Mack Ott

Mack Ott is a senior economist at the Federal Reserve Bank of St. Louis. *The author acknowledges the helpful suggestions and criticisms of Andrew Kamarck, Tom Mayer, Guy Meredith, Gordon Midgely, Marius van Nieuwkerk, Lois Stekler, A.C.J. Stokman, Bill Witte, Geoffrey Wood, Stephen Wright and seminar participants at Notre Dame and Appalachian State Universities. Nancy D. Juen and Rosemarie V. Mueller provided research assistance.*

Have U.S. Exports Been Larger Than Reported?

IN LATE 1987, the U.S. Commerce Department announced that in its monthly trade reports, exports to Canada would henceforth use Canadian customs data on imports from the United States rather than U.S. export data. The rationale for this procedure is the documented inaccuracy since 1970 of U.S. customs data for exports to Canada. The discrepancies between the U.S. and Canadian data have become substantial both in absolute terms — nearly $11 billion in 1986 — and in terms of their effect on the U.S. trade balance — a 42 percent reduction in the 1986 U.S. trade deficit with Canada. While these errors are corrected in the annual reconciliation of U.S-Canadian trade data, their persistence raises a broader question: Are U.S. exports to other countries similarly understated?

This possibility raises some important political and economic issues. In recent years, the trade balance has been the focus of much economic policy debate, rivaling or complementing such traditional domestic issues as employment, inflation and growth. In this context, isolating large understatements in U.S. merchandise export data is clearly a topic with important policy implications.

In this article, the relationship between export underreporting and the statistical discrepancy in the balance of payments, which also rose from insignificance to prominence during the 1970s, is developed and is used to assess the validity of estimated U.S. export underreporting in the 1970s and 1980s.

BALANCE OF PAYMENTS ACCOUNTING, REPORTING ERRORS AND THE STATISTICAL DISCREPANCY

The first postwar U.S. trade deficit did not occur until 1971, a quarter of a century after World War II. During the early 1970s, the U.S. merchandise trade account alternated between deficits and surpluses; despite the comparatively weak growth of U.S. merchandise exports relative to imports, however, the declining U.S. current account balance remained in surplus during most years until 1982, primarily because of strong income from U.S. foreign investments.

Along with the declining current account balance, a persistently large discrepancy arose between the current and capital account balances. Since the first OPEC embargo in 1973–74, this dis-

crepancy has averaged nearly $22 billion.[1] Before 1975, it had been generally small and negative, averaging −$1.1 billion from 1960 to 1974. The relation between the current account balance, errors in exports and the statistical discrepancy can be illustrated by reviewing balance of payments accounting.[2]

The Rudiments of Balance of Payments Accounting

Balance of payments accounting is structured by two basic principles: double-entry accounting and equality between net sales minus gifts and the change in financial claims. Balance of payments accounts record a country's sales (exports) and purchases (imports) of goods and services plus transfers to foreigners as well as its lending to (capital exports) and borrowing from (capital imports) other countries. The sum of goods and services purchased and sold to foreigners, minus transfers, in a given period is called the *current account balance*; the concomitant change during the same period in the country's financial position due to capital outflows and inflows is called its *capital account balance*. Oftentimes, discussion focuses on bilateral balances — for example, between the United States and Japan; however, countries generally have surpluses with some countries and deficits with others, and the overall balance with all countries is the most informative measure of a country's international economic condition. An illustration of these principles in a three-country example will highlight the offsetting equality of the current and capital account balances *assuming they are completely and accurately measured*.

An Illustration of Balance of Payments Accounting

Suppose that total world merchandise trade during a quarter consisted of a $1 million computer sold by the United States to Japan and $300,000 worth of crystal imported by the United States from Ireland, each paid for with short-term notes. These IOUs are capital imports (inflows) of the borrowers and capital exports (outflows) of the lenders. Suppose also that a corporation in Ireland, owned by U.S. residents, had profits during the period of $80,000, $50,000 of which remained with the subsidiary as retained earnings and $30,000 of which were paid to the U.S. owners out of the firm's deposits in a U.S. bank. The profits of the Irish firm, in effect, are the payment for the use of machines, buildings and financial resources that the U.S. owners have sent to Ireland — capital services exported by the United States to Ireland. The balance of payments for each of the three countries during the quarter is shown in figure 1.

