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*Rationing Agricultural Credit in Developing Countries:
The Role and Determinants of Transaction Costs for
Borrowers*

INTRODUCTION

Transaction costs in financial intermediation are a measure of the 'friction' existing in the functioning of financial markets. The higher the costs of intermediation, the less efficient the performance of the financial sector in resource allocation and distribution. Transaction costs frequently increase as a result of regulations imposed on financial markets, such as interest-rate restrictions and selective credit policies. Financial intermediaries circumvent interest-rate regulations through non-price mechanisms that generate transaction costs for lenders and borrowers, whereas selective credit policies usually carry built-in cost-increasing procedures and requirements.

In this paper we investigate the role of transaction costs of borrowing as a rationing mechanism in the agricultural credit markets of five less-developed countries. We show that borrowing transaction costs become an effective non-price rationing device in these markets. We further argue that the results of these rationing practices are regressive, despite the intended distributional goals of low-interest rate credit policies and small-farmer credit allocations schemes. We also investigate the main determinants of borrowing transaction costs, and show that an inverse relationship exists between the level of the explicit interest rate charged on loans and the magnitude of these transaction costs. Our findings indicate that both development banks and private banks pass on transaction costs to borrowers as an implicit-pricing mechanism to ration out undesired clients. Private banks are generally more effective in doing this than development banks and, at the same time, more responsive to changes in the interest-rate structure.

We first present a summary and discussion of recent evidence on the levels and degree of regressiveness of borrowing transaction costs in agricultural credit. The next section deals with the main determinants of these costs borne by farmer borrowers, emphasising the trade-off between transaction costs and interest rates on the one hand, and the differences between private bank and development bank behaviour on the other hand. Major conclusions follow.

COSTS OF BORROWING TRANSACTIONS IN LDCs: A REVIEW OF RECENT RESEARCH

This section draws upon results from field surveys reported in five different studies of agricultural credit programmes undertaken between 1981 and 1983. Four of these studies relate to Latin-American countries: Honduras (Cuevas), Ecuador, Panama and Peru (Inter-American Development Bank), while the fifth study was undertaken in Bangladesh (Ahmed). These surveys document the explicit and implicit non-interest costs incurred by farmer-borrowers in the process of securing and repaying loans. Explicit costs consist primarily of transportation, lodging and meal expenses associated with trips to the bank's office, and fees and other cash payments for documents and legal procedures. Implicit costs correspond to the opportunity cost of time spent by farmers in negotiating and securing their loans.

The most important common characteristic of all five case studies is a low nominal interest rate to provide subsidised credit to small and medium-sized farms. These rates implied negative real interest rates in three cases: -3 per cent in Bangladesh, -0.5 per cent in Ecuador, and -22 per cent in Peru. In the other two cases the resulting real interest rates were positive (3.3 per cent in Honduras, and 2 per cent in Panama) though still clearly subsidised when taking into account the opportunity cost of capital in these societies.

Table 1 summarises the results reported in the five country-studies. Panel A presents the magnitude of transaction costs as a percentage of the

TABLE 1 *Borrowing transaction costs at the farm level in selected countries, by loan size*

Transaction costs by loan size	Bangladesh	Ecuador	Honduras	Panama	Peru
	%	%	%	%	%
A. Transaction costs as percentage of loan amount					
Sample average	21.7	2.8	3.0	5.2	1.2
Small loans	29.4	5.3	5.9	5.7	3.9
Medium loans	17.5	2.0	1.6	3.0	1.3
Large loans	7.0	0.6	0.2	2.0	1.0
B. Transaction costs as percentage of explicit- interest charges ^a					
Sample average	180.8	22.9	23.1	46.4	4.0
Small loans	245.0	47.7	45.4	50.9	13.0
Medium loans	145.8	17.3	12.3	26.8	4.3
Large loans	58.1	4.1	1.5	17.9	3.3

Sources: Bangladesh, Ahmed; Honduras, Cuevas; Ecuador, Panama and Peru, Inter-American Bank.

^aComputed based on the levels of explicit interest rate reported in the different sources, e.g., for Bangladesh the average transaction costs in panel A is 21.7 per cent and the explicit rate reported by Ahmed is 12 per cent; therefore $(21.7/12) \times 100 = 180.8$ per cent.

loan amount. In Panel B, these transaction costs have been expressed as a proportion of the explicit-interest charges documented in the case studies. This proportion indicates the relative importance of transaction costs *vis-à-vis* explicit interest charges. In both panels we report the sample average of each measure and the results for three loan-size categories.

