calculating grant equivalents have thus used actual observed rates as a reference – commercial rates between the same parties, other rates considered analogous, or rates considered indicative of the lender's sacrifice or the borrower's benefit.

However, new challenges are emerging in the wake of the 2008 global financial crisis. For while central bank controls on interest rates were traditionally confined to short-term rates (the "money market"), their interventions are now also affecting long-term rates (the "bond market"). Many would argue that the interventions have been so large and so widespread as to render current global interest rates those of a hampered market – one which does not reflect lenders' and borrowers' freely determined assessments of the future value of money or of contracted payments of money.

The current anomalous state of the global capital market, and its possible future evolution, pose new challenges in finding appropriate discount rates. The IMF and the World Bank have revised their discount rates since the crisis, and the DAC has agreed to regularly review the discount rates it uses in ODA calculations.

2.4. Conclusion

The valuation of official loans and other financial transactions in terms of their grant equivalents is no more than an extension of accounting methods long employed to price bonds, annuities and other financial products, and to calculate the present value of income-producing assets.[3]

It was introduced into official aid statistics in 1969 in an effort by DAC members to encourage the softening of the terms of their loans to developing countries. In 1972 it became the basis for assessing the eligibility of development loans to qualify as "official development assistance". Over the succeeding decades it was increasingly widely applied in international finance, including by export credit agencies, multilateral development banks, the Paris Club, and the IMF.

In 2014 it was decided to make grant equivalents the headline measure of ODA loans, with effect from 2019 reporting on 2018 flows, and in 2016 to extend its use to equities and guarantees. Work continues on the parameters for such measurements, while aid figures will also continue to be published on the traditional cash flow basis.

The central element in any grant equivalent calculation is the discount rate used to reduce future expected flows to their present value. Finding the right discount rate for particular transactions has always been a matter for fine judgment, and the special conditions prevailing in global capital markets since 2008 now make this more challenging.

[3] For a sophisticated discussion of the issues involved in pricing risk into government budgeting in general, see Lucas and Phaup, 2010.

Technical note: Grant elements and repayment schedules

The two examples in the main text deal only with the type of loan where interest is paid annually and the principal repaid at the end. This type of loan generates the same pattern of repayments as a term deposit at a bank, or purchasing a bond. It is referred to as a bullet payment or "lump sum (principal)" loan.

But there are several other types of repayment schedule. Nothing may be paid until the end of the loan term, when a single payment covering both principal and compound interest will be made. This is called a "lump sum (principal and compound interest)" loan. A very rare variant of this is not to compound the interest, so that the single, final repayment consists of the principal and the simple sum of annual interest bills. In this case, the nominal interest rate is an overstatement, since a second interest rate of zero is being charged on the unpaid interest as it accumulates.[4]

A more common form of aid loan involves repaying the principal progressively, usually in equal annual or semi-annual instalments (called an "equal principal payments" (EPP) loan). In this case the largest payments occur at the beginning of the loan, when the outstanding principal is still large, meaning the interest bill is also large. To moderate the financial demands of these types of loans in the early years, a "grace period" is often included, during which no repayments of principal will be required. Sometimes the grace period also implies not charging the interest.

The dots in the table below show when payments fall due on common types of a five-year loan.

Years since loan extended	Equal principal payments (EPP)		EPP with 3-year grace period on principal only		Lump sum (principal)		Lump sum (principal and compound interest)	
	Principal	Interest	Principal	Interest	Principal	Interest	Principal	Interest
1	●	●		●		●		
2	●	●		●		●		
3	●	●	●	●		●		
4	●	●	●	●		●		
5	●	●	●	●	●	●	●	●

All of these different repayment schedules can have their grant elements calculated using the method shown in the main text, i.e. by setting out all the repayments by date and discounting them to today's money. The calculation table should also include any fees, charges, commissions, etc., whether one off or recurrent, that the borrower must pay to receive the loan.

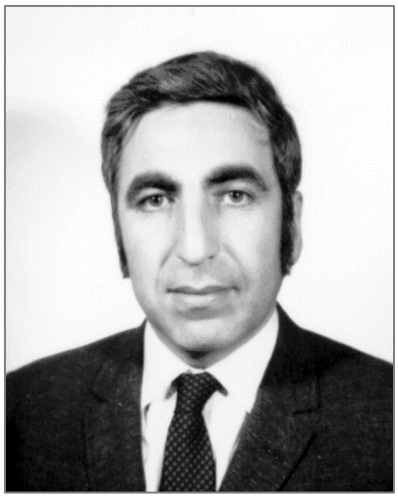
To simplify calculations, automated grant element calculators have also been developed. However, these can only give the right answer if the loan payment schedule conforms exactly to one of the payment types included. If the payments required on the loan deviate in any way from a standard payment schedule, then a manual calculation in a table will be required.