Some Accounting Principles. The figure displays the transactions between the three countries in the T-accounts in the upper panel. Every transaction is entered twice, usually as a debit and a credit but also in a variety of other ways, depending on the transaction. For example, for the U.S. owned Irish firm's transactions, an $80,000 debit for capital services imported, a minus $30,000 debit for U.S. bank deposits drawn down, and a plus $50,000 credit for the reinvested retained earnings are the entries in the Irish accounts, while the opposite, balancing entries appear in the U.S. accounts. Note that debits (left-hand side of T-account) are entered with negative signs in the balance of payments (lower panel), while credits (right-hand side of T-accounts) are entered with positive signs. For example, the computer exported by the United States to Japan appears as a credit (export) in the U.S. current account and a debit (import) in the Japanese current account. In contrast, in the capital account, capital outflows (exports) appear with a negative sign while capital inflows (imports) appear with a positive sign. Thus, the Japanese note paying for the computer appears as a debit (capital export) in the U.S. capital account and a credit (capital import) in the Japanese capital account.

The Balance of Payments Identity. When the transactions for each country are summed up, the resulting statement is the balance of payments

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[1]Throughout this article, the statistical discrepancy reported will be the "total discrepancy" — that is, the statistical discrepancy as it would be without the reconciliation adjustment for unreported trade with Canada.

[2]For a more detailed discussion of balance of payments accounting, see chapter 15, "The Balance of Payments and Foreign Exchange Rate," in Caves and Jones (1981). For an application of these principles to the U.S. trade deficit, see Chrystal and Wood (1988).

Figure 1

The Relation Between International Transactions and the Balance of Payments

Transactions T-Accounts

United States

(−)		(+)	
$1,000,000	note	$1,000,000	computer exported
300,000	crystal	300,000	note
50,000	foreign investment	80,000	services
		−30,000	U.S. deposits

Ireland

(−)		(+)	
$300,000	note	$300,000	crystal exported
80,000	capital services	50,000	Corporate retained earnings of U.S. subsidiary
−30,000	U.S. deposits		

Japan

(−)		(+)	
$1,000,000	computer imported	$1,000,000	note

Balance of Payments Accounts

U.S. balance of payments		Irish balance of payments		Japanese balance of payments	
Current Account:		Current Account:		Current Account:	
Exports	$1,080,000	Exports	$300,000	Exports	$0
Imports	− 300,000	Imports	− 80,000	Imports	−1,000,000
Balance on current account	$780,000	Balance on current account	$220,000	Balance on current account	−$1,000,000
Capital Account:		Capital Account:		Capital Account:	
Increase (−) in U.S. assets abroad	−$1,050,000	Increase (−) in Irish assets abroad	−$270,000	Increase (−) in Japanese assets abroad	$0
Increase (+) in foreign assets in U.S.	270,000	Increase (+) in foreign assets in Ireland	50,000	Increase (+) in foreign assets in Japan	1,000,000
Balance on capital account	−$780,000	Balance on capital account	−$220,000	Balance on capital account	$1,000,000
Statistical discrepancy	$0	Statistical discrepancy	$0	Statistical discrepancy	$0

shown in the lower panel of figure 1. Since goods and services exports (imports) have positive (negative) signs in the current account balance while capital exports (imports) have negative (positive) signs, the current account balance (CAB) is equal and opposite in sign to the capital account balance (KAB) for each country. This essential identity of balance of payments accounting,

(1) $CAB + KAB \equiv 0$,

must hold as long as the international transactions are properly and completely recorded, as they are in figure 1. In other words, if there is a trade surplus, $CAB > 0$, there must be a capital deficit (net capital outflow) of an equal absolute amount, $KAB = -CAB < 0$, and vice versa.

The common sense of this fundamental identity is that if a country sells more goods and services to foreigners than it buys from them, foreigners must balance this shortfall with real assets and financial claims on themselves — equities, real property, bonds and money.[3] Consequently, the balance of payments statistical discrepancy for each country in figure 1, a correction equal to the sum of CAB and KAB with the opposite sign, is zero.

In the example in figure 1, the United States has an overall current account surplus ($780,000), but it has a trade *deficit* with Ireland ($220,000) and a trade *surplus* with Japan ($1,000,000). If reporting errors or omissions are made with any country, they will show up in either the statistical discrepancy, the world current account balance or both. To see why, consider what happens when reporting errors are made.

The Effects of Errors in Reported Exports. In practice, the statistical discrepancy typically is not zero; errors or omissions in the data result in a nonzero discrepancy. For example, suppose the U.S. exporter had filed export documents listing the computer sale incorrectly as $900,000 while the earnings of the Irish firm are correctly given as $80,000. If no offsetting errors were made, the U.S. balance of payments would be as shown in figure 2, panel a. In this case, there is a statistical discrepancy equal to the export underreporting, $100,000. Such errors can be labeled relative errors: they affect the current account balance (ε) or capital account balance (κ) *relative* to each other causing a statistical discrepancy of equal magnitude and opposite sign.

