View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by Research Papers in Economics

IMF Staff Papers
Vol. 52, Special Issue
© 2005 International Monetary Fund

Mundell's *International Economics:* Adaptations and Debates

RUSSELL S. BOYER and WARREN YOUNG*

Most of the chapters in Mundell's International Economics *differ, owing to adaptation, from the original sources. The revisions yield valuable insights into the contributions made by the initial publications.*

In this paper we look only at the changes that take the form of elisions of material. These outtakes are amusing but demonstrate how Mundell was willing to either irritate or ignore his discussants. Issues raised by them are important enough to warrant our further consideration. In doing so we question both the validity and the interpretation of some of the conclusions in the Nobel-cited capital mobility paper. [JEL B29, B31, E10, F41]

*Russell S. Boyer is Professor of Economics at the University of Western Ontario, and Warren Young is Associate Professor of Economics at Bar-Ilan University. This paper is a revised version of one prepared for the conference honoring Michael Mussa on the occasion of his sixtieth birthday, held June 4–5, 2004, at the International Monetary Fund, Washington, D.C. It is the first output of a line of research that was initiated in response to the awarding of the Nobel Prize to Robert A. Mundell in 1999. We thank him for conversations and correspondence concerning the keynote address that he presented at Bar-Ilan University for the conference entitled "The Open Economy Macromodel: Past, Present and Future." Boyer would like to express his appreciation to Jim Boughton, Bob Flood, and J. J. Polak for conversations during visits to the IMF. The staff at the IMF Archives was invaluable in making available some of the early drafts of papers by Fleming and Mundell. David Laidler provided important insights about the nature of exercises in the history of thought but specifically warned of the dangers of constructing memoirs. Boyer would like to acknowledge his debt to Alison Fleming, who provided some of her father's diaries for his inspection, and who gave him the photo that appears with this publication. He also held fruitful conversations on the topic of this paper with John Floyd and Grant Reuber. Young would like to thank Bar-Ilan University for financially supporting travel that expedited this research project. Comments from a referee for this journal helped to correct some mistakes in an earlier draft and to sharpen up the argument at certain points. None of these individuals or organizations is responsible for the conclusions that this paper contains.

Note: Clockwise from left of the piglet: Gloria Fleming, Eugene Birnbaum, Elizabeth Johnson, J. Marcus Fleming, Harry G. Johnson, Robert A. Mundell, and Wassily Leontief.

Michael Mussa and I (Boyer) were graduate students together at the University of Chicago from 1966 to 1970. Much of our interaction took place in the International Economics Workshop, which was organized by Harry Johnson and Robert A. Mundell. These were among the workshop's greatest years, and the fun, excitement, and unconventional behavior witnessed in this setting are exemplified by the photo that accompanies this paper. Johnson and Mundell are in the photo, but so too is another famous contributor to open economy macromodeling, J. Marcus Fleming. Johnson was the arbiter of who would receive the majority of the credit for developing the crucial model, and appropriately in this photo he sits between Fleming and Mundell.

The first time I heard Fleming's name was from Jacob Frenkel in 1969 in the corridor outside the seminar room in which the workshop met each Monday. The name came up in the context of a discussion of Richard Cooper's (1969) newly published volume of readings, *International Finance.* A remarkable aspect of the volume, Jacob pointed out, was that it did not contain a single paper by Mundell.

Being a well-informed student of international finance, I wondered about the glaring omission of Mundell's magnum opus, "Capital Mobility and Stabilization Policy Under Fixed and Flexible Exchange Rates" (1963d). To my surprise Cooper had found an alternative for that publication in the form of a paper by Fleming (1962). I was convinced at the time that this was indeed a poor substitute for the real thing, but the episode permanently linked in my mind the names Fleming and

Mundell, apparently before the term "Mundell-Fleming model" had been coined (Boughton, 2003).

These two names are central to understanding the development of the open economy macromodel during the 1960s, a period of massive upheaval in the subject. This paper examines these two great economists in an unorthodox way. We consider their contributions in light of the contrast in the extent to which revisions were made to their works as they were reprinted in an adapted form.

The difference in this regard is quite marked. While Fleming's famous paper went from Departmental Memorandum (DM) (1961d)[1] to publication, with reprints in two separate venues, there has been a minimal amount of reworking along the way. In contrast, Mundell's papers have been extensively modified from their original forms (Mundell, 1963a, 1963b, 1963c, 1963d, 1964, and 1967) to their publication in adapted form in *International Economics* (Mundell, 1968a).

Some of Mundell's adaptations are merely amusing, and to these we devote most of our attention. We do this by considering the reworking in the form of elision of material that appears in earlier versions. Even so, the comments of discussants on the original papers are worth reviewing, and we do this in the case of McLeod (1964) (discussing Mundell, 1963d[2]) and Fleming (1967) (discussing Mundell, 1967).

The task of dealing with revisions that add material to Mundell's original publications is left for a subsequent paper.

I. Trash Worth Reading by Students

To begin this comparison between Fleming and Mundell, we focus on two other dimensions in which they differed: namely, their desire to create controversy and their willingness to acknowledge the originality of others' work.

Of Fleming's celebrated paper, Mundell remarked:

> Marcus that year was active in the theater (literature, drama, and history were old avocations) but nevertheless managed to write a paper on the monetary-fiscal mix that built upon the subject that I had worked on, and he produced a paper that is still worth reading today by students (Fleming, 1978, p. xix).

Fleming is somewhat more inclined to see his own work as being a useful construct:

> The essay in Chapter 9, written in 1962, was inspired by a feeling that the Canadian experiment with a floating exchange rate had been vitiated

[1]It should be noted that Departmental Memoranda no longer are issued at the IMF; their function has been taken over by a working paper series that conforms more closely to what the profession uses that term to describe. Perhaps the most important difference between the two during the 1960s was that DMs were specifically designated to be used only internally, although this guideline was interpreted broadly to mean that both the governments and central banks of member countries had full access to them. In addition, it was not unusual for authors to distribute their DMs to other economists with whom they were corresponding.

[2]McLeod was also the discussant of Mundell's (1963b) paper at the Canadian Political Science Association meetings in Quebec City on June 6, 1963.

> by a failure to observe that such an arrangement called for a different mix of fiscal and monetary policies from those that were appropriate under a regime of fixed exchange rates (Fleming, 1971, p. 18).[3]

While the emphasis in his paper is not on how capital mobility affects his comparative static results, Fleming does cover the polar case of perfect mobility both in the body of his paper and in a mathematical appendix. Furthermore, his view of the importance of capital mobility remained steadfast throughout the rest of his life, as his research output makes clear.

Fleming was an international civil servant whose natural tendency was to avoid controversy if possible. In contrast, Mundell appears to relish his ability to stir things up, and he gives as a prime example of this proclivity his first paper written as a new employee at the IMF (Mundell, 1961d):

> It is hard to imagine the consternation this paper created within the Fund in October and November 1961. It arrived at conclusions that did not exactly coincide with Fund policy. . . . it was initially rejected by *Staff Papers* . . . (Mundell, 1968f, p. 493).