[4] A highly experienced World Bank expert on debt, Ms Malvina Pollock, states that she has never seen a loan of this type. It is however included as an option ("Lump sum principal & interest") in the IMF grant element calculator.

Annex: A Grant Element Scrapbook

Biographical and pictorial material on the origins of grant elements

First to propose a grant equivalent measure of aid: John Pincus



Alexis John Pincus was born in Cambridge, Massachusetts on 14 September 1926. He was brought up there and in Worcester, Mass., where his father, Gregory Goodwin (Goody) Pincus, played a central role in the development of the contraceptive pill. After undergraduate studies at Colby College he took his master's in public administration at Columbia in 1950 and then a second master's followed a Ph.D. in economics at Harvard in 1963. By then he had already been a consultant to the OEEC, the predecessor of the OECD, and started working at the RAND Corporation on development issues. His 1963 RAND paper "Foreign Aid Costs in 1961" was the first application of grant equivalent methodology to aid statistics. He followed it up with increasingly wide-ranging articles and books on aid, culminating in a weighty 1967 study, "Trade Aid and Development" in the prestigious Atlantic Policy Studies series to which other contributors included future US Secretary of State Henry Kissinger and future National Security Advisor Zbigniew Brzeziński, as well as Richard N. Cooper (see below). Having thoroughly covered the aid field in his writings, he switched careers in 1969 to become Director of RAND's Education and Human Resources Program. He was appointed to the California Board of Education by Governor Jerry Brown in 1975. John Pincus died in 2011, three years before the DAC agreed to his 1963 suggestion to "reformulate the definition of aid [so that]…all forms of aid are reduced to their value as grant or subsidy" (Pincus, 1963, pp. 4-5).

Table 5

ESTIMATED DAC AID COMMITMENTS AND GNP, 1962; DISCOUNTED VALUE BASIS
(In $ million)

Country	(1) Nominal Value of Aid	(2) Discounted Value, Loans Discounted at: Own Interest Rate[a]	(3) 5.75%	(4) 10.00%	(5) Aid as % of GNP, Discounted at: Own Interest Rate	(6) 5.75%	(7) 10.00%	(8) Rank: Aid as % of GNP[b]
Canada	73.1	58.8 (6.10)	58.8	60.8	0.16	0.16	0.16	8
France	1034.6	908.4 (6.00)	907.4	937.4	1.32	1.32	1.37	1
Germany	497.4	231.4 (6.00)	225.7	301.2	0.27	0.27	0.36	3
Italy	137.1	27.7 (6.25)	25.7	31.7	0.07	0.07	0.08	9
Japan	295.6	128.7 (8.30)	110.7	139.7	0.24	0.21	0.27	6
Netherlands	63.5	35.4 (5.20)	37.4	44.4	0.27	0.29	0.34	4
Portugal	60.2	6.2 (5.00)	9.2	19.2	0.22	0.33	0.69	7
United Kingdom	570.4	210.8 (7.00)	166.8	290.8	0.27	0.21	0.37	5
United States (A)	4975.0	3661.0 (5.00)	3759.0	4139.0	0.66	0.68	0.75	2
United States (B)	4383.0	3069.0 (5.00)	3167.0	3547.0	0.55	0.57	0.64	(2)
United States (C)	4145.0	2830.0 (5.00)	2928.0	3306.0	0.52	0.53	0.60	
Total with U.S. (A)[c]	7706.9	5268.4	5300.7	5964.2	0.59	0.59	0.67	
Total with U.S. (B)[c]	7114.9	4676.4	4708.7	5372.2	0.52	0.53	0.60	
Total with U.S. (C)[c]	6876.9	4437.4	4469.7	5131.2	0.50	0.50	0.57	

SOURCES: Col. 1: From Table 4. Col. 2: Interest rates based on each country's average 1962 mortgage rate or long-term bond rate plus 1 per cent. Cols. 2-4: Official bilateral and multilateral grants plus difference between nominal value and discounted value of loans. Cols. 5-7: Cols. 2-4 as percentage of GNP.

[a] Each country's domestic long-term interest rate shown in parentheses.

[b] Ranking based on Col. 5 ratios.

[c] United States (A) and (B) as in Table 3.

The first published table of DAC aid using the grant equivalent method, from page 17 of Pincus (1963). The figures for the United States represent three methods of valuing its food aid: method A was the value reported to the DAC.