Transaction costs per cent of the loan amount vary between 1.2 (Peru) and 21.7 (Bangladesh), and the magnitudes across countries and loan-size categories range from 0.2 to almost 30. There is a striking contrast between the results shown for Bangladesh and those reported for the Latin-American countries. This contrast is accounted for by the unusually small loan sizes characteristic of the Bangladesh survey in comparison to those recorded in Latin America. This contrast is also reflected in panel B, where transaction costs are expressed as a percentage of explicit-interest charges. Here transaction costs for Bangladesh are on average almost twice as large as the explicit interest charged on loans, whereas in the Latin-American cases they represent between 4 and 46 per cent of explicit interest. With the exception of Peru, the findings suggest that borrowing transaction costs play an important role as implicit prices in these credit markets. Their magnitude certainly cannot be ignored by prospective borrowers. Loan procedures established by lenders create these transaction costs and should be interpreted as rationing or screening devices. These mechanisms substitute for explicit prices (i.e., interest rates) that are constrained under the regulatory schemes prevailing in these markets.

The figures in Table 1 also highlight the distributional effects of credit rationing through this implicit pricing. In all cases the incidence of transaction costs by loan-size categories is clearly regressive with small loans bearing high costs and large loans entailing the lowest borrowing transaction costs as a percentage of the loan. In relative terms, transaction costs for small loans in Honduras are almost 30 times as high as those associated with large loans, 8.8 times as high in Ecuador, 4.2 times in Bangladesh, 3.9 times in Peru, and 2.9 times in Panama.

We conclude that the intended effect of credit policies promoting a low and relatively uniform interest rate among borrowers is not attained in practice. Instead, a skewed, regressive structure of total credit costs (interest rate *plus* transaction costs) is obtained. Even when the administered rates are set so that small loans are charged a lower rate than medium or large loans, as is the case in the Ecuador study, transaction costs more than offset the explicit interest-rate differential (two percentage points in the Ecuador case).

SOME DETERMINANTS OF COSTS OF BORROWING TRANSACTIONS:

Interest rates and lending institutions

The Honduras case provided information on transaction costs borne by clients of the development bank, private banks and credit unions.

Lenders were constrained by a narrow range of explicit interest rates they could charge on loans, therefore they used selective and discriminatory application of their loan procedure to screen and ration out loan applicants. Transaction costs were passed on to borrowers in direct proportion to the perceived risk involved in the different loan operations.

A trade-off equation was estimated between borrowing transaction costs and the explicit interest rate charged on loans. In this estimation a generalised power function was specified with transaction costs as a function of the explicit interest rate, the area of the farm, the loan amount, a set of dummy variables to account for loan source (development bank, private banks, credit unions), and another set of dummy variables that captured the effect of loan end-use.¹

As expected, transaction costs as a percentage of the loan amount were a decreasing function of the loan amount. Transaction costs *per loan* are an increasing function of loan amount; however, the elasticity of this function is less than one, therefore transaction costs per loan increase at a decreasing rate as loan size increases. As a result, transaction costs *per unit of money borrowed* decrease as the loan amount increases.

The results obtained for the effect of the interest rate on transaction costs were also significant and stable across different specifications. Overall, the coefficient associated with the direct effect of the interest rate on transaction costs was not significantly different from -1 . This finding indicates that there is a trade-off between transaction costs of borrowing and the nominal interest rate charged on loans, such that a one per cent increase in the interest rate will bring about a one per cent decrease in borrowing transaction costs.

The foregoing general results for the overall sample are broken down in Table 2, controlling for both the loan source and the loan-size. For simplicity, only two loan sources (development bank, private banks) and two loan-size categories are defined here. The first column of Table 2 indicates the estimated transaction costs as a percentage of the loan amount. It is evident from these figures that borrowing from private banks is about twice as expensive as borrowing from the development bank, a finding that suggests a greater ability of private banks to pass on transaction costs to borrowers. The skewed, regressive incidence of transaction costs by loan size is clear in Table 2, regardless of the lending institution involved.