Alternatively, some errors affect both current and capital accounts. For example, suppose the $1 million computer export was correctly reported, but the $80,000 earnings of the U.S. owned firm in Ireland were not reported. As a result, the rise in U.S. claims on Ireland ($50,000) also would be unreported in the United States as shown in panel b of figure 2. In this case, the U.S. statistical discrepancy would be $30,000 because of the documented (bank reports) decline in Irish-owned U.S. assets; however, the other $50,000 of the U.S. export understatement would be offset so that the levels of both current and capital balances are understated by the absolute amount of this error, $50,000. That is, the unreported $50,000 in retained earnings — unreported service income on current account — is matched by the unreported $50,000 reinvested in the firm — unreported capital outflow on capital account. These offsetting errors, denoted by α, can be called absolute errors since they change the *absolute* level of both current and capital accounts. They do not affect the relative levels of the two accounts; thus, they have no effect on the statistical discrepancy.

The general relation of the reported balance of payments data with the actual trade and financial transactions can then be summarized as follows:

(2) $\hat{CAB} \equiv CAB + \varepsilon + \alpha$

(3) $\hat{KAB} \equiv KAB + \kappa - \alpha$

where the " $\hat{}$ " indicates the reported data, ε and κ are relative errors in the reported $\hat{CAB}$ and $\hat{KAB}$, respectively, and α is an absolute error. The logic of the accounting conventions requires that

$$\hat{CAB} + \hat{KAB} + SD \equiv 0,$$

so the statistical discrepancy (SD) is defined as the negative of the sum of the reported balances,

(4) $SD \equiv -[\hat{CAB} + \hat{KAB}]$.

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[3]This is, of course, the same rule which describes any voluntary exchange between two people. Any imbalance in the value of goods and services received over time is equal and opposite in sign to the net value of financial flows between them. Each person gives to the other a collection of goods, money and assets equal in value to what he receives.

Figure 2
Source of Statistical Discrepancy

(a)
Statistical Discrepancy: Underreported Exports without Offsetting Errors (ε = −$100,000)

U.S. Balance of Payments		
Current account		
Exports	$980,000	
Imports	− 300,000	
Balance on current account		$680,000
Capital account		
Change in U.S. assets abroad	−$1,040,000	
Change in foreign assets in U.S.	260,000	
Balance on capital account		− 780,000
Statistical discrepancy		$100,000

(b)
Statistical Discrepancy: Underreported Exports with partly Offsetting Errors (α = −$50,000, ε = −$30,000)

U.S. Balance of Payments		
Current account		
Exports	$1,000,000	
Imports	− 300,000	
Balance on current account		$700,000
Capital account		
Change in U.S. assets abroad	−$1,000,000	
Change in foreign assets in U.S.	270,000	
Balance on capital account		− 730,000
Statistical discrepancy		$30,000

From (2), (3) and (4),

$$SD \equiv -[CAB + \varepsilon + \alpha + KAB + \kappa - \alpha],$$

so that, by (1), SD is simply the negative of the sum of the relative errors, ε and κ; that is,

$$(5)\quad SD \equiv -[\varepsilon + \kappa].$$

While absolute errors (α) do not affect any country's balance of payments discrepancy, such errors do show up in the world balance of payments totals. Panel a of figure 3 shows that, with no reporting errors, the current account balance of the world is zero. The common sense of this is that for the total trading system, the surpluses of the nations with more exports than imports must balance the deficits of the nations with less exports than imports.[4] Panel b of figure 3 shows that with relative current account errors (ε), the U.S. export

[4]In macroeconomic theory, this is referred to as Walras' Law of Markets — the sum of trades (planned or actual) must be zero — with excess demands (+) and supplies (−) cancelling. See Patinkin, (1965) pp. 34–36.

Figure 3

The World Current Account and the World Current Account Discrepancy

(a) No Reporting Errors		
U.S. current account		
Exports	$1,080,000	
Imports	− 300,000	
U.S. CAB		$780,000
Irish current account		
Exports	$300,000	
Imports	− 80,000	
Irish CAB		220,000
Japanese current account		
Exports	$0	
Imports	− 1,000,000	
Japanese CAB		− 1,000,000
World CAB		$0
(b) Underreported Exports With Relative Errors (ε = − $100,000)		
U.S. current account		
Exports	$980,000	
Imports	− 300,000	
U.S. CAB		$680,000
Irish current account		
Exports	$300,000	
Imports	− 80,000	
Irish CAB		220,000
Japanese current account		
Exports	$0	
Imports	− 1,000,000	
Japanese CAB		− 1,000,000
World CAB		− $100,000

Figure 3 cont'd.