That this paper was accepted for publication is credited to a senior member of staff, who wrote the following statement of support:

> I understand that some members of the Committee may question the publication of this piece because they think it conflicts with established Fund policy. I would first of all question whether it does conflict with established Fund policy . . . The S.E. quadrant of Mundell's article provides a theoretical foundation for Lord Cromer's Mansion House speech. . . . On the other hand, I would be most concerned if I thought that *Staff Papers* would reject an article which was theoretically valid but which might conflict with accepted Fund practice . . ." (Mundell, 1968f, p. 494).

Mundell's complaints about the treatment of his paper may not be completely justified. He acknowledges it was written in a single week in September or October 1961 (Mundell, 2001, p. 222). It was immediately approved by Fleming, so that the DM appeared on November 8. If there was a fight about the paper, it did not last long: the paper was published in the March 1962 *Staff Papers.*[4]

Mundell asserts that the theoretical framework in his paper demonstrated the correct policy mix and that President Kennedy midway through his term in office reversed the settings of his policies to conform to the Mundell recommendation. Nonetheless, he later admitted (Mundell, 2001, p. 222) that his view all along was

[3]Boughton (2003) has noted that Fleming (1962) was essentially in its published form (except, perhaps, for its appendix) by September or October 1961. It is therefore clear that the actual writing dates from 1961 at the latest.

[4]In contrast, Fleming's famous paper was issued as a DM also on November 8, but it was not published until 12 months later. Perhaps the title of Mundell (1961d) is a casualty of the speed with which the DM was released. That title is "The Use of Monetary and Fiscal Policy for Internal and External Stability." For the published version of this paper (Mundell, 1962) the title is "The Appropriate Use of Monetary and Fiscal Policy for Internal and External Stability." The adaptation published as Mundell (1968c) modifies the title further to "The Appropriate Use of Monetary and Fiscal Policy Under Fixed Exchange Rates."

that his paper was "trash."[5] Perhaps unaware of this attitude, some well-known economists, such as Flood (2002), Johnson (1967), Kemp (1972), McCallum (1996), and Tsiang (1975), have taken the paper seriously enough to give it a thorough review, or at least to cite it.[6]

Such reversals are a bit jarring to readers who first encounter them, but those who know Mundell are used to this aspect of his personality. Indeed, he used Walt Whitman's famous quotation about self-contradiction to preface his talk to well-wishers at the American Economic Association luncheon honoring him for receiving the Nobel Prize.

But few economists are aware of the extent of Mundell's reversal with respect to capital mobility. In his capital mobility paper, he writes that the assumption of perfect capital mobility ". . . will overstate the case, but it has the merit of posing a stereotype toward which international financial relations seem to be heading" (1963d, p. 475). That view set the research agenda in international finance for at least 30 years. In stark contrast, Mundell's own research moved in just the opposite direction; he assumed thereafter that the economy under analysis was in a situation of zero capital mobility.

Such an assumption is made: in his barter theory paper (Mundell, 1967), which led to the Mundell-Dornbusch literature (Dornbusch, 1973); in his analysis of growth and the balance of payments (Mundell, 1971b), which laid the groundwork for the monetary approach to the balance of payments; and in his "Uncommon Arguments for Common Currencies" (Mundell, 1973). While it may be true that the degree of capital mobility does not make much difference in certain of these papers, it seems unlikely that the argument in the common currencies discussion remains intact when the countries involved have access to a nonmonetary market instrument that affords the opportunity for international borrowing and lending.[7]

II. True Zen Master

Soon after Mundell arrived at the Fund in September 1961, Fleming provided crucial support for Mundell's research. In his own DM, Fleming (1961) cited a paper forthcoming in the *Canadian Journal of Economics and Political Science* (Mundell, 1961c), and he quickly approved the DM mentioned above (Mundell, 1961d).

He continued this support into 1963 by doing joint research with Mundell on intervention in the forward foreign exchange market (Fleming and Mundell, 1963). In March of that year Fleming approved as a DM the first definitive version of the

[5]To fill in the context, we should note that Mundell says ". . . that I felt like Bizet after he had written the Toreador Song to *Carmen:* 'If it's trash they want, I'll give it to them!' "

[6]Perhaps the most surprising aspect of Mundell (1962) being used to justify the Kennedy tax cut is that the model explicitly assumes that the economy under analysis is small. This is hardly an accurate description of the United States of that era.

[7]Dornbusch (2000, p. 201) remarked that the arguments in the original optimum currency areas paper (Mundell, 1961b) so militate against the view that Europe should have a single currency that we should not see Mundell as the godfather of the euro but rather "Euro despite Mundell." McKinnon (2002) notes how the discussion in Mundell (1973) does not use any of the terms that were employed in the famous paper written 12 years earlier.

capital mobility paper (Mundell, 1963a)[8] even though it had an unfinished feel, lacking references and footnotes.[9]

It is therefore a great surprise to find that in the spring of 1963 Fleming did not approve as a DM the first of Mundell's zero-capital mobility papers. This paper in its original published form is titled "International Disequilibrium and the Adjustment Process" (Mundell, 1967).

Two years later Fleming was called on to play the role of discussant for this paper, even though he had already reacted negatively to it. The occasion was the presentation of the paper by Mundell at a 1965 World Bank conference. Of course, having seen the paper two years earlier Fleming was well prepared to express his misgivings in this public forum. The paper and the discussants' comments are published in Adler (1967).

Mundell's paper appears in an adapted form in *International Economics* (Mundell, 1968a) as Chapter 8, and its title has been modified to "Barter Theory and the Monetary Mechanism of Adjustment." The introduction to the paper is substantially reworked, although the body of the text is not. What makes the following outtakes interesting is that the introductory section seems tailored to irritate the discussant. He, in turn, responds in a confident and even satirical fashion, so that to many readers Fleming wins this debate.

The following are the opening paragraphs of the original publication that, after adaptation, appeared as Chapter 8 in *International Economics.* All citations are from Mundell (1967).

> *A Cup of Tea*
> Nan-in, a Japanese master during the Meiji era (1868–1912) received a university professor who came to inquire about Zen.
>
> Nan-in served tea. He poured his visitor's cup full, and then kept on pouring.
>
> The professor watched the overflow until he no longer could restrain himself. "It is overfull. No more will go in!"
>
> "Like this cup," Nan-in said, "you are full of your own opinions and speculations. How can I show you Zen unless you first empty your cup?" (p. 441).
>
> International monetary economics needs to follow Nan-in's advice. We have an abundance of theories, mechanisms and techniques for understanding it, but many of them seem to be no better rooted in theoretical understanding than the opinions and speculations of Nan-in's guest. Too many theories are almost as debilitating as too few. The subject has become so cluttered that it does seem necessary to empty our cups (p. 441).

[8]There exists a still-earlier draft of this paper in the form of a two-page attachment (entitled "The Implications of International Capital Mobility for Stabilization Policy and Theoretical Evaluation of Empirical Evidence," dated January 4, 1963) to a notice of a seminar in the Special Studies Division of the IMF on January 9, 1963.