Column two of Table 2 reports the elasticity of transaction costs with respect to the interest rate for different combinations of loan source and loan size. Borrowing transaction costs are very elastic to changes in the interest rate in the case of private banks. For these loans the absolute value of the elasticity is three to five times as large as the values obtained for the development bank. In the latter, large loans show a unitary elasticity whereas for small loans the response of transaction costs to changes in the interest rate is inelastic (significantly less than zero and greater than -1). For small-loan operations, the absolute value of the elasticity is lower than the values obtained for large loans, denoting a less flexible response. This is expected, since smaller loans are associated with more rigid and cumbersome targeting schemes.

TABLE 2 *Borrowing transaction costs as percentage of loan amount (t), elasticities of t with respect to changes in the explicit interest rate (i), and changes in t with increases in i, by lender and loan size*

Lender/Loan Size	Estimated value of transaction costs (t) ^a %	Estimated value of elasticity ^b e(t, i)	Change in t with a one-point increase in the interest rate (i) pct. points
Development Bank			
Small Loans	2.85	-0.5551	-0.123
Large Loans	0.38	-0.8425 ^c	-0.025
Private Banks			
Small Loans	5.77	-2.6692	-1.184
Large Loans	0.77	-2.9566	-0.175

Source: Cuevas. Details results of the estimated function available from the authors. See note 1.

^a Estimates evaluated at geometric means of farm area and interest rate.

^b All estimates significantly different from zero.

^c Not significantly different from -1.

The response of transaction costs in percentage points to a one-point increase in the interest rate were calculated based on the elasticities discussed above. These are presented in the last column of Table 2. This response is considerably larger for private-bank loans. A one-point increase in the explicit interest rate will lead to a larger compensatory decline in borrowing transaction costs in private-bank loans than in the case of loans from the development bank. This result shows that private banks are more responsive and flexible in adjusting their loan procedures and requirements to changes in the regulatory environment.

In both lending institutions the compensatory change in borrowing transaction costs as a result of an increase in the interest rate is considerably larger for small loans than for large loans. This implies that a one-point increase in the interest rate will be almost fully translated into a corresponding increase in total borrowing costs (i.e., interest rate *plus* transaction costs) in the case of large loans, since the compensating effect of reduced transaction costs is very small. For small loans however, this offsetting response of transaction costs is far more important. Thus an increase in the explicit interest rate will be partially compensated by the resulting reduction in borrowing transaction costs. Since this offsetting effect occurs for increases as well as decreases in the level of the interest rate, it follows that further reductions in the interest rate on loans will benefit primarily borrowers of large amounts, instead of farmers borrowing small loans. In this sense, cheap-credit policies will not attain their intended distributional goals in the rural sector.

SUMMARY AND CONCLUSIONS

In this paper we have investigated the role of transaction costs of borrowing as a rationing mechanism in agricultural credit markets in less developed countries. Results of recent research in five LDCs suggest that the intended effect of credit policies involving a low and relatively uniform interest rate is not attained. Instead, a skewed, regressive structure of total credit costs (interest rate *plus* transaction costs) is obtained.

The estimation of a transaction-costs function based on data from one of the case studies above indicated that loan amount, interest rate, and loan source are significant determinants of the level of transaction costs. Transaction costs as a percentage of the loan amount decrease with loan size, decline with increases in the interest rate (i.e., the trade-off relationship), and are higher for private-bank loans than development-bank loans, at given loan sizes and interest rates. The trade-off (negative elasticity) is larger in private banks than in the development bank, and is more significant for small loans than for large loans. We conclude that, under interest rate restrictions, private banks are more effective in passing on intermediation costs to borrowers than development banks. At the same time, private banks are more responsive to changes in the interest-rate structure, and more flexible in adjusting their loan procedures and requirements to a changing regulatory environment. Finally, contrary to conventional wisdom, an increase in the explicit interest rate on loans would have a progressive impact, since it would reduce transaction costs more for small loans than for large loans.