(c)

Underreported Exports with Absolute Errors (α = – $50,000) and Relative Errors (ε = – $30,000)

U.S. current account		
Exports	$1,000,000	
Imports	– 300,000	
U.S. CAB		$700,000
Irish current account		
Exports	$300,000	
Imports	– 80,000	
Irish CAB		220,000
Japanese current account		
Exports	$0	
Imports	– 1,000,000	
Japanese CAB		– 1,000,000
World CAB		– $80,000

underreporting results in figure 2, panel a in an equivalent deviation from the logical world zero current account balance. Finally, panel c shows that both the absolute (α) and relative (ε) errors — the unreported U.S.-owned Irish firm's $50,000 retained earnings in figure 2, panel b *and* the $30,000 of unreported dividends — are reflected in the world CAB even though the U.S. SD shows only the relative ($30,000) error.

Some indirect evidence on the world current account discrepancy (see shaded insert) implies that the U.S. current account reflects both absolute (α) and relative (ε) errors, a mix illustrated in the distribution of the profits of the U.S.-owned Irish corporation in figures 2 and 3.[5] By its definition in identity 5, the U.S. balance of payments statistical discrepancy reflects only relative errors. Still, the indirect implication of unreported U.S. investment

[5]In testimony before the Joint Economic Committee, Heller (1984), p. 67, argued that such unreported investment earnings might be large enough to offset the reported CAB deficit:

> There is some reason to believe that the bulk of the unrecorded transactions is due to an underrecording of receipts of service items such as reinvested earnings abroad, investment income and fees. Consequently, the U.S. current account deficit, if measured properly, is likely to have been substantially smaller than indicated by the officially reported data. Thus it is entirely possible that the U.S. was in substantial current account surplus in 1983.

Stekler provides evidence that U.S. service exports are understated because of unreported interest; she uses differences between the data on U.S. claims on foreigners from three non-Treasury sources and the U.S. Treasury International Capital Reporting System (TIC) to generate estimates of unreported foreign source interest income. Her estimates suggest that unreported interest income was substantial during the early 1980s:

> In summary, in the three cases where data on U.S. claims on foreigners from the TIC reports can be compared with data from other sources it appears that the TIC data seriously understate U.S. claims. The size of the discrepancy between the data sources can only be roughly measured, but for example, a total on the order of $100 billion would not seem impossible. This would imply that U.S. interest receipts are underestimated by about $12 billion a year currently (assuming an average return of 12 percent). Stekler (1984), p. 7.

The World's Current Account Discrepancy

Any exported good from the country of origin is an imported good for the country of destination. As a consequence, if the data are complete and accurate, the world can have neither a trade deficit nor surplus; it must have a balance (see figure 3). Yet, as shown in the accompanying table, the world trade data do not yield a balance on current account.

Throughout the first half of the 1980s, world merchandise trade was in "surplus," substantially so in 1980 and 1981, and negligibly so since then. More broadly throughout the 1980s, the current account — the sum of merchandise and service trade minus transfers — has been in substantial deficit with no clear trend toward balance. The implication of these statistical discrepancies is that substantial export income is not being reported; that is, exports of services are understated.

The data in the table document a world current account deficit averaging $70.9 billion during the early 1980s. This world CAB discrepancy can be accounted for by a negative service account balance, with unreported shipping income, unreported direct investment income and unreported portfolio investment income the largest contributors. Shipping income is irrelevant for the United States; the IMF working party found it attributable to "several economies with large maritime interests (notably those of Greece, Hong Kong and Eastern Europe)."[1] The other two discrepancy items, direct

Selected Balances of World Current Account Transactions (billions of U.S. dollars)

	1980	1981	1982	1983	1984	1985
Merchandise trade balance	$31.1	$25.5	– $0.9	$3.0	$9.7	$7.8
Service balance	– 46.8	– 75.7	– 88.5	– 73.4	– 85.1	– 60.6
Shipment	– 31.9	– 35.3	– 34.5	– 33.2	– 33.3	– 27.4
Other transportation	– 2.9	– 5.3	– 3.8	– 2.8	– 2.3	0.2
Travel	– 0.5	0.8	1.6	4.1	4.7	5.3
Reinvested earnings on direct investment	13.0	11.0	2.0	8.4	10.0	21.0
Other direct investment income	– 9.9	– 13.1	– 9.0	– 11.6	– 14.9	– 12.5
Other (portfolio) investment income	– 7.9	– 18.6	– 31.1	– 28.8	– 38.9	– 46.6
Other official transactions	– 11.6	– 15.2	– 12.2	– 14.0	– 12.1	– 4.5
Other private transactions	4.9	0.1	– 1.5	4.6	1.6	4.0
Private transfers	6.5	5.2	3.6	6.3	6.6	2.7
Current account (excluding official transfers)	– 9.2	– 45.0	– 85.8	– 64.1	– 68.8	– 50.1
Official transfers	– 19.6	– 17.6	– 17.5	– 15.3	– 16.9	– 15.5
Current account (including official transfers)	– 28.8	– 62.6	– 103.4	– 79.4	– 85.7	– 65.6

