

Preliminary
Comments Welcome

The Relation Between
Growth and Inflation
in Latin America

By

Sebastian Edwards
University of California, Los Angeles

UCLA Department of Economics
Working Paper #235
(December 1981)

Revised: February 1982

In an interesting recent paper, James Hanson (1980) has analyzed the relationship between inflation and growth for a group of Latin American countries using the framework of modern macroeconomic analysis (i.e., Lucas [1973], Barro [1977]). Hanson concludes that for these countries "[A]s a rule of thumb, ten percentage points of unexpected inflation raise output about one percentage point above trend..." (Hanson, 1980, page 987). However, in his empirical analysis, Hanson has neglected two important characteristics of most Latin American economies: First, in specifying the money supply process, he has not taken into account the relationship between the fiscal deficit and the increase in the quantity of money. It is a well recognized characteristic of most Latin American countries that a substantial fraction of the government deficit is financed by money creation.^{1/} Additionally, Hanson's conclusions largely rely on results obtained using past inflation as a predictor of monetary growth. It is not clear in what sense, if any, the difference between money growth and past inflation is to be interpreted as "unexpected" money. Secondly, Hanson's paper completely abstracts from the fact that all of the Latin American countries considered in his sample are substantially open to the rest of the world, and that in this case a modified version of the Lucas-Barro approach might be called for.^{2/} In this respect, it would seem interesting to at least investigate the effects of changes in the terms of trade as a determinant of growth.^{3/} It is also important to distinguish countries with different exchange rate systems, since presumably the effectiveness of monetary shocks would be different in small countries with fixed exchange rates and countries with adjustable exchange rates.^{4/}

The purpose of this paper is to show that when a monetary process that explicitly incorporates the role of fiscal deficits is considered, Hanson's general result -- that suggests an elasticity of .10 between output growth and unexpected money for all these countries -- does not hold any more. In particular, it is shown that when this alternative monetary process is used, these countries exhibit very different behavior with respect to the relationship between unexpected money and growth. Furthermore, it is shown that Lucas' (1973) proposition of an inverse relationship between the effect of (unexpected) monetary policy and the variability of the supply of money seems to hold for these countries. The paper also incorporates into the analysis the fact that these countries are open economies. This is done in three ways: (1) changes in the terms of trade are explicitly incorporated as possible determinants of growth; (2) for the case of Mexico -- which maintained a fixed exchange rate during most of the period -- unexpected domestic credit is also used as the relevant policy variable; (3) the possibility that all these countries are subject to common external shock is explicitly incorporated in the estimation procedure.

Hanson's study is based on the estimation of equations of the type of (1) for Brazil, Chile, Colombia, Mexico and Peru.

$$DY_t = a_2 + a_1 DMR_t + u_t \quad (1)$$

where y_t is the log of real output, $DY_t = (\log Y_t - \log Y_{t-1})$, and DMR_t is the unexpected change in the log of the quantity of money. Hanson tries several specifications for DMR_t . Some of his best results are obtained when DMR_t is replaced by actual changes in the quantity of money DM_t (Table 1 of Hanson's paper), and when DMR_t is defined as actual growth of the quantity of money minus past inflation -- $DMR_t = DM_t - DP_{t-1}$ (Table 4 of Hanson's paper).

Table 1 presents the results obtained from the estimation of equation (1) using these definitions of DMR_t . Even though the data used does not exactly correspond to Hanson's, the results are very similar.^{5/} From panel A it may be seen that the coefficient of DM_t is positive and significant at the conventional levels for Colombia, Mexico and Peru. For the cases of Colombia and Mexico, the D.W. statistic indicates the absence of first order serial correlation. As in Hanson's paper, the coefficients of DM_t are negative for Brazil and Chile, and in these cases the D.W. statistic indicates the presence of first order serial correlation. These results were obtained, as in Hanson's paper, using a narrow definition of money (M_1). When a broad definition of money is used, similar results are obtained.