NOTE

¹The transaction-costs function estimated here is:

$$\ln T = a_0 + a_1 \ln A + a_2 \ln L + a_{30} \ln(i) + a_{31} S \ln(i) + a_{32} D_1 \ln(i) \\ + a_{33} D_2 \ln(i) + a_{34} F \ln(i) + b_1 D_1 + b_2 D_2 + c_1 U_1 + c_2 U_2 \\ + c_3 U_3$$

where,

T is the borrowing (non-interest) transaction costs per loan,

A is the area of the farm,

L is the loan amount,

i is the explicit interest rate that can be charged on the loan by the lender,

S is the dummy variable for loan-size category,

S = 1 if the loan amount is less than or equal to L. 2,000, S = 0 otherwise,

D₁ and D₂ are dummy variables that account for deviations of T in private banks and credit unions with respect to the development bank, that is used as the base or level of reference,

F is a dummy variable for farm-size category,

$F = 1$ if the area of the farm is less than or equal to 20 hectares, $F = 0$ otherwise, U_1 , U_2 , and U_3 are dummy variables defined to capture the effects on transaction costs of different loan-uses: basic grains, export crops, and livestock, as deviations with respect to a miscellaneous end-use category conformed by all other end-uses in agriculture (land purchases, trade, vegetable crops, and others).

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DISCUSSION OPENING I – MARK DRABENSTOTT

Financial stress is the leading problem of agriculture in many countries around the world. Thus, as economists grapple with the complex set of forces that are producing that stress, it is appropriate that we re-examine many questions of finance as they relate to farm firms. This session serves a very useful role in highlighting some of these pertinent questions.

Boehlje and Lowenberg-DeBoer provide a well-constructed theoretical model of the farm firm incorporating some useful financial dimensions. Their treatment of capital gains and losses helps to explain farm behaviour. The decade of the 1970s supports their conclusion that rapid capital gains will induce producers to become more land extensive. The emphasis on finance charges is appropriate, particularly the delineation of liquidity value. One might ask, however, if the collateral and liquidity value do not come close to equalling one another when asset values are declining rapidly, as they have recently in the United States. A thorough treatment of taxes, both income and capital gains is certainly also welcome.

The firm survival constraint is perhaps the authors' best contribution. The current financial strains on highly leveraged farm firms certainly underscore the need for this constraint.

Their model is a robust framework for some possible improvements in even better explaining farm firm behaviour. I offer the following suggestions. First, the *externalities of inputs* are still not internalised. The authors mention externalities in their introduction, but then do not include them in the model. Second, *financial risk management* is more than just survival. While survival is an overriding goal, firms that are liquid will still manage their financial risk in other ways. For example, the model does not account for interest rate risk within decision periods. What effect would volatile interest rates have on the firm? What is the value to the firm of interest rate risk management techniques such as financial futures and options?

Finally, the model seems to ignore the effects of positive *real* interest rates. With deregulated financial markets in many developed countries, real interest rates are likely to remain positive, and highly positive if price inflation accelerates. Firms will alter their financial structures in response to the increase in real rates. The authors conclude that debt use increases with higher levels of capital gains. But with deregulated financial markets, interest rates will rise in step with accelerating inflation (if not faster), thus removing the incentive to purchase farm real estate with borrowed capital.

The Boehlje-Lowenberg paper stimulates a number of important policy questions. Faced with an eroding credit reserve of unrealised capital gains, how do farm firms behave? The answers can serve as useful guides to policy-makers who may try to assist such farmers. The authors conclude that government policies that raise farm incomes will, by creating capital gains, tend to increase farm size and make land-use more extensive. That conclusion prompts the question: can farm policies which improve farm income have neutral effects on farm structure? The answer appears to be no, unless the policy is very carefully targeted. Finally, as farm borrowers re-order their financial positions due to positive real interest rates, what innovative means will arise to bring off-farm equity into agriculture? The markets currently are poorly developed at best. Cuevas and Graham provide some results that can be very useful to policy-makers. Their conclusion that transaction costs, compared with either the loan amount or the interest rate, often more than compensates for the subsidized interest rate is a striking one. The conclusion that transaction costs are regressive is not surprising, but useful to the policy-maker. And that private lenders pass on more transaction costs than do development banks is also not surprising, but certainly worth documenting.

While the authors could not fully develop their analysis within the pages allowed, I offer some suggestions to improve their worthwhile study. First, the paper does not delineate transaction costs. What components were most critical: perceived credit risk, transportation costs, or administrative fees? The answer will have great bearing on any policy attempts to reduce transaction costs. Second, it was not clear what credit risk, if any, was assumed by the national governments. If the

government does guarantee the loan, then private lenders ought to reduce their 'fees'.