SOURCE: International Monetary Fund, *Report on the World Current Account Discrepancy*, table 6.

[1]International Monetary Fund (1987), p. 3.

and portfolio investment income, were found to be attributable in large part to U.S. investors' unreported or misreported foreign income.[5]

There are several common elements in these major unreported service exports comprising the world CAB discrepancy. First, in each case, the importer has reported receiving a service and paying for it, but the creditor has not acknowledged the income receipt or financial arrangement. Second, U.S. investments are either directly implicated by the evidence (direct investment) or indirectly implicated by the size of portfolio earnings (service exports). Third, for both direct and portfolio unreported earnings, there will be both absolute (α) and relative errors (ε) in the U.S. balance of payments: an unreported credit for service export and an unreported debit for the capital outflow represented by the unrepatriated earnings (see figure 3, panel c). Thus, these unreported exports do not affect the U.S. SD, but they illustrate that the world current account statistical discrepancy is primarily the result of underreported exports and that U.S. firms and individuals are involved in underreporting exports.

[5]For a discussion of direct investment adjustments attributed to U.S. nonreported or misreported income, see pp. 35–39 of International Monetary Fund (1987). For portfolio investment adjustments, the U.S. role is more conjectural in that the working party was able only to pin down adjustments to industrial countries and others. Yet, it is plausible that the United States, as the largest holder of foreign securities in the year (1983) analyzed in detail — 27.8 percent of world cross-border bond holdings and 44 percent of cross-border equities (p. 68) — is a substantial nonreporter. See pp. 45–80, in particular tables 29 and 30 where unreported U.S. nonbank deposit interest is estimated at $7.7 billion; see also Stekler (1984).

earnings is that U.S. exports have been understated during the 1980s and that this understatement is reflected partly (ε) in the U.S. statistical discrepancy. It is especially noteworthy how large and persistent both the statistical discrepancy and the world current account balance have been since the mid-1970s.

The U.S. Balance of Payments Statistical Discrepancy: 1960–86

As chart 1 shows, the statistical discrepancy has become quite large since the mid-1970s. Two versions of the discrepancy are shown in chart 1: the reported SD (SDHAT) and the total SD (SDTOT). SDTOT includes the discrepancy due to U.S. underreporting of U.S. exports to Canada. SDHAT has been purged of this error by the annual reconciliation agreed upon between the U.S. Census Bureau of the Commerce Department and its Canadian counterpart, Statistics Canada.