[9]That this version was indeed unfinished is suggested by the following evidence. In less than three months the manuscript (Mundell, 1963a) had metamorphosed into a version (Mundell, 1963b) that is in roughly its form as published (Mundell, 1963d). In the process it had more than doubled in length; tables, references, footnotes, and diagrams had been added; and the text had been completely reorganized. Within an additional six months this new draft, with further minor changes, was published.

> It would be a mistake, however, to empty out two hundred years of international trade theory and forget about it. We need instead to sift it of its extraneous elements, and to add a little of what appears to be missing. In un-Zen-like fashion, then, we can begin by taking a brief look at what has occurred since Hume, and in particular at the effects on the development of international monetary economics of the classical distinction between the monetary mechanism and the theory of barter (p. 441).
>
> The success of the dichotomy proved too overwhelming—epistemologically. In the hands of the successors of Ricardo—Mill, Marshall, Taussig, Viner, Meade, Johnson, etc.—the long-run barter theory of trade developed into a carefully tooled and highly sophisticated engine of analysis . . . international monetary economic analysis never received precise mathematical formulation. Restricted to the raw logic of verbal analysis, it could not and did not develop the rigorous base necessary for ordered progressive scientific accumulation (p. 443).

After further discussion of this sort the introductory portion of the paper finishes with the caveat that the assumptions of the model ". . . limit the direct applicability of the conclusions to a small country that is underdeveloped in the sense that it lacks an important capital market" (p. 445). There is a noteworthy difference from the version in *International Economics* in the section titled "The Classical Case and Devaluation." In that section is a mention of Mohamet and his mountain (p. 455), but otherwise the body of the paper is much as we find it in Mundell (1968a).[10]

The following are comments by Fleming (1967):

> Comments on Professor Mundell's Paper
>
> Professor Mundell begins, with the self-confidence of a true Zen master, by telling us to empty our cups of all we thought we knew about international monetary economics in order to receive the milk—or rather the green tea—of the true doctrine. Before accepting this somewhat Messianic claim, however, and bending our heads meekly to receive the thwacks of his mathematical "hossu," we ought, I think, to ask ourselves the question, "What is so special about Mundell's Zen?" (p. 462).
>
> The paper before us, like the body of the Buddha, manifests itself at three levels—the level of disequilibrium analysis, or Sambhogakaya, the level of comparative equilibrium analysis, or Dharmakaya, and the level of policy prescriptions, or Nirmanakaya. (The meaning I attach to these terms will be explained anon.) (p. 463.)
>
> Now, in the world of disequilibrium analysis, things are not exactly what they seem. It is a strange world, composed partly of *ex post* realities, like Imports, Exports, Prices, and Incomes, and partly of visionary entities of an *ex ante* character such as Expenditure, which is really a piece of wishful thinking, but nevertheless has magnitude and mixes happily with the real entities in Mundell's equations and diagrams (p. 463).
>
> . . . Now I must admit to being rather allergic to this kind of disequilibrium analysis, though, I admit it has a respectable ancestry in economic thought. In Buddhist lore, this realm is called the Body of Enjoyment,

[10]The conscientious reader may be surprised that the caveat is sufficiently elastic so that during the discussion which followed his paper Mundell cited Italy's experience in 1963 and 1964 as being an example to which this analysis in applicable. In addition, the very same framework is used to analyze the case of Britain in 1964 (Mundell, 1971a).

> or the Body of Enlightenment, but while I enjoy it I don't feel entirely enlightened (p. 463).
>
> One could wish that Professor Mundell had ventured a little more deeply into what he calls "the cluttered clouds of verbal analysis" (p. 464).
>
> We are now in a position to climb out of the ambiguous half-lights of the disequilibrium process into the sunlit uplands of equilibrium analysis, the realm of Dharmakaya, or Heavenly Void. I am sure that our Zen master would admit that this blissful realm could be attained by a number of different paths. In other words, different systems of dynamic adjustment, including that followed by the ancient worthies of the classical tradition, are compatible with the same set of equilibrium relationships. It is, therefore, not surprising that the conclusions of this part of Professor Mundell's paper . . . are relatively uncontroversial, within the limitations imposed by their basic assumptions, of which perhaps the most crucial is the full employment assumption (p. 467).
>
> However, when in the concluding section we descend from the rarefied atmosphere of equilibrium analysis to the terrestrial world of Nirmanakaya where policies have to be applied by human beings, controversial propositions come thick and fast. Most of these propositions are so impeccably conservative that it would be churlish of me, as an IMF man, to quarrel with them; . . . (pp. 467–8).
>
> On the whole, what strikes me most about Mundell's Zen is its similarity to that of the Ancient Worthies, the early patriarchs, with its lesson of wu-wei, or *laissez faire.* It is clear that the tea he wants us to empty out of our cups is the tea of that un-Zen-like activist, Maynard Keynes (p. 468).

From a historical point of view, it would be interesting to know who had the last chance to revise his contribution. Fleming seems like a meticulous worker, and so the miscitations of the equations in the paper come as a surprise. Maybe the numbering of the equations was altered in the final copyediting of the paper, without corresponding changes to the discussants' comments. Furthermore, Fleming's quotation ". . . the cluttered clouds of verbal analysis . . ." does not appear in any version of Mundell's paper that we have seen. Perhaps it was modified to ". . . raw logic of verbal analysis. . . ." And, finally, who was copying whom when both authors use the expression "un-Zen-like"? Just a coincidence?

For those readers who are wondering about all the references to Zen, we should mention that Fleming had a particular interest in Zen Buddhism. This enjoyable and literate repartee provides an unusual view of the interaction of these two economists.

It is worth pursuing this episode somewhat further, because it sheds some light on the difficulties a scholar has in pinning down the motivations of the agents involved.[11] We have not been able to find any written source by Fleming expressing his feelings about his two encounters with the barter theory paper.[12]

---

[11]One can read Mundell's interpretation of Fleming's reaction to this paper in the following sources: (Mundell, 1991, p. 481; 2001, p. 225; and 2002, p. 13).

[12]Fleming's professional papers at the IMF have not been catalogued in the Archives, although the project to organize his writings is under way. Diaries and correspondence of various sorts are in the possession of his daughters, Alison Fleming and Hilary Knatz, but these have not yielded any direct information about their father's reaction to these events.