Third, the analysis could be strengthened by comparing transaction costs for farm loans with costs for other types of loans in the various countries. Are farm loans special, or is there a more general credit problem that must be addressed? Finally, the authors imply that development banks are more benevolent in passing smaller transaction costs on to borrowers. A strong case can be made that private lenders simply understand their costs better.

The Cuevas and Graham paper prompts some important questions about government programmes to supply low cost loans to farmers. How can governments supply subsidized credit to farm borrowers while minimising regressive side effects such as high transaction costs? If transportation is a major portion of transaction costs, then the loan programme can be made more effective by creating more field loan offices. But if credit risk is the problem, then other tools must be used. What role can fixed term federal loan guarantees play in supplying credit to farmers through commercial lenders? If private lenders are attaching large administrative fees to subsidized loans, then the government can overcome this by guaranteeing the loans for a fixed period of time, during which the credit risk would gradually revert back to the commercial lender. This partnership makes the loan more palatable for the lender when the loan is extended, but does not leave the government to bear all of the loan servicing costs and possible loan losses.

Finally, how ought farm credit and farm income support policies complement one another? Or, in the context of the Cuevas and Graham paper, do high transaction costs simply reflect low profitability for the sector? Subsidized credit can only be substituted for income so long. Eventually, either cash flow is sufficient to service the loan, or the lender must foreclose. In the United States, the Farmers Home Administration is currently under the cloud of a multi-billion dollar loan portfolio that will never be fully repaid if current market conditions continue.

DISCUSSION OPENING II – MADHUKAR GADGIL

Being an economist working in a bank, I must admit that I had a banker's bias when I read the two papers. I propose therefore to comment on both the papers from the viewpoint of policy and action in credit institutions financing agriculture.

The paper on 'Integration of Production and Financial Theory' has obviously been inspired by the recent developments in US agriculture. The rising farm land prices in the US during the pre1984 period were caused by a variety of factors pointed out by the authors, but easy access to credit for speculative purchases of land was probably an important contributory factor. The basic policy issue for the financing banks

therefore is: should they finance the purchase of farm land at all, especially when land prices increase far beyond the level indicated by their intrinsic productive value? In India, formal credit for the purchase of land has been taboo for the last 15 years, mainly for avoiding financing of transfer transactions. Since almost every farmer inherits his land, this provision has basically curbed speculative land purchases.

The next question is the basis for the valuation of land when it is considered as a collateral for loans. If the market price of land is higher than its capitalised future income, valuation with reference to market price will produce over-financing and over-capitalisation of the farm. In India, where the supply of land is inelastic and where, for that reason, the market price of land is always higher than its intrinsic value, banks have been advised to estimate the collateral value of land on the basis of the income capitalisation method to avoid over-financing of those investment loans which require land as a collateral.

The paper refers to higher capital charges and increased financial and business risk in agriculture attributable to greater price volatility and higher leverage ratios and hence the need for re-evaluating specialised farming and capital-labour substitution. Is the new financial environment economy-wide or is it a change in the environment for agriculture relative to other sectors? Steps for corrective action would depend upon an answer to this question.

Is farm survival related to financial failure really a new risk? To what extent is it caused by fluctuating interest rates and other financing terms? Apart from their impact on input-output mix, changes in financial arrangements are frequently used to influence the viability of a farm enterprise and should therefore be built into the survival constraint equation. The larger question that arises here is the financial strategy to assist farmers in distress.

A complete theoretical explanation of the behaviour of farm firms should also recognise differential changes in market prices of land across regions not related to differences in real productive values but to exogeneous factors. Farmers in India are known to respond to such a phenomenon by selling their lands in one region and acquiring larger lands in other regions to maximise their annual income stream.

One last question: is it theoretically possible to anticipate all externalities and internalise them into a model to explain farm firm behaviour?