The *éminence grise*: Wilson Schmidt

In 1964, the year after Pincus' article, Wilson Emerson Schmidt published a paper using grant element methodology to determine when loans should be preferred to grants. This elegant and pithy survey touched on almost all issues subsequently discussed in the grant element literature, and even considered terms of trade effects, which later dropped from view. But Schmidt swiftly moved on to other fields and his contribution in this subject is often overlooked. He became head of the Economics Department at Virginia Tech in 1966; in this capacity he hired James Buchanan and Gordon Tullock who founded the Center for Study of Public Choice there; he was also Deputy Assistant Secretary of the Treasury 1970-2. He died following a fire in his room at the Cosmos Club in Washington in 1981, while awaiting Senate confirmation as US Executive Director of the World Bank. Wilson Schmidt's father, Emerson Schmidt, was Director of Research at the US Chamber of Commerce, and his eldest son, Eric Emerson Schmidt, was CEO of Google from 2001 to 2011.

Eric Schmidt and James Buchanan (Nobel Prize in Economics, 1986) next to a photo of Wilson Schmidt at the Center for Public Choice, George Mason University, November 2012; the photo itself.

Loan of L at interest rate of p for n years:

$$L + zL - \sum_{t=1}^{t=n} \frac{pL}{(1+r)^t} - \sum_{t=1}^{t=n} \frac{zpL}{(1+r)^t} - \frac{L}{(1+r)^n} - \frac{zL}{(1+r)^n} = L\left(1 - \frac{p}{r}\right) \times [1-(1+r)^{-n}](1+z). \quad (3)$$

Schmidt's derivation of a grant element formula. Omitting from the result the terms for loan principal (L) and changes in the terms of trade (1+z), we have $(1 - p/r)*[1 - (1+r)^{-n}]$, where p is the interest rate, r is the discount rate, and n is the term of the loan. This works for a "lump sum principal" loan. For example, taking the loan in Table 2 of the main text, the grant element is $(1 - .02/.05)*[1 - (1+.05)^{-10}] = 0.6*0.3861 = 23.17\%$.

Grant elements and policy advice: Richard Cooper

Richard N. Cooper (left), Under-Secretary for Economic Affairs, US Department of State, and James Schlesinger, US Secretary of Energy, at the Ministerial Meeting of the International Energy Agency in Paris, 5-6 June 1977. Cooper (b. 1934) and Schlesinger (1929-2014) were both Harvard men, they both worked at the RAND Corporation, they both wrote on defence issues, they both held senior posts (as here) in President Carter's administration, and they both wrote seriously, decades later, on the question of man-made climate change. Dealing with the latter, Cooper returned to the discount rate issue. Some had proposed applying a zero discount rate to possible future climate damage when comparing it with the costs of countermeasures now. But Cooper pointed out that a "discount rate of zero leads to the nonsensical conclusion that the current generation should invest all its income above that required for subsistence so long as the net return on investment is positive, however small." (Cooper, 1999, p. 45).

Cradle of grant element studies: The RAND Corporation

Pictured below is the RAND headquarters in the 1960s. Considerable thought went into designing its accommodation so as to promote intellectual work and the type of interdisciplinary thinking that produced grant element methodology. In his 1950 "Comments on RAND Building Program", the head of RAND's Mathematics Division, John Williams, envisaged a lattice pattern of offices, with patios, to maximise chance interactions. He based his thinking on his appreciation of what staff wanted in their new premises: "the qualities that are more desired are, approximately in the order of importance: privacy; quiet; natural light; natural air; spaciousness." (RAND, 1950).

The RAND Corporation
PRIVATE PARKING
UNAUTHORIZED CARS WILL BE
TOWED AWAY AT OWNERS EXPENSE

The Development Centre contribution I: Ian Little

It was said of Ian Malcolm David Little (1918-2012) that he "was outwardly diffident but had an inner core of iron self-confidence" (Nuffield, 2012). His varied career, recounted in his *Collection and Recollections* (1999), ranged from manning experimental flying apparatus for Britain during the War to Deputy President of the OECD Development Centre (1965-7).

His work in economics was path-finding in several domains. His first major publication, *A Critique of Welfare Economics* (1950) used a logical positivist approach to attack the claims to objectivity being made in that subject. In 1974 he published, with James Mirrlees (Nobel Prize in Economics, 1996), *Project appraisal and planning for developing countries*, which became a standard text and guide. His later works encouraged developing countries to abandon regulation, planning and import substitution. One of his students, Manmohan Singh, later put these ideas into effect as Finance Minister and then Prime Minister of India, with impressive results.