One can argue that Fleming's reaction was merely to particular aspects of an unpolished first draft, and that with suitable revisions he would have warmed to the paper and approved its distribution as a Departmental Memorandum. This was apparently the purpose of the comments he made in a 1963 memorandum entitled "Lament for Economics."[13] According to one version of the story (Mundell, 1991, p. 481), this "lament" was the basis for Fleming's discussant comments that are excerpted above.[14]

Another possibility might explain Fleming's aversion to Mundell's paper. This explanation gains credence on examination of the problematic way Mundell cites his paper in his inaugural Mundell-Fleming Lecture (Mundell, 2001). The citation in the list of references is as follows:

> ________, 1963a, "Barter Theory and the Monetary Mechanism of Adjustment," later published as Chapter 8 of Mundell (1968). Also published as "International Disequilibrium and the Adjustment Process," in *Capital Movements and Economic Development: Proceedings of a Conference held by the International Economic Association,* ed. by John H. Adler with the assistance of Paul W. Kuznets (London: Macmillan; New York: St. Martin's Press, 1967), pp. 441–68.[15]

The citation is misleading in that the title of the paper presented in the IMF seminar in 1963 was "International Disequilibrium. . . ." The title "Barter Theory . . ." does not appear until the paper was adapted for publication in *International Economics* in 1968. Furthermore, the first section of the 1963 version was likely similar if not identical to that which we have described above: namely, the version in the Adler volume.[16] It therefore contained the Zen master conversation as we have laid it out. If one looks instead at the 1968 version, the reader finds quite a different introductory section, which leads one to think that Fleming was overreacting to this paper. Indeed, Fleming's comments appear to be very strange if the paragraph about the Zen master that triggered them is not taken into account. Such an outcome is guaranteed for readers who rely on *International Economics,* as this material has been elided from the original paper in the process of adaptation.

A question which can be raised concerns the dating of the events described above. Mundell claims that the barter theory paper, which uses a classical model, was formulated after the appearance of the capital mobility paper, which employs a Keynesian framework. He says that this new paper represented a shift in research direction which Fleming "really disliked" (Mundell, 2002, p. 13). But new evidence casting doubt on this claim involves the date on which Per Jacobsson had a heart attack, April 28, 1963. When this date is combined with Mundell's account

[13]Such is the description of Mundell (1991, p. 481). In contrast, Mundell (2001, p. 225) describes this expression as being penciled directly onto Fleming's copy of the manuscript. The expression "lament for economics" must be an allusion to the book by Wootton (1938).

[14]We are unable to corroborate this version of these events as we have been unsuccessful in finding any materials dealing with this paper except those written by Mundell.

[15]The paper itself covers only pages 441–62, with the rest of the pages containing Fleming's comments as the formal discussant (462–68). Discussion from the floor is in pages 468–71.

[16]This conjecture was corroborated by a usually reliable source. Unfortunately further supporting evidence about the events surrounding this paper has not been available.

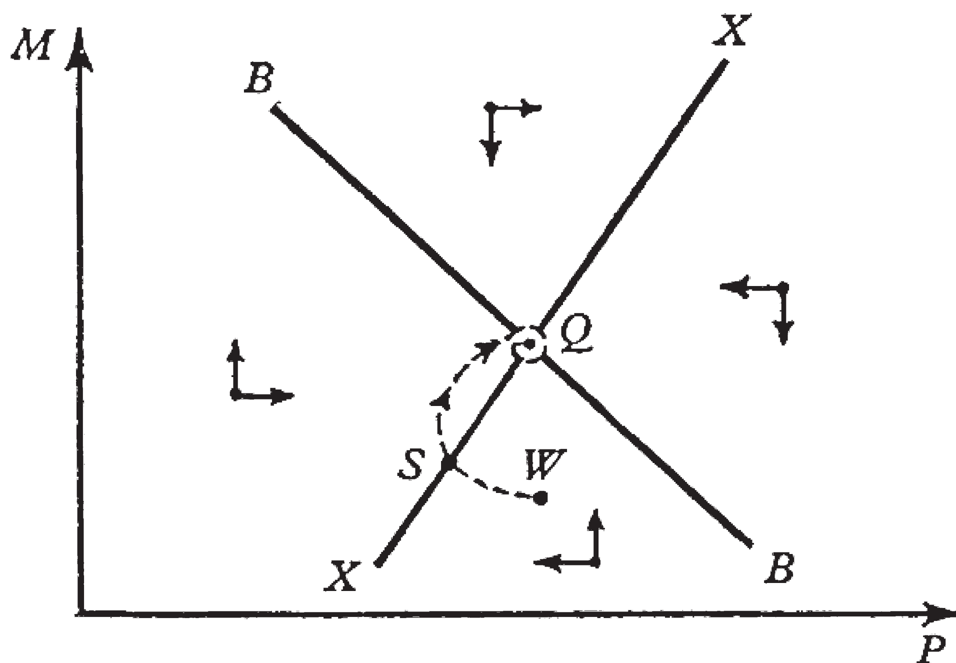
(2002, p. 13) of these events, the authors find that the seminar for the barter theory paper probably took place before the date of presentation of the familiar form of the capital mobility paper, June 6, 1963. Since Mundell later was immersed in both his Banca Nazionale del Lavoro paper (published in September 1963 (Mundell, 1963c)) and his extension of the capital mobility paper (published in August 1964 (Mundell, 1964)), a more balanced view is that during this period he worked on both classical and Keynesian models contemporaneously. Looking at the papers which Fleming published during this time (Fleming, 1971), the authors find that Fleming seems to have done likewise.

III. Mundell's Mandalas

Another way in which Fleming and Mundell differ is in their use of diagrams. It is generally agreed that Mundell is a master in their construction and deployment. We will see in a moment that Fleming was quite the opposite. Acknowledging the elegance and impenetrability of Mundell's drawings, Fleming says the following:

> At this point I would like to make an allusion to the diagrams illustrating the adjustment process. What I would like to call "Mundell's mandalas" are always worthy objects of contemplation, and Figure 5 [Figure 1 below], which illustrates the adjustment process, is no exception (Fleming, 1967, p. 464).

Figure 1. The Adjustment Process



Source: Mundell, Robert A., 1967, "International Disequilibrium and the Adjustment Process," in *Capital Movements and Economic Development,* ed. by John H. Adler (London: Macmillan), Figure 5, p. 452.

Credit: Reproduced with the permission of Palgrave Macmillan.

In contrast, the three diagrams by Fleming that accompany his discussant comments (Fleming, 1967, pp. 465–7) capture polar cases when money is assumed to have extreme effects on the balance between income and expenditure. The nature of these assumptions is such that the resulting diagrams are ungainly and awkward. The elegance of the earlier figure has disappeared, and the possibility of instability is now raised.[17]

While Mundell is a master of this art, we think it should be said that when he does not devote enough time to his creations, a few errors can creep in. Figure 2 below comes from Mundell (1968d):

Can all five errors in this figure be easily identified? No, they cannot. That's because two of them are due to denotations of variables in the paper that are different from what is shown in the figure.

The errors are as follows:

1. X is used for two conflicting purposes. It is used both to measure along the horizontal axis and to denote the internal balance line.
2. y appears on the vertical axis, and y_1 and y_2 appear on the horizontal axis.
3. y_1 and y_2 are used to indicate values measured by X.
4. In the appendix to the paper y is the letter used to denote output, which in the figure is measured by X.
5. In the appendix, π is used to denote the exchange rate, but in the figure this variable is measured by y.[18]

Finally, Mundell at times makes his own diagram more obscure by including extraneous lines or arrows. We provide an example in the form of Figure 3 below (the second figure in Mundell (1968e)). In this figure it can be seen that the *FF* locus in the bottom panel is unnecessary. Its many shifts merely confuse the issue, as we are bound to end up at the intersection between the relevant vertical dotted line and the related *XX* locus in the bottom panel.