Panel B of Table 1 presents the results obtained when unexpected money is defined as the difference between actual money growth and past inflation. (These results correspond to Table 4 in Hanson's paper.) As may be seen, now the coefficient of $DMR_t (=DM_t - DP_{t-1})$ is positive and significant for the case of Brazil and Chile, and remains significant in the cases of Mexico and Peru. In the case of Colombia, however, $(DM_t - DP_{t-1})$ is not significant.^{6/} These results, together with pooled estimations, constitute the base of Hanson's analysis.^{7/} However, as is shown below, once the role of a fiscal deficit and open economy factors are allowed in the analysis, the similarity across countries of output response to monetary changes reported in Table 1 tends to disappear.

Table I
GROWTH OF OUTPUT AND MONEY GROWTH (M2)
IN LATIN AMERICA

	<u>Brazil</u> 1952-1974	<u>Chile</u> 1952-1970	<u>Colombia</u> 1951-1974	<u>Mexico</u> 1950-1974	<u>Peru</u> 1951-1974
A. $DY_t = a_2^1 + a_1 DM_t + w_t$					
a_2^1	.107 (4.340)	.040 (1.930)	.018 (1.107)	.036 (2.889)	.033 (3.019)
a_1	-.103 (1.481)	-.012 (.198)	.190 (1.926)	.227 (2.220)	.131 (2.448)
R^2	.109	.003	0.171	.206	.261
D.W.	1.123	1.303	2.047	2.046	1.227
B. $DY_t = a_2^{*1} + a_1^* (DM_t - DP_{t-1}) + w_t^*$					
a_2^{*1}	.0636 (7.428)	.032 (6.258)	.049 (8.821)	.045 (8.197)	.042 (5.906)
a_1^*	.159 (2.073)	.142 (3.035)	.002 (.031)	.239 (3.711)	.148 (2.748)
R^2	.193	.365	.001	.420	.308
D.W.	1.400	2.263	1.825	2.074	1.192

Note: For data sources, see the Appendix. Absolute t-statistics in parentheses.

R^2 refers to the coefficient of correlation D.W. in the Durbin-Watson statistic.

I. Fiscal Deficit and Monetary Growth in Latin America

A well-known feature of LDC's in general, and Latin-American countries in particular, is that money creation is an important source of government revenue (see, for example, Harberger, 1964, 1978; French-Davis, 1973; and Baer and Beckerman, 1974). In this section I present results obtained from the estimation of monetary growth equations that explicitly incorporate the role of the fiscal deficit in money creation. The equations fitted assume that in every period the growth of the quantity of money partially responds to that period fiscal deficit, and to past rates of money creation.

$$DM_t = \alpha_0 + \sum_{i=1}^k \alpha_i DM_{t-i} + \beta DEF_t + w_t \quad (2)$$

where DEF_t is equal to the ratio of the fiscal deficit to the quantity of money in $t-1$. The residuals obtained from the estimation of this equation [$\hat{w}_t = DM_t - \hat{DM}_t$] are used in section II as a measure of unexpected money. Table II presents the results obtained from fitting (2) for these five Latin-American countries. In most cases k was set equal to 3. In the case of Chile, however, k was chosen to be equal to 2, and in the case of Peru k was set equal to 4, in order to induce white noise residuals. In addition, for the case of Mexico -- the only country in the sample that had a fixed exchange for most of the period of time -- an equation for domestic credit is also reported.^{8/} As may be seen, in most cases DEF_t is positive and significant. In the case of Chile, while the coefficient is positive, it is not significant. In the case of Mexico, on the other hand, DEF is only significant in the narrow money (M1) equation, having the wrong sign and being insignificant in the case of the domestic credit equation. Additionally, it may be noted that in all