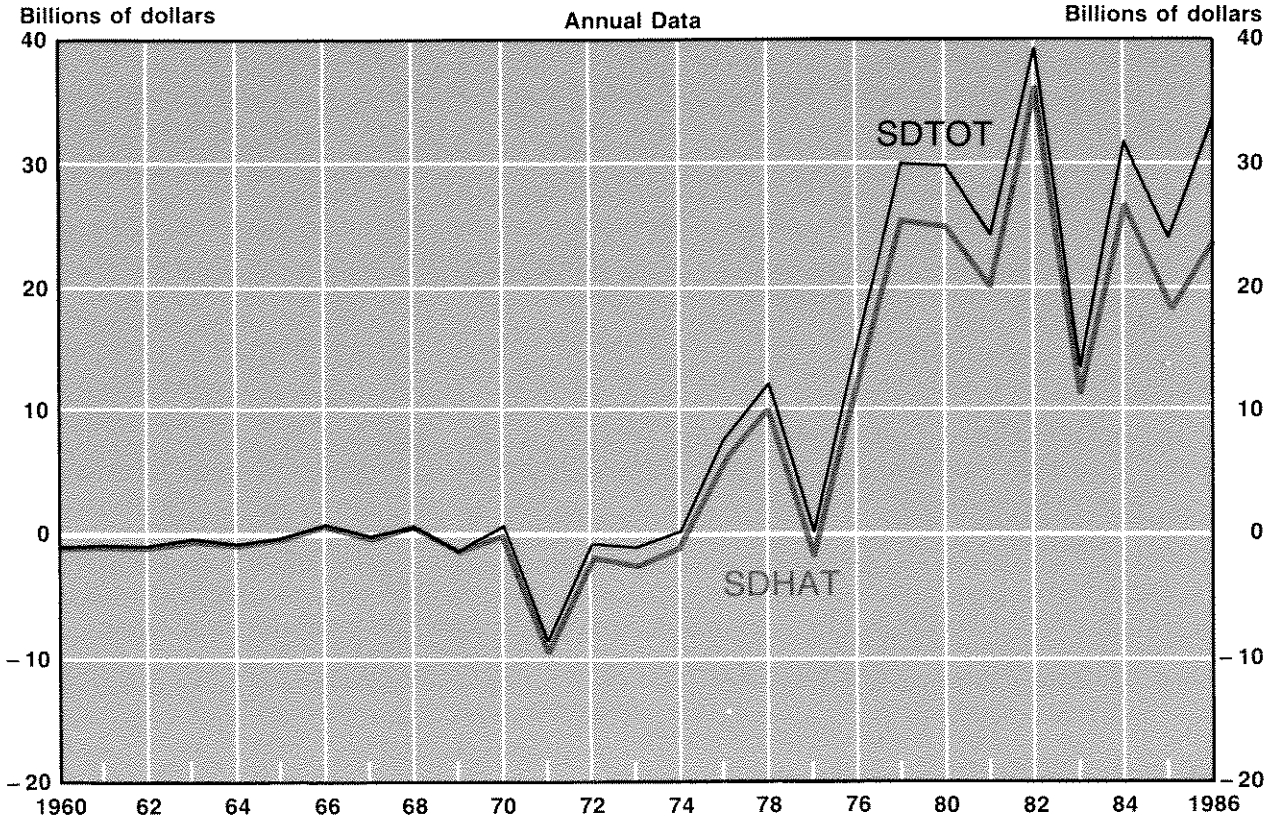
The persistence of large positive values of the statistical discrepancy from 1975 onward suggests that there are non-random errors in the U.S. balance of payments data. From the definition of the statistical discrepancy in identity 5, the expected value of this summation of errors and omissions in each year would be zero, *if such errors and omissions were not systematic*. Thus, over several years' observations, the mean of the statistical discrepancy would tend to be close to zero. Absent systematic errors, a decline in the data's reliability might cause wider fluctuations in the SD; persistent positive SDs since the mid-1970s, however, suggest systematic errors.

The Source of the Statistical Discrepancy: Capital or Current Account Errors?

By its definition in identity 5, the statistical discrepancy must be due to either relative overstatement (ε) of the current account deficit or relative understatement (κ) of the capital account surplus. If capital account errors are responsible for the SD, capital inflows must have been persistently understated: as equation 4 shows, the capital surplus would have to be increased in order to drive SD to zero.[6]

[6]From a strictly logical point of view, there is also the possibility of overstatement of U.S. gross capital outflows — that is, an exaggeration of U.S. investment abroad; however, there is neither empirical evidence nor *a priori* behavioral foundation for its occurrence.

Chart 1
U.S. Balance of Payments Statistical Discrepancies, Unreconciled and Adjusted



NOTE: The reported statistical discrepancy, SDHAT, reflects the U.S.-Canadian merchandise trade reconciliation; the unreconciled statistical discrepancy, SDTOT, is the statistical discrepancy as it would be without the U.S.-Canadian reconciliation.

Although most observers argue that capital account understatements are to blame for the SD's large deviations, this hypothesis is implausible from a behavioral standpoint.[7] Capital inflows primarily represent increases in debt for U.S. firms and individuals, and they have strong incentives to report them since the interest payments to service these debts are tax-deductible. This supposition has been supported by the IMF Working Group's study, *The World Current Account Dis-*

[7]The Department of Commerce intimates that the statistical discrepancy is likely to be relative capital account errors (κ): "If one assumes that a large part of cumulative net unrecorded inflows of about $140 billion from 1979 through 1984 was accounted for by capital inflows, foreign assets would have been understated by that amount . . ." Jack Bame, quoted in Scholl (1984), p. 26. Stekler (1983), p. 3, observes that "When the Interagency Work Group on the Statistical Discrepancy was set up in mid-1980, it was assumed that the bulk of the huge positive statistical discrepancy in 1979 and 1980 was accounted for by unrecorded capital inflows." Amuzegar (1988), p. 18, a former IMF Executive Director, reinforces this: ". . . capital inflows into the United States are probably underrecorded." Pluckhahn (1988) reports that Commerce officials still downplay the notion of current account errors explaining the discrepancy: "More likely, they say, capital flow statistics — measuring international financial transactions — have not kept up with the ongoing deregulation of financial markets." That SD has been KAB error is also assumed in textbook discussions, such as Krugman and Obstfeld (1988), p. 299, and empirical applications of the balance of payments data; for example, see Hooper and Morton (1982), p. 45: "The sum of the current account plus official intervention purchases of domestic currency (I) *define net private capital flows . . .*" *[italics added]*

crepancy, and by the Internal Revenue Service (1979) study of U.S. domestic unreported income. The Working Group found that borrowers worldwide do consistently report international capital inflows, while lenders have been found consistently to underreport their capital exports:

> The main result of analyzing the gaps in portfolio investment income reporting is that the discrepancy results mainly from the understatement of receipts by the private nonbank sector and that this deficiency is widespread across countries.[8]

Unreported capital inflows are the requisite explanation if the U.S. SD is due to capital account relative errors (κ); yet, debt increments have been found to be dependably reported. Unreported capital inflows would be inconsistent with both worldwide findings and the debtors' tax-minimizing incentives to report such debt increments. If anything, the IMF finding suggests that the capital account may be *overstated* because some capital outflows associated with reinvested earnings may be unreported.[9]

Conversely, if U.S. merchandise exports can be shown to be understated generally — as they have been in the specific case of Canada — then understatement of the CAB is a plausible culprit. There are three behavioral foundations for U.S. export understatement. First, is simple negligence or the costs of reporting, especially if the penalties for nonreporting are small. Second, sellers have an incentive to underreport sales because, if undetected, it reduces their taxable income. Third, the United States imposes restrictions on about 40 percent of U.S.-manufactured merchandise exports; to avoid outright export prohibitions or reduce the higher costs imposed on foreign buyers of U.S. machinery by such restrictions, some unreported sales are likely.[10]

U.S. MERCHANDISE EXPORTS: THE COMPARATIVE RELIABILITY OF U.S. EXPORT DATA VS. COUNTRY-OF-DESTINATION IMPORT DATA

In principle, as illustrated in the balance of payments figures 1–3, U.S. exports could be measured by U.S. data or country-of-destination import data. Yet, beginning in 1970, the U.S. Commerce Department has documented a persistent understatement of U.S. exports to Canada. Referred to as "undocumented exports," the extent of this problem is revealed in the annual reconciliation of U.S. and Canadian trade data through comparisons of U.S. export and Canadian import data.[11]

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[8]International Monetary Fund (1987), p. 78. Consistent with these IMF findings indirectly implicating U.S. investors, Stekler (1984), p. 3, observes that:

> Some have argued that since the United States accounts for about 20 percent of world services exports, that the United States probably accounts for the same share of the global services discrepancy ($15 billion in 1982).

[9]Note that in the 1980s, while the world current account discrepancy has been a substantial deficit, the world merchandise discrepancy has been slightly in surplus; see table a in the shaded insert. The world current account discrepancy and the large U.S. holding of foreign assets creates a presumption that U.S. service exports are understated. By itself, this provides a counter argument to the claim that unreported capital inflows are the explanation for the statistical discrepancy. In contrast, the absence of a worldwide merchandise export understatement does not in and of itself imply anything about errors in U.S. merchandise exports data.

[10]The first explanation is documented by the Commerce Department and is one of the reasons implied for the late 1960s episode of export underreporting in the United Kingdom. See "Under-recording of exports" (1969). The second has been substantiated by the IMF Working Party *Report on the World Current Account Discrepancy*, by the IRS (1979) study of unreported U.S. income, in the OECD study by Veil (1982) and in Stekler (1983). The third conjecture receives a variety of supporting argument in terms of costs and competitive disadvantage imposed on U.S. producers in the National Academy of Sciences (1987) study of U.S. export controls.

[11]For example, the cover page of the U.S. Department of Commerce release, "Summary of U.S. Export and Import Merchandise Trade" for March 1987 described the discrepancy in export reporting as follows:

> The annual trade data reconciliation study with Canada (scheduled for release in June) indicates a substantial and growing undercount of exports from the United States to Canada in 1986, amounting to approximately 20 percent. This is due primarily to the non-filing of export documents with the U.S. Customs Service. A number of joint U.S./Canadian efforts are underway to address this issue (informational mailings, bilateral collection of export documents, data exchange, etc.). The annual reconciliation studies also confirm that import data are more accurate than export data.