Despite these errors, it is clear that Mundell is more masterful in diagrammatic analysis than is Fleming. So how do their powers compare when it comes to equations?

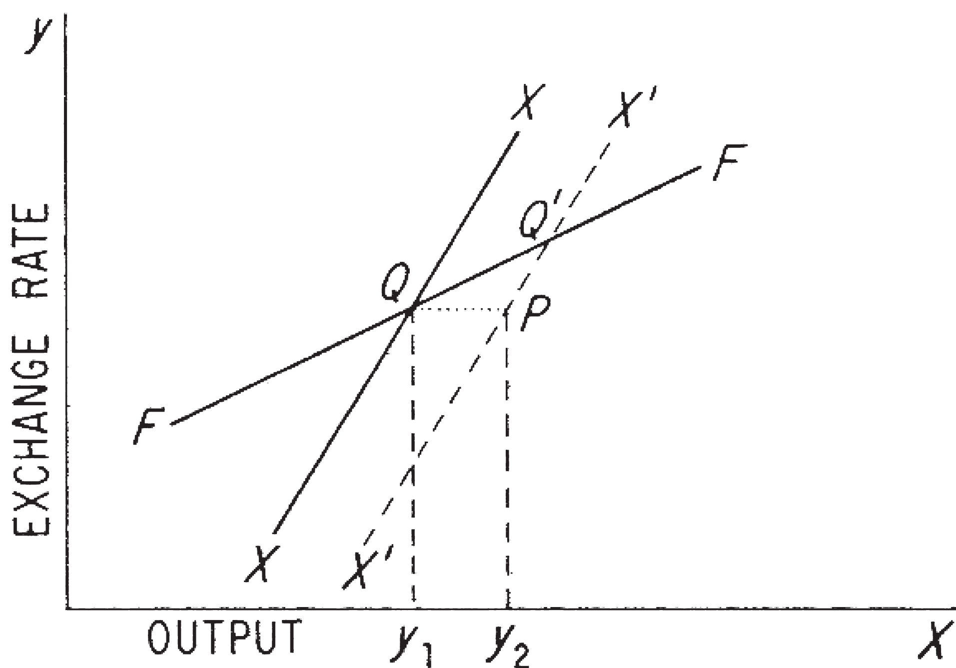
IV. Wonderful Skill

Dornbusch (2000, p. 199) praised Mundell's "... wonderful skill to capture the story in a few equations. ..." Dornbusch presents the whole argument in the capital

[17]We agree with Mundell's comment, made during the general discussion of the paper, that even when *BB* is vertical, the economy must converge on the equilibrium (Adler, 1967, p. 470). This means that the ungainly dynamic path shown in Fleming's Chart 1 (1967, p. 465) is not consistent with the equations implicit in the model. In contrast, Fleming (1967, p. 465) appears to be correct in his discussions of his Chart 2 (1967, p. 466) concerning the confusion that Mundell's model presents about the connection between an intolerance of excess supply and demand for money and the relationship between income and expenditure.

[18]The careful reader may also want to identify the point *P* as an error in this diagram. While the casual observer believes that point is the fixed exchange rate equilibrium, it is not so identified in the paper. Nonetheless, the conclusion of the paper makes claims as to the nature of an unspecified fixed exchange rate equilibrium.

Figure 2. The Effect of Fiscal Policy on Employment



Source: Mundell, Robert A., 1968, *International Economics* (New York: Macmillan), Figure 17-3.

Credit: Reproduced with the permission of Pearson Education, Inc.

mobility paper (Mundell, 1963d) using two equations: $M/P = L(i, Y)$; $i = i^*$ (Dornbusch, 2000, p. 202).

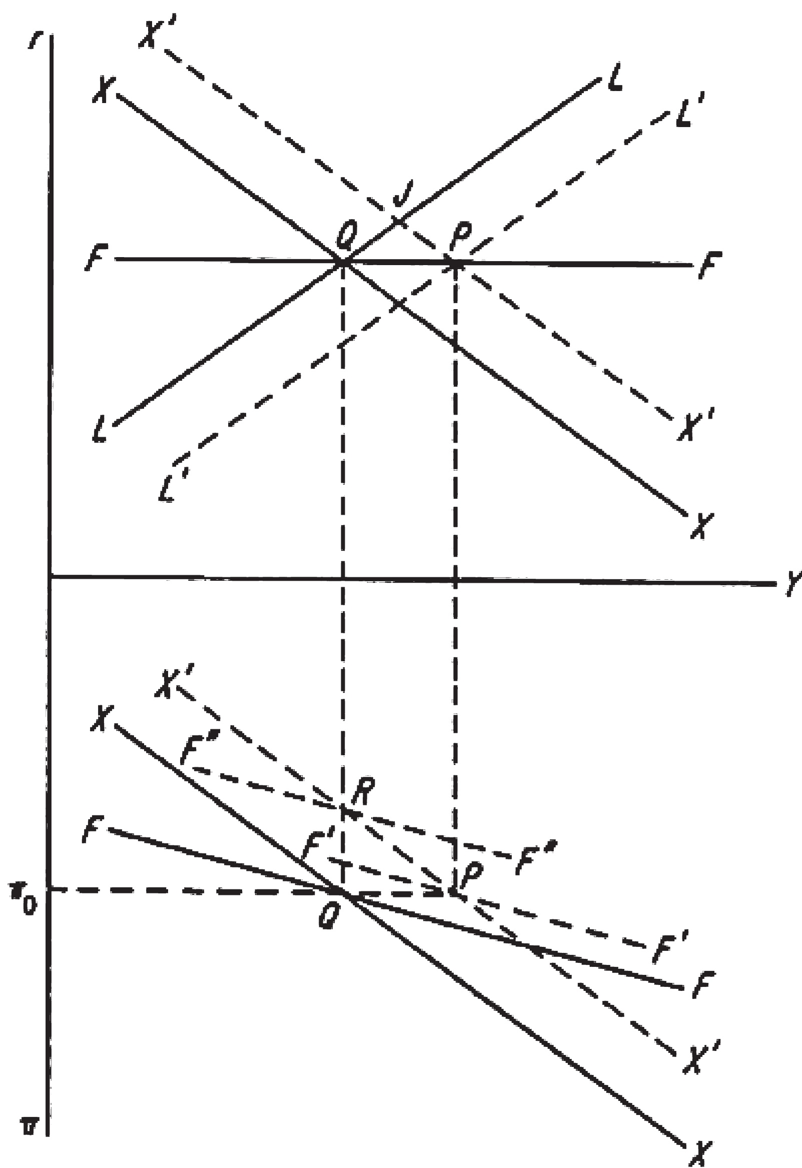
There are two problems with this demonstration. As we will see momentarily, this equation does not appear in the paper. In addition, as Swoboda (1972) argued convincingly, the ineffectiveness of expansionary monetary policy under fixed exchange rates is independent of the degree of capital mobility, so basing the argument on perfect capital mobility (as the second equation indicates) hides the fact that this assumption contributes nothing to the conclusions.