Table II

Monetary Growth and Fiscal Deficit in Latin America

$$DM_t = \alpha_0 + \sum_{i=1}^4 \alpha_i DM_{t-i} + \beta DEF_t + u_t$$

EQ. NO.	COUNTRY	MONETARY AGGREGATE	CONSTANT	α_1	α_2	α_3	α_4	β	S.E.	D.W.	R ²	F
(2.1)	Brazil	M2	.054 (1.455)	.904 (4.585)	-.529 (1.992)	.343 (1.870)	--	.392 (3.285)	.0530	1.858	.829	18.17
(2.2)	Chile	M2	.138 (.880)	.739 (2.844)	-.358 (1.175)	--	--	.083 (.709)	.0797	1.632	.427	3.98
(2.3)	Colombia	M2	-.064 (.878)	.598 (3.152)	-.067 (.279)	.730 (2.538)	--	.576 (3.719)	.0336	1.918	.594	5.60
(2.4)	Mexico	M1	.107 (2.993)	.901 (4.507)	-.971 (5.406)	.212 (1.262)	--	.088 (2.487)	.0189	1.676	.746	11.75
(2.5)	Mexico	Domestic Credit	.021 (.307)	.987 (3.563)	-.806 (3.042)	.696 (2.129)	--	-.403 (.424)	.0592	1.807	.525	10.87
(2.6)	Peru	M1	.085 (1.353)	.164 (.790)	-.329 (1.519)	.062 (.291)	.332 (1.573)	.343 (3.165)	.0782	1.631	.613	3.80

Notes: Absolute t statistics in parentheses.

S.E. refers to the standard error of the regression.

cases the F statistic indicates that the regression is significant at the conventional levels. The Durbin-Watson statistic, and the analysis of the autocorrelation functions of the residuals using the procedure suggested by Box and Jenkins (1976) show that the residuals of these monetary equations are white-noise, indicating that they are appropriate candidates for the measure of unexpected money.^{9/}

An important characteristic of the money equations presented in Table II is that, when measured by the standard deviation of the prediction error, they outperform simple autoregressions and past inflation in predicting actual monetary changes.^{10/}

II. Monetary Shocks and Growth in Latin-America

In this section the relationship between growth and unexpected monetary policy in Latin America is re-investigated, using the residuals from the money supply equations reported in Table II as a measure of unexpected money. Additionally, the possible role of changes in the terms of trade ($DTOT_t$) in these countries' growth is explicitly investigated. For each country, equation (3) was estimated using the residuals of the monetary equations in Table II as measures of unexpected monetary shocks.

$$DY_t = \delta_0 + \sum_{i=0}^K \gamma_i DMR_{t-i} + \theta DTOT_t + (\emptyset \text{ TIME}) + \epsilon_t \quad (3)$$

where the time variable was only used for the case of Brazil in order to reduce the degree of serial correlation observed in the residuals.

In the analysis K was chosen to vary between 0 and 3. There are several ways to justify the inclusion of lagged values of DMR in equation 3. First, as Barro (1978, page 553) has argued, lagged DMR's may capture the effects of

unexpected monetary shocks on stock variables (like capital) that are carried forward. Additionally, by including lagged values of DMR we are investigating both the short-run and long-run effects of monetary shocks on growth. While γ_0 may be interpreted as capturing the short-run effect of unexpected monetary shocks, $\sum_{i=0}^3 \gamma_i$ may be interpreted as the long-run effect of these shocks. This interpretation of the coefficients of lagged values of DMR in an equation of the type of (3) has recently been suggested by Kormendi and McGuire (1981).

Equation (3) was estimated in two alternative ways: First, OLS were used for each country, using the residuals from the monetary process equations reported in Table II as measures of unexpected money. Secondly, equation (3) was also estimated using Zellner's (1962) seemingly unrelated regression procedure (SURE) for the cases of Brazil, Colombia, Mexico and Peru for 1954-1974.^{11/} This procedure allows for capturing the possible correlation between the error terms ε_t from the growth equations for these countries. Since all these countries are open economies, and are presumably subject to common external shocks, the residuals (ε 's) from the growth equations for each of them could be correlated. The use of this GLS procedure is superior to simply pooling the different equations since it still allows for differences in the γ_i 's across countries.