I shall now turn to the second paper entitled 'Rationing Agricultural Credit in Developing Countries'. The basic argument of this paper is that because credit institutions in most developing nations charge low interest rates on agricultural lands, the borrowers' transaction costs are higher and since the incidence of such costs is higher on small lands than on big lands, charging of low interest rates and small farmer credit allocation programmes turn out to be regressive. Let us examine this argument. The costs of borrowing transactions consist of the explicit expenses on

transport to and from the bank office, lodging and boarding expenses etc. Implicit costs equal the opportunity costs of time spent by a borrower on securing a loan. I suggest that, other things being constant, both the explicit and the implicit costs are more or less fixed in absolute terms and it is but natural that the proportion of such costs would be inversely related both to the amount of loan as well as to the interest rate. A change in the bank's lending rate is not likely to reduce the distance between the borrower's village and the bank office, nor is it likely to reduce the formalities associated with securing a loan. What matters to the farmer is the sum of transaction costs and interest charges and not the relative changes in the two components. The mathematical relationship pointed out by the authors (1 per cent increase in interest rate is associated with 1 per cent decrease in the borrower's transaction costs) appears to me to be questionable unless a satisfactory explanation of why transaction costs decrease with an increase in the interest rate is provided. While studying borrowing transaction costs, one must distinguish between production credit, which has to be borrowed for each crop season, and investment credit which a farmer may borrow once or twice in his lifetime. In India, the documentation associated with a production loan does not have to be repeated each crop season. A farmer may also have several options for borrowing such credit but the common practice is to borrow from the village co-operative. Thus, the explicit and implicit transaction costs associated with production credit are both low and non-repetitive. The transaction costs associated with investment loans are relatively high, but their annual incidence is low due to infrequent borrowing of such loans by farmers and long loan maturities (five to fifteen years). The paper does not tell us whether farmers in the five countries had borrowed both types of credit or only one and how many of them were borrowing for the first time.

An additional but important component of the implicit borrowing transaction costs is the time spent by a farmer on securing a loan and its effect on the input-output relationship of the farm. For instance, if a farmer is unable to obtain credit for buying fertilizer at the right time, his output and income may be reduced and the cost of the foregone output/income may overshadow other transaction costs. The paper does not recognise such costs.

In most developing nations, formal credit is used as an instrument for promoting agricultural development by increasing the rate of on-farm investment. The effectiveness of this instrument depends on several endogenous and exogenous factors – adequacy and timeliness of credit, extension service, land tenure system, input supply, product market prices and location-specific technology, to mention only a few. The priority for research by agricultural economists on developing agriculture should therefore be the impact of credit on agricultural development and the steps required to raise its marginal productivity.

GENERAL DISCUSSION – RAPPORTEUR: URS GANTNER

Regarding the first paper it was commented that many farmers had loans which their present and expected incomes could not service. One option which these farmers had was to liquidate their assets in order to reduce the debt. This meant selling land, which in turn reduced net revenue by much more than the interest saved and hence income goes down. The result was a smaller business with the same problem and indicated that it was almost impossible to get out of a debt problem through contraction.

Comments on the second paper included one of surprise at the small value of transaction costs shown – in Africa differences in rates of interest between traditional moneylenders and commercial banks is of the order of 200 per cent; thus 20 per cent is almost negligible. Another speaker asked how was it that transaction costs between 1981 and 1983 (Table 1) went up more than five times.

In reply, Professor Boehlje stated that:

- 1 collateral and liquidity coefficients would become the same under financial stress;
- 2 the model did not explicitly encompass externalities but the specification allowed for it;
- 3 parameters like income and cash flow could be stochastic;
- 4 he agreed with the policy issues raised and added a few additional ones;
- 5 the study was US-inspired but was not unique to a US environment;
- 6 income capitalisation was appropriate but it ignored the supply side which was an important additional determinant of land values.

Replying to discussion on the second paper, Dr Cuevas stated that ways of reducing transaction costs included the reduction of targeting requirements associated with loan programmes; having a more flexible interest rate structure; and reliable guarantees to commercial banks. He agreed that a flexible interest rate structure would not change the distance to the bank; but it might change the number of times a borrower had to go. The loan procedure is a risk reducing mechanism, therefore if part of the risk was accounted for by the explicit interest rate, procedures could be simplified and, thus, transaction costs reduced.

In his reply to comments from the floor, he pointed out that the reported transaction costs related only to those borne by *borrowers*. To get total costs one would have to add those incurred by lenders, which were considerably higher.

Participants in the discussion included M. Boussard, P. A. Sow and G. E. Dalton.