Let's see how this wonderful skill is exemplified in the original version of the capital mobility paper (Mundell, 1963d). The only equations in the text are in the form of a square table with five separate listings on each side. In each case, both horizontally and vertically, the sum of the elements in the table is zero. There are 10 equations as a result, but the majority of them are misleading as to the way the analysis is actually conducted in the text. The one equation that is of some help is familiar:

$$(T-G)+(S-I)+(M-X)+* = 0.$$ [19]

[19]This presentation puts in a horizontal format an equation that is written vertically in the table in the original publication (Mundell, 1963b, p. 476). An asterisk is used to denote a negligible magnitude that is included for completeness.

Figure 3. Fiscal Policy



Source: Mundell, Robert A., 1968, *International Economics* (New York: Macmillan), Figure 18-2.
Credit: Reproduced with the permission of Pearson Education, Inc.

This is the equilibrium condition in the domestic goods market and when plotted in (*Y, r*) or (*Y,* π) space (where *Y* is output, *r* is the rate of interest, and π is the exchange rate) is denoted by *XX* indicating internal balance. In particular, we have noted this locus in Figures 2 and 3 above. This line is well known from macroeconomic analysis and is often called the *IS* curve.

Usually, the second curve in the macroeconomic diagram is denoted by *LM,* and in the capital mobility paper it unexceptionally is called *LL.* Problems arise when one attempts to determine, from the body of the paper, which equation is used to draw this locus. The paper proceeds along two lines that appear to be inconsistent. The first is that the money market is in equilibrium when ". . . the community is willing to accumulate the increase in the money supply offered by the banking system" (Mundell, 1963d, p. 477). As with the specification of the foreign exchange market, this view suggests that equilibrium occurs in the money market when the rate of change of supply is equal to the rate of change of demand. This statement appears also to coincide with the flow nature of the equations in the table and in particular with the equation under the column title "Market/Money" that reads:

$$\text{Government dishoarding} + \text{Private dishoarding} + * + \text{Monetary expansion} = 0.$$

The alternative description in the paper of equilibrium in the money market is the conventional one. It states that equilibrium occurs ". . . when income has risen sufficiently to induce the domestic community to hold the increased stock of money created by the banking system" (Mundell, 1963d, p. 477). As to the demand for money, the assumption is that it ". . . depends only on income and the rate of interest" (Mundell, 1963d, p. 476).

We should note that the demand-for-money function that this phrase describes is quite general; so much so that demand could conceivably depend negatively on income and positively on interest rates. We will not pursue such possibilities but instead assume that these responses have their usual sign. But the key point is that nowhere does the paper state that demand for money is assumed to be unitary elastic in income. Because such an assumption is not made, we will question a specific result that is repeated in the later sections of the capital mobility paper.

V. Curious Outtake

We presented above remarks from Fleming putting in perspective the contribution that his famous paper makes to our understanding of an open economy's macro performance. What does Mundell see as the important new results in his capital mobility paper?

Mundell concludes that the important mechanism that needs to be heeded in an open economy revolves around the degree of capital mobility. He states, "We have demonstrated that perfect capital mobility implies different concepts of stabilization policy from those to which we have become accustomed in the post–World War II period" (Mundell, 1963d, p. 484). Presumably, he is referring to the ineffectiveness results he derives for monetary policy under fixed exchange rates and for fiscal policy under flexible exchange rates. A more satisfactory basis for this claim

would have included a demonstration that less-than-perfect capital mobility generates quite different results. Here is where Swoboda's conclusion is again worth noting. If monetary policy's effectiveness under fixed exchange rates is always zero, independent of the degree of capital mobility, doesn't it serve as a counter-example to Mundell's claim? In the same vein, if capital mobility is as important as is asserted, then why did Mundell assume zero capital mobility in all his subsequent research?

Similarly to Fleming, Mundell points to the Canadian situation as an example for which his analysis ". . . should have a high degree of relevance . . ." (Mundell, 1963d, p. 475). As does Fleming (1962, p. 372), Mundell (1963d, p. 485) cites Rhomberg's work in this regard, stating, "Perhaps the most complete verification of the applicability of the conclusions to the Canadian case is provided by an econometric paper by R. Rhomberg to be published in the *Journal of Political Economy.*" In one of the more curious outtakes in the Chapter 18 adaptation, the citation to Rhomberg's work (Rhomberg, 1964) is deleted, and the interested reader is pointed in the direction of a Royal Commission Report by Clarence Barber with the title "The Canadian Economy in Trouble" (Barber, 1962) and of a speech titled "Canada in a Changing World Economy," which Mundell claims Harry Johnson delivered to the Canadian Club of Toronto in November 1962 (Johnson, 1962).[20]

VI. Theory Is the Poetry of Science

While many of the problems we have identified in the capital mobility paper continue throughout its various incarnations, some of its conclusions are buttressed by a subsequent publication that extends the model to a world made up of two countries. This publication, titled "A Reply: Capital Mobility and Size" (Mundell, 1964), provides additional, better-specified equations and replicates some of the small country results by taking the two-country conclusions to the limit when one of the countries is very small relative to the other. While *International Economics* includes this paper as an appendix to Chapter 18, it fails to include the comments by Alex N. McLeod (1964) that sparked the reply. The comments were apparently welcomed in that they afforded an opportunity that Mundell exploited. But, as we will see, McLeod's comments and the responses to them are interesting on their own. They constitute the outtakes from the adaptation in *International Economics* that we include below.

McLeod did not think highly of the capital mobility paper, as is apparent in the following excerpts:

> Mundell's article, however, is not primarily addressed to this problem; instead it is a comparative study of monetary and fiscal policies on the basis of a number of simplifying assumptions, of which the perfect mobility of capital is only one—and not necessarily the most radical (p. 413).
>
> Mundell's rigid demand-for-money function, when coupled with the assumption that the interest rate is given, throws us back on something

[20]This talk appears to be miscited in all versions of the capital mobility paper (Mundell, 1963b, 1963d, and 1968e). The likely correct citation of this work is given in the list of references below as Johnson (1962).

> hardly distinguishable from one of the cruder forms of the quantity theory of money (pp. 414–5).
>
> Even within the limitations imposed by his simplifying assumptions, however, the logic of Mundell's analysis is far from rigorous and his results are by no means definitive. His description of the outcome under the various circumstances he considers may be plausible enough, provided certain conditions (not always fully specified) are deemed to obtain, but they are not the only possible and not necessarily the most probable results (pp. 415–6).
>
> This is inexcusable, and can only bring discredit on the economics profession if allowed to go unchallenged (p. 420).

Mundell's reply (1964) to this onslaught is as ethereal as it is unresponsive.

> Theory is the poetry of science. It is simplification, the essential abstraction, the exaggeration of truth. Through simplification theory creates a caricature of reality. Through deduction the premises of the caricature are translated into empirical—and therefore refutable—generalizations. The caricature itself is not the real world—it mocks it. Yet mind true things by their mockeries! The caricature mocks reality; the deductions from the caricature illuminate it (p. 421).
>
> I hope, too, that my conclusions are tautological creations of my assumptions. That means my deductions are free of logical error (p. 421).
>
> I shall now exploit this opportunity to extend my previous writings on the subject to cover a point which McLeod and others have raised concerning the influence of size (p. 423).