In Table III the results obtained from the OLS estimation of equation (3) are reported. Table IV, on the other hand, contains the seemingly unrelated regression results from the simultaneous estimation of equations (3.1), (3.3), (3.4) and (3.6) for Brazil, Colombia, Mexico and Brazil.^{12/} As may be seen, the results are very different across countries. For the cases of Brazil and Chile, no evidence was found, at any lag, of a significant effect of unexpected money on output growth. On the other hand, for the cases of Colombia, Mexico

and Peru, some evidence of significant positive effects of unexpected money on growth was found. However, the (significant) coefficients for unexpected money changes not only have different magnitudes for these countries, but they also correspond to different lagged periods. It may also be noted that the simultaneous (SURE) procedure provided more efficient estimates than the OLS results.

Peru is the only country where there is a strong contemporaneous effect of unexpected money on output growth. According to the SURE results (Table IV), a 1% unexpected increase in the quantity of money will result in a 0.3% increase in output growth. On the other hand, for Peru there is no evidence of significant effects of lagged unexpected money changes on growth.

The results for Mexico are particularly interesting. While none of the γ_1 's is significant when unexpected changes in domestic credit are used, a positive, significant coefficient for γ_1 is found when M1 is used as the relevant monetary aggregate. This result suggests that a 1% unexpected change in money will have an approximately 0.6% effect on output's growth with a one-year lag. This is, to some extent, surprising, since one would expect that in the case of a small open economy with fixed exchange rates, domestic credit would be the relevant policy variable.

Equations (3.3) and (4.3) in Tables III and IV, respectively, summarize the results obtained for Colombia. As may be seen, when SURE is used the coefficient for contemporaneous unexpected changes of the quantity of money (γ_0) is significant at the 10% level. The coefficient for γ_3 is significant at the 5% level both when OLS and SURE estimation methods are used, indicating that for Colombia it might take up to three years for unexpected changes in money to have any significant effect on output growth.

The results presented in Tables III and IV also indicate that, as expected, changes in the terms of trade are positively related to output growth in these countries (θ is positive in all cases). However, these coefficients are only significant at the conventional levels for the cases of Chile and Mexico.

In general, according to the results presented in Tables III and IV, there is some evidence of a positive relationship between unexpected monetary changes and output growth in Colombia, Mexico and Peru. However, the nature of this relationship is different across these countries. While for Peru the positive effect of unexpected money on output growth is reflected in the same year, for Mexico there is a one-year lag, and for Colombia there is a three-year lag. For the cases of Brazil and Chile, no positive effect, at any lag, of unexpected money on growth was found. These results -- which contrast with Hanson's (1980) general "rule of thumb" for all these countries -- support Lucas' (1973) hypothesis of an inverse relationship between the effect of unexpected monetary shocks and the variability of monetary policy: The more stable countries in the sample -- Colombia, Mexico, and Peru -- exhibit significant and positive coefficients for unexpected monetary changes, while in the more unstable and inflationary countries -- Brazil and Chile -- there is no evidence of a positive effect of unexpected money on growth.^{13/} It is interesting to note that in the cases where unexpected money seems to matter (Colombia, Mexico and Peru), only one γ_i is significant, indicating that even though the impact of unanticipated monetary policy might not be reflected in the same year, it is not distributed along a number of years. The results obtained also show that, at least for the cases of Chile and Mexico, changes in the terms of trade have an important role in explaining growth.