Little's approach to economic problems was logical rather than mathematical, and in dealing with aid loans he arrived at a suite of discount rates that proceeded from different assumptions. He showed the same rigour when searching for other benchmarks, but got his results by intuition and reasoning rather than through strict mathematical proof. This occasionally exasperated his more fastidious colleagues. The story goes that at the time he was writing his book with Mirrlees, he was heard to remark that project proposals should be assessed using prices at the national border – thus taking the values encountered in trade as the reference for cost-benefit analysis. When Mirrlees was told of this remark, he expostulated, "How does he know that, I have only just proved it!" (Nuffield, 2012).

Little's comparison of gross aid reported to the DAC with the value of that aid on a grant equivalent basis, using different interest rates. Lacking the precise repayment schedules of the loans, Little assumed equal principal payments, and made separate estimates assuming grace periods of one year and five years (Little and Clifford, 1965).

TABLE 17

Total cost of 1963 disbursements by DAC *members*

$m.

Rate of discount assumed for capital repayments and interest on loans	6%		10%		15%		
Average grace period assumed for loans	1 year	5 years	1 year	5 years	1 year	5 years	Total aid (gross) reported to the DAC
Country							
Belgium	92	92	92	93	93	93	93
Canada	64	64	72	73	78	81	101
Denmark	9	9	9	9	9	9	10
France	744	749	774	785	799	815	892
Germany	199	205	256	273	304	328	455
Italy	33	33	47	52	61	70	86
Japan	87	87	107	112	125	134	207
Netherlands	29	29	31	32	33	34	39
Norway	10	10	10	10	10	10	10
Portugal	17	18	26	28	33	35	47
UK	274	277	313	322	342	355	440
USA Method I	3,325	3,372	3,529	3,590	3,660	3,726	4,061
USA Method II	1,990	2,035	2,192	2,253	2,323	2,389	
DAC Total I	4,883	4,944	5,262	5,376	5,544	5,688	6,451
DAC Total II	3,548	3,609	3,927	4,041	4,209	4,353	

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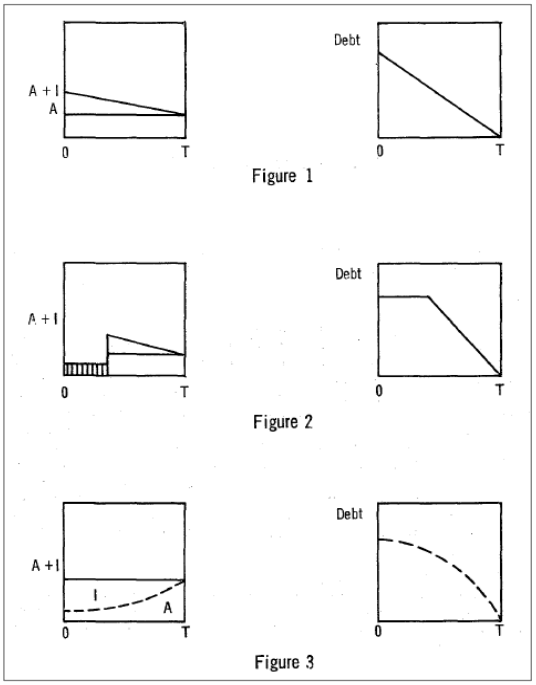
The Development Centre contribution II: Göran Ohlin

Göran Ohlin (1925-1996) is pictured here behind his nameplate at a seminar celebrating the first 15 years of Development Centre activities held in Paris on 12-13 December 1978. To his right is the vacant chair of Angus Maddison, the great historian of the world economy, who remarked 25 years later that "Göran was a meticulous scholar, and had great literary talent, but he applied such exacting standards to himself that he had published very little. Being in the Centre was good for Göran. The pressure to publish unleashed his talent, and inspired a life-long commitment to development issues." (OECD, 2002, p. 241). Ohlin assisted the Pearson Commission that proposed an aid target of 0.7% of GNP; he was later an ex-officio member of the Brandt Commission, and then served as Assistant Secretary General of the United Nations. His uncle, Bertil Ohlin, won the Nobel Prize in Economics in 1977.

Ohlin investigated the mathematical properties of grant elements in depth, carefully distinguishing between different types of loans. He also pioneered graphical representations of loan repayments. In this illustration (from Ohlin, 1966b) he shows payments (left) and outstanding debt (right) from the beginning (0) to the end (T) of different types of loans. The payment diagrams comprise amortisation (A) and interest (I). Figure 1 shows a loan with equal principal (amortisation) payments; Figure 2 a loan with a grace period applying only to amortisation; and Figure 3 an "annuity" loan, like a mortgage, where each payment is equal but the interest share is highest at the beginning. Note that for simplicity, Ohlin assumed a continuous repayment stream; in reality, loans are repaid at discrete intervals – often annually or semi-annually. This introduced slight inaccuracies in his grant element tables, which were corrected in 1972 (Scott, 2015, p. 6n).



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