VII. McLeod, Mundell, and Classical Quantity Theory

McLeod's analysis raises three specific issues that deserve fuller discussion. The first point we cover, taken from McLeod (1964), is as follows:

> In summary, the real limitation on the use of monetary and fiscal policies to expand income and employment in an open economy turns out to be simply the old familiar "foreign drain" that has played such an important role in the literature for at least thirty-five years, not to mention the much older version of essentially the same idea in the "external cash drain" that limits credit expansion in purely institutional money-and-banking theory going back at least to the bullionist controversies (p. 419).

Mundell asserts the unusual nature of the equilibria generated by perfect capital mobility, without clinching his case by making a comparison with the situation where mobility is less than perfect. In this regard it is worth pointing out that Mundell has earlier papers of a comparative static nature in which capital mobility is considered. For example, his *Kyklos* paper (Mundell, 1961a) includes capital mobility, but the thrust of its message is that capital mobility does not alter the essence of the adjustment mechanism with which we have been familiar since the writings of Hume. While alterations in the level of income may be part of the process determining the flow of reserves, and these can be in addition to or instead of the influences that rely on price movements, the nature of the adjustment mechanism is not fundamentally altered by the introduction of capital mobility.

In light of the contrasting results in both the *Kyklos* article and the flexible exchange rate paper (Mundell, 1961c), some readers are inclined to see the claims in the capital mobility paper as somewhat exaggerated. They are wary about endorsing the argument too fully, in anticipation of further reversals in the future.[21] Mundell (1963d, p. 485) says that ". . . my conclusions are black and white rather than dark and light grey." In addition, as we noted above, Mundell thereafter abandoned the perfect capital mobility view in carrying out his research agenda.

A second point by McLeod (1964) is worth considering in detail:

> But is it true that under a fixed exchange rate the authorities must abandon their efforts to expand income and employment by monetary policy? No, not as long as they are able to borrow abroad, because foreign borrowing is an effective alternative to the depletion of exchange reserves (p. 417).

Mundell dismisses this idea as due to "confusion" on McLeod's part (Mundell, 1964, p. 422), but in fact McLeod is providing a reasonable paraphrase of a logical exercise concerning a policy presented in the original article. In the flexible exchange rate case, Mundell says foreign exchange market operations (". . . 'open market operations' in foreign exchange . . .") should be viewed as an "alternative form of monetary policy" (Mundell, 1963d, p. 478). The consequences are the same as for a standard expansionary open market operation in domestic securities, with the one exception that such an alternative operation increases the level of international reserve holdings.

Such an operation can be carried out under fixed exchange rates as well, and on further consideration one realizes that the conflict between internal and external balance goes away when such operations are used. The increase in the supply of money tends to increase domestic output, and the purchase of foreign currency by the central bank raises the level of international reserves. Though such reserves will be depleted over time, their level can be restored by merely repeating the foreign borrowing operation as needed.[22]

The final point that McLeod (1964) makes returns us to the minimalist specification of the asset markets that the capital mobility paper employs:

> However, this conclusion is in fact nothing but a tautological creation of his assumptions; by hypothesis income and money supply must vary in exact proportion . . . (p. 418).

The point here is that Mundell does not assume that the demand for money is unitary elastic in income. As a result, the conclusion that income and the money sup-

---

[21]Krueger (1965), while noting the results of Mundell (1963d), focuses her attention on Mundell (1961c) instead. Swoboda (1972) is an important counterexample, as we noted above. Sohmen (1969) sees both the Fleming (1962) and the Mundell (1963d) results as valid in particular circumstances. Dornbusch (2000, p. 199) mentions Mundell's "marketing department" as an important factor in the wide recognition his work has received.

[22]It should be noted that this process cannot be pursued indefinitely while we maintain the assumption of perfect substitutability of domestic and foreign market instruments. There would come into play mechanisms arising from the intertemporal budget constraint for an open economy, a point that is key to recent insights about the nature of currency crises. But because Mundell does not mention wealth in his analysis, faulting McLeod for a failure to anticipate this recent literature seems unwarranted.

ply must vary in exact proportion is not an implication of the model in the capital mobility paper. The overly specific claim, which Mundell has called the Classical Quantity Theory conclusion (Mundell, 1968d, p. 261), is as follows:

> Because the interest rates are unaltered, this means that income must rise in proportion to the increase in the money supply, the factor of proportionality being the given ratio of income and money (income velocity) (Mundell, 1963d, p. 477).

This point is one that Fleming (1962, pp. 374 and 379) makes in his discussion of monetary policy under flexible exchange rates, in the perfect capital mobility case. It is a correct deduction in that paper precisely because the demand for money relation is expressed in terms of a velocity function that is assumed to depend only on the rate of interest.

The same is not true in the Mundell model, because, as we noted above, the specification of the money-demand function does not include the assumption of unitary elasticity with respect to income. This point would not be worth belaboring except that the claim appears at least five times in the capital mobility paper (Mundell, 1963d, pp. 477, 479, 481, and 484). It is mentioned at least twice in Mundell (1964, pp. 430 and 431).

VIII. Conclusion

This paper has examined two of the chapters in *International Economics* to get a better sense of their roles in the development of the theory of open economy macro. We have done this through noting the differences between those chapters and the material in the original sources. But as a result we have done less than half of the job, because our focus has been entirely on the words that have been elided in the process of adaptation.

The larger tasks remain of identifying the material that is added in the process of revising the papers and of explaining why those changes were made.

Because Mundell's *International Economics* continues to be cited as an important source for insights about the development of the open economy macromodel, we feel that such an exercise is well worth the effort.

REFERENCES

Adler, John H., 1967, *Capital Movements and Economic Development.* (London: Macmillan).

Barber, Clarence, 1962, "The Canadian Economy in Trouble," *Royal Commission on Banking and Finance* (April).

Boughton, James, 2003, "On the Origins of the Fleming-Mundell Model," *IMF Staff Papers,* Vol. 50, No. 1, pp. 1–9.

Cooper, Richard N., ed., 1969, *International Finance: Selected Readings* (Harmondsworth, Middlesex, England; Baltimore: Penguin Books).

Dornbusch, Rudiger, 1973, "Devaluation, Money, and Non-Traded Goods," *American Economic Review,* Vol. 63 (December), pp. 871–80.

———, 2000, "Robert A. Mundell's Nobel Memorial Prize," *Scandinavian Journal of Economics,* Vol. 102, No. 2, pp. 199–210.

Fleming, J. Marcus, 1961, "Internal Financial Policies Under Fixed and Floating Exchange Rates," Departmental Memorandum 61/28 (November 8), IMF Central Files (S 430, "Exchange Rates 1950") (Washington: International Monetary Fund).