Table III

Output Growth and Unexpected Money in Latin America:
Ordinary Least Squares Results

$$DY_t = \delta_0 + \sum \gamma_1 DMR_{t-1} + \theta DTOT_t + \emptyset TIME + \epsilon_t$$

EQ. NO.	COUNTRY	MONETARY AGGREGATE	δ_0	γ_0	γ_1	γ_2	γ_3	θ	\emptyset	D.W.	R^2	F
3.1	Brazil	M2	-6.106 (1.235)	-.040 (.176)	-.087 (.382)	-.423 (1.775)	-.273 (1.252)	.023 (1.136)	.003 (1.248)	1.813	.546	1.60
3.2	Chile	M2	.035 (4.609)	-.031 (.348)	-.064 (.581)	-.086 (.866)	-.012 (.132)	.163 (2.075)	--	1.587	.413	.99
3.3	Colombia	M2	.055 (13.474)	.153 (1.093)	.113 (.669)	.021 (.116)	.289 (1.566)	.028 (.611)	--	2.367	.419	1.30
3.4	Mexico	M1	.073 (11.835)	.472 (1.494)	.741 (2.139)	.526 (1.326)	.176 (.472)	.188 (1.961)	--	1.966	.484	1.69
3.5	Mexico	Domestic Credit	.063 (11.114)	-.084 (.680)	-.060 (.482)	-.222 (1.667)	.024 (.207)	.116 (1.164)	--	1.998	.377	1.09
3.6	Peru	M1	.053 (8.269)	.303 (2.750)	.118 (1.253)	.054 (.600)	.064 (.689)	.062 (.949)	--	1.861	.524	1.98

Note: Absolute t-statistics in parentheses.

Table IV

Output Growth and Unexpected Money in Latin America:
Seemingly Unrelated Regressions Results

$$DY_t = \delta_0 + \Sigma \gamma_1 DMR_{t-1} + \theta DTOT_t + \phi TIME + \epsilon$$

EQ. NO.	COUNTRY	MONETARY AGGREGATE	δ_0	γ_0	γ_1	γ_2	γ_3	θ	ϕ
(4.1)	Brazil	M2	-6.134 (1.312)	-.048 (.217)	-.052 (.235)	-.445 (1.940)	-.296 (1.409)	.020 (1.001)	.003 (1.326)
(4.3)	Colombia	M2	.055 (13.718)	.195 (1.839)	.069 (.481)	.060 (.404)	.298 (2.058)	.016 (.412)	--
(4.4)	Mexico	M1	.074 (12.749)	.246 (.942)	.632 (2.237)	.538 (1.553)	.202 (.647)	.269 (3.637)	--
(4.6)	Peru	M1	.052 (8.198)	.325 (2.965)	.138 (1.481)	.066 (.751)	.051 (.553)	.060 (.941)	

Note: Absolute t-statistics in parentheses.

III. Money, Inflation and Growth in Brazil and Chile

According to the discussion presented in the preceding section, for the cases of Brazil and Chile, unexpected monetary changes have no effects on output growth. These results, however, appear to be inconsistent with Hanson's findings -- reported in panel B of Table 1 of this paper -- that indicate that when unexpected money is measured as the difference between actual money growth (DM_t) and past inflation (DP_{t-1}), there is a significantly positive relationship between "unexpected" money and growth in these countries. This inconsistency, however, is more apparent than real, and is due to the peculiar definition of unexpected money used by Hanson. In order to further investigate this problem, I re-estimated Hanson's equations without restricting the coefficients of DM_t and DP_{t-1} to be equal (in absolute terms) but of opposite signs. The following result was obtained for Brazil:

$$DY_t = .098 + .050 DM_t - .159 DP_{t-1}$$

(4.439) (.536) (2.250)

D.W. = 1.747
 $R^2 = .313$
F = 3.87

and the following result was obtained for Chile:

$$DY_t = .035 + .033 DM_t - .146 DP_{t-1}$$

(6.721) (.321) (3.301)

D.W. = 2.105
 $R^2 = .401$
F = 3.04

As may be seen, in both cases the coefficient of actual money changes is not significant, while the coefficient for past inflation is significantly negative. Furthermore, in both cases the restrictions imposed by Hanson of equality (with opposite signs) of the coefficients of DM_t and DP_{t-1} are rejected. When these results are looked at from this perspective, they are

perfectly consistent with our previous findings reported in section III: in these highly inflationary countries, money growth (actual and unexpected) has no effect on output growth. However, inflation has a significantly negative effect on growth in these countries.

IV. Conclusions

In this paper Hanson's (1980) results regarding the relation between growth and unexpected monetary policy in five Latin-American countries have been re-investigated, using more appropriate money growth equations. The fact that these countries are open economies has also been incorporated into the discussion. The results show that when these money supply equations -- which explicitly incorporate the role of the fiscal deficit in money creation -- are used, Hanson's common "rule of thumb" for all these countries does not apply any more. On the contrary, the results indicate that these countries have a different behavior regarding the effect of unanticipated monetary shocks on growth: While there is some evidence that in Mexico, Peru and Colombia unexpected increases in money growth will have an effect on output growth, in Brazil and Chile there will be no effect of either actual or unexpected monetary changes on growth.

The results also indicate that in at least two of the cases (Chile and Mexico), changes in the terms of trade have an important effect on growth. This suggests that neglecting the open economy aspects in these types of analyses may result in misleading conclusions.

DATA APPENDIX

1. Real Income: For Colombia it is real GDP taken from the International Financial Statistics. For Peru and Brazil, real GDP obtained from U.N. National Accounts was used. For Mexico, real GDP from ECLA, as reported in UCLA's Statistical Abstract of Latin America, was used. For Chile, data on real GDP taken from Ffrench-Davis (1973) was used.
2. Money (M1 and M2) and Domestic Credit: For Brazil, Colombia, Mexico and Peru, yearly averages constructed from the IFS raw data were used. For Chile, the series reported in Ffrench-Davis (1973) were used.
3. Prices: For Brazil, Colombia, Mexico and Peru, the data was taken from the IFS. For Chile, Ffrench-Davis series were used.
4. Terms of Trade: Taken from ECLA's "America Latina: Relación de Términos de Intercambio, 1928-1976".
5. Fiscal Deficit: For Brazil, Colombia, and Peru the data was taken from the IFS. For Chile, data from Ffrench-Davis (1973) was used.

FOOTNOTES

1/ See, for example, Harberger (1964, 1978), French-Davis (1973), Aghevli and Kahn (1978) and Baer and Beckerman (1974). Hanson (1980) acknowledges the importance of monetary emission as a source of government revenue in Latin America (page 975). However, he does not incorporate the fiscal deficit as an explanatory variable in his money supply processes.

2/ On the relationship between growth and monetary policy in an open economy using a Lucas-Barro type of framework see Leiderman (1979).

It is important to note that Hanson acknowledges the fact that he is practically ignoring the open economy issue (pages 974 and 988).

3/ Barro (1978) included a terms of trade variable in his study of the U.S. case. In his case, however, it was not significant.

4/ Hanson's sample (Brazil, Chile, Colombia, Peru, and Mexico) includes countries with very different exchange rate regimes. While Brazil and Chile followed a mini-devaluation policy during most of the period, Peru experimented with several exchange regimes, from freely floating (1950-1954) to fixed (1961-1966; 1969-1974). Mexico, on the other hand, had a fixed rate during most of the period.

5/ I have followed, as far as possible, the indications in Hanson's paper (page 979) to construct my data. However, I have purposely introduced some changes. In particular, I have used ECLA's data on GDP for Brazil and Mexico, since it is well known that the IFS data set contains serious flaws on these series for the earlier periods. In private communication Hanson has indicated to me that his monetary data for Colombia was taken from the Banco de la Republica Bulletin. In this study, however, the monetary data for Colombia, and other countries -- except Chile -- are yearly averages constructed from the IFS data. See the Appendix for further details on the data.

6/ The non-significance of this coefficient for Colombia contrasts with Hanson's results. The reason for this is the different monetary series used.