———, 1962, "Domestic Financial Policies Under Fixed and Under Floating Exchange Rates," *Staff Papers,* International Monetary Fund, Vol. 9 (November), pp. 369–79.

———, 1967, "Comments on Professor Mundell's Paper," in *Capital Movements and Economic Development,* proceedings of a conference held by the International Economic Association, ed. by John H. Adler (London: Macmillan), pp. 462–68.

———, 1971, *Essays in International Economics* (London: Allen and Unwin).

———, 1978, *Essays on Economic Policy* (New York: Columbia University Press).

———, and Robert A. Mundell, 1963, "A Simplified Analysis of Official Intervention in the Forward Exchange Market," Departmental Memorandum 63/16 (April 3) (Washington: International Monetary Fund).

Flood, Robert M., 2002, "*IMF Staff Papers* Has a New Look," *IMF Survey,* Vol. 31, February 11, pp. 38–39. An *IMF Survey* interview with Robert Flood.

Johnson, Harry G., 1962, "Canada in a Changing World Economy," *Alan B. Plaunt Memorial Lectures* (Toronto: University of Toronto Press, published in cooperation with Carleton University).

———, 1967, "Theoretical Problems of the International Monetary System," *Pakistan Development Review,* Vol. 7, pp. 1–28.

Kemp, Murray, 1972, "Book Review," *Econometrica,* Vol. 40 (January), pp. 206–7.

Krueger, Anne, 1965, "The Impact of Alternative Government Policies Under Varying Exchange Systems," *Quarterly Journal of Economics,* Vol. 79 (May), pp. 195–208.

McCallum, Bennett T., 1996, *International Monetary Economics* (New York: Oxford University Press).

McKinnon, Ronald W., 2002, "Mundell, the Euro and Optimum Currency Areas," in *Money, Markets, and Mobility: Celebrating the Ideas of Robert A. Mundell, Nobel Laureate in Economic Sciences,* ed. by Thomas J. Courchene (Kingston, Ontario: Queens University, John Deutsch Institute for the Study of Economic Policy), pp. 41–58.

McLeod, Alex N., 1964, "Capital Mobility and Stabilization Under Fixed and Flexible Exchange Rates: A Comment," *Canadian Journal of Economics and Political Science,* Vol. 30 (August), pp. 413–21.

Mundell, Robert A., 1961a, "The International Disequilibrium System," *Kyklos,* Vol. 14, pp. 153–71.

———, 1961b, "A Theory of Optimum Currency Areas," *American Economic Review,* Vol. 51 (September), pp. 657–65.

———, 1961c, "Flexible Exchange Rates and Employment Policy," *Canadian Journal of Economics and Political Science,* Vol. 27 (November), pp. 509–17.

———, 1961d, "The Use of Monetary and Fiscal Policy for Internal and External Stability," Departmental Memorandum 61/27 (November 8) (Washington: International Monetary Fund).

———, 1962, "The Appropriate Use of Monetary and Fiscal Policy for Internal and External Stability," *Staff Papers,* International Monetary Fund, Vol. 9 (March), pp. 70–77.

———, 1963a, "The Significance of Capital Mobility for Stabilization Policy Under Fixed and Flexible Exchange Rates," Departmental Memorandum 63/13 (March 20) (Washington: International Monetary Fund).

———, 1963b, "Capital Mobility and Stabilization Policy Under Fixed and Flexible Exchange Rates," manuscript presented at the Quebec Meeting of Canadian Political Science Association, June.

———, 1963c, "On the Selection of a Program of Economic Policy with an Application to the Current Situation in the United States," *Banca Nazionale del Lavoro Quarterly Review,* Vol. 16 (September), pp. 262–84.

———, 1963d, "Capital Mobility and Stabilization Policy Under Fixed and Flexible Exchange Rates," *Canadian Journal of Economics and Political Science,* Vol. 29 (November), pp. 475–85.

———, 1964, "A Reply: Capital Mobility and Size," *Canadian Journal of Economics and Political Science,* Vol. 30 (August), pp. 421–31.

———, 1967, "International Disequilibrium and the Adjustment Process," in *Capital Movements and Economic Development,* proceedings of a conference held by the International Economic Association, ed. by John H. Adler (London: Macmillan), pp. 441–62.

———, 1968a, *International Economics* (New York: Macmillan).

———, 1968b, "Barter Theory and the Monetary Mechanism of Adjustment," Chapter 8 in *International Economics* (New York: Macmillan).

———, 1968c, "The Appropriate Use of Monetary and Fiscal Policy Under Fixed Exchange Rates," Chapter 16 in *International Economics* (New York: Macmillan).

———, 1968d, "Flexible Exchange Rates and Employment Policy," Chapter 17 in *International Economics* (New York: Macmillan).

———, 1968e, "Capital Mobility and Stabilization Policy Under Fixed and Flexible Exchange Rates," Chapter 18 in *International Economics* (New York: Macmillan).

———, 1968f, "The International Monetary Fund," *Journal of World Trade Law,* Vol. 3, pp. 455–97.

———, 1971a, "Devaluation," Chapter 9 in *Monetary Theory: Inflation, Interest, and Growth in the World Economy* (Pacific Palisades, California: Goodyear Publishing).

———, 1971b, "The International Distribution of Money in a Growing World Economy," Chapter 15 in *Monetary Theory: Inflation, Interest, and Growth in the World Economy* (Pacific Palisades, California: Goodyear Publishing).

———, 1973, "Uncommon Arguments for Common Currencies," Chapter 7 in *The Economics of Common Currencies,* proceedings of the Madrid Conference on Optimum Currency Areas, ed. by Harry G. Johnson and Alexander K. Swoboda (London: Allen and Unwin).

———, 1991, "The Quantity Theory of Money in an Open Economy," Chapter 19 in *International Financial Policy: Essays in Honor of Jacques J. Polak,* ed. by Jacob A. Frenkel and Morris Goldstein (Washington: International Monetary Fund).

———, 2001, "On the History of the Mundell-Fleming Model," *IMF Staff Papers,* Vol. 47, Special Issue (December), pp. 215–27.

———, 2002, "Notes on the Development of the International Macroeconomic Model," in *The Open Economy Macromodel: Past, Present and Future,* ed. by Arie Arnon and Warren Young (London: Kluwer Academic Publishers).

Rhomberg, Rudolph R., 1964, "A Model of the Canadian Economy Under Fixed and Fluctuating Exchange Rates," *Journal of Political Economy,* Vol. 72 (February), pp. 1–31.

Sohmen, Egon, 1969, *Flexible Exchange Rates* (Chicago: University of Chicago Press, rev. ed.).

Swoboda, Alexander K., 1972, "Equilibrium, Quasi-Equilibrium, and Macroeconomic Policy Under Fixed Exchange Rates," *Quarterly Journal of Economics,* Vol. 86 (February), pp. 162–71.

Tsiang, S. C., 1975, "The Dynamics of International Capital Flows and Internal and External Balance," *Quarterly Journal of Economics,* Vol. 89 (May), pp. 195–214.

Wootton, Barbara, 1938, *Lament for Economics* (London: George Allen and Unwin).