7/ Of course, Hanson's paper includes important discussions on the relevance of the alternative specifications for the Latin-American countries in the sample. Since it is not possible (at least to me) to summarize a 20-page paper in a few paragraphs, the reader is referred to the original paper by Hanson.

8/ For all countries, equations for M1, M2 and domestic credit were fitted. However, due to space considerations, only the "best" results -- as measured by the standard error of the regression -- are reported in Table II. For the cases of Brazil, Colombia and Peru, the residuals from the domestic credit equations exhibited serially-correlated errors.

- 9/ An additional problem with the results reported in Table 1 is that for the cases of Peru, Brazil and Chile DM is not white noise. For the cases of Chile and Mexico, there are also some indications that $DM_t - DP_{t-1}$ might not be white noise. For this reason it is not clear in what sense these variables can be associated with unexpected money for these countries.
- 10/ With the exception of one case (Chile when three-period lagged inflation is used to predict money), these equations' predictive power outperforms those used by Hanson.
- 11/ Chile was not included in the SURE estimations in order for the estimation to be based on a longer time period.
- 12/ Other sets of equations were also simultaneously estimated using SURE. The results -- available from the author -- are not reported here due to space considerations.
- 13/ The standard deviations of the growth of money for these countries are:
Brazil: $\sigma_{M1} = .122$, $\sigma_{M2} = .124$; Chile: $\sigma_{M1} = .099$, $\sigma_{M2} = .089$; Colombia:
 $\sigma_{M1} = .034$, $\sigma_{M2} = .044$; Mexico: $\sigma_{M1} = .039$, $\sigma_{M2} = .037$, $\sigma_{DC} = .072$; Peru:
 $\sigma_{M1} = .089$, $\sigma_{M2} = .059$.

REFERENCES

- B.B. Agheveli and M.S. Kahn, "Government Deficit and the Inflationary Process in Developing Countries," IMF Staff Papers, 25 (1978), 383-416.
- R. Barro, "Unanticipated Money Growth and Employment in the United States," American Economic Review, 67 (1977), 101-115.
- _____, "Unanticipated Money, Output, and the Price Level in the United States," Journal of Political Economy, 86 (1978), 549-580.
- W. Baer and P. Beckerman, "Indexing in Brazil," World Development (Oct./Dec.), 1974.
- G.E.P. Box and G.M. Jenkins, Time Series Analysis: Forecasting and Control (second edition), San Francisco: Holden, Day, 1976.
- R. Ffrench-Davis, Políticas Económicas en Chile, Santiago de Chile: Editorial Nueva Universidad, 1973.
- J. Hanson, "The Short-Run Relation Between Growth and Inflation in Latin America," American Economic Review, 70 (1980), 972-989.
- A.C. Harberger, "Notes on Inflation," in W. Baer and I. Kenstenetzky (eds.), Inflation and Growth in Latin America, Illinois: Homewood, 1964.
- _____, "A Primer on Inflation," Journal of Money, Credit and Banking, 10 (1978), 505-521.
- R.C. Kormendi and P.G. McGuire, "The Real Output Effect of Monetary Shocks: Cross Country Tests of Rational Expectations Propositions," Report 8123, Center for Mathematical Studies in Business and Economics, The University

of Chicago, 1981.

- L. Liederman, "Expectations and Output-Inflation Tradeoffs in a Fixed-Exchange-Rate Economy," Journal of Political Economy, 87 (1979), 1285-1306.
- R.E. Lucas, Jr., "Some International Evidence on the Output-Inflation Trade-Offs," American Economic Review, 63 (1973), 326-334.
- T.J. Sargent, "The Observational Equivalence of Natural and Unnatural Rate Theories of Macroeconomics," Journal of Political Economy, 84 (1976), 631-640.
- A.G. Zellner, "An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias," Journal of the American Statistical Association, 57 (1962), 348-368.