See also *Daily Report for Executives* for August 5, 1987. Such discrepancies are not unprecedented — see below, table 2 and footnotes 21, 22, 24 and 25. More generally, smuggling is a topic of longstanding interest to economists, both theoretically and empirically — see Bhagwati (1974). In industrial countries, the United Kingdom documented a pervasive period of export understatement in the late 1960s, amounting to about 3 percent of exports and, more significantly, as high as 58.2 percent of the reported trade balance in 1966. See "Underrecording of Exports" (1969), p. 667. While greatly reduced from the troublesome levels of the late 1960s, export underreporting in the United Kingdom continues and is accommodated in the national income accounts by a 1 percent allowance in exports in the CIF/FAS conversion procedure (private correspondence, Stephen Wright, Bank of England). There is also evidence that the Canadian export data are subject to similar lapses: During 1978–79, a refinery in New Brunswick did not file customs reports on exports to the United States; this resulted in a $700 million understatement in petroleum products exported by ship to the United States. See Rose (1979).

Table 1

U.S.-Canadian Merchandise Trade, 1980-86 (billions of dollars)

	Northbound Trade[1]			Southbound Trade[1]		U.S.-Canadian Trade Balances[2]		
	U.S. exports	Undocumented[3]	Canadian imports (FAS)	U.S. imports[4] (FAS)	Canadian exports	U.S. compiled	Canadian compiled	Reconciled
1980	$35.4	$4.9	$41.2	$41.2	$41.1	−$6.1	$0.2	−$1.4
1981	39.6	5.0	45.2	45.9	46.5	−6.9	−1.2	−2.8
1982	33.7	4.2	38.5	45.9	46.5	−12.8	−7.9	−9.7
1983	38.2	5.1	44.2	51.5	53.8	−13.9	−9.9	−11.7
1984	46.5	5.3	53.0	65.6	66.3	−20.0	−12.4	−15.4
1985	47.3	6.0	54.6	68.1	68.3	−21.7	−13.6	−15.7
1986	45.3	10.2	56.1	67.3	67.2	−22.9	−11.4	−13.3

[1]Reported exports and imports from IMF *Directions of Trade Statistics Yearbook, 1987.*
[2]U.S.-Canadian trade balances from U.S. Bureau of Census, Department of Commerce, "Reconciliation of Canada-United States Merchandise Trade, 1986."
[3]Undocumented exports from U.S. Department of Commerce (1987b), table 14.
[4]U.S. FAS imports estimated from CIF data, adjusted using 2.0 percent CIF/FAS margin; this choice is based on a comparison of FAS and CIF Canadian import data in the 1980s; see footnote 14.

The persistent understatement of U.S. exports to Canada and the resulting overstatement of the U.S. bilateral trade deficit with Canada in the 1980s is shown in table 1. The first five columns in the body of the table show the northbound trade (U.S. exports/Canadian imports) and southbound trade (U.S. imports/Canadian exports) as recorded by each of the countries' customs authorities, and their reconciled estimate of undocumented U.S. exports. While the southbound trade evinces no substantive disparities between the U.S. and Canadian data, the northbound trade data exhibit differences ranging from 14 percent to 24 percent of the U.S. export figures. As the undocumented exports column shows, most of this discrepancy has been acknowledged by the U.S. authorities as an understatement of exports. The sum of the compiled and undocumented U.S. exports approximate the Canadian import data, indicating that the Canadian import data are a far superior gauge of U.S. exports.

The last three columns of the table show the bilateral trade balances during the 1980s as compiled by each country and as reconciled during conferences between their respective customs authorities. Of course, the understatement of exports results in an underestimate of the U.S. trade balance — that is, an overstatement of the trade deficit. The acknowledged U.S. errors — U.S. exports — ranged from 27 percent to 80 percent of the U.S.-compiled bilateral deficit with Canada and from 4 percent to 19 percent of the U.S.-compiled total trade deficit with the world in the 1980s.[12]

In summary, the Canadian data are substantially more accurate than the U.S. data as the reconciled bilateral balance is far closer to the initial Canadian balance. More generally, these documented errors suggest that other country-of-destination import data may also offer a superior alternative to U.S. export data.

Two Problems with Using Country-of-Destination Import Data to Estimate U.S. Exports

There are two basic problems with using country-of-destination import data. First, most import data are reported CIF (Cost + Insurance + Freight), while export data are reported FAS (Free Alongside Ship) — that is, not including in-

[12]Computed from data in U.S. Department of Commerce (1987b), Table 14.

surance and freight charges.[13] These CIF import data must be adjusted to approximate the FAS export data.[14] This adjustment has been the subject of some research with inconclusive results.[15] Second, there is the issue of smuggling, especially in less-developed or nonindustrial countries, in which the omitted imports in the country-of-destination data could well exceed the omitted exports in the export data.[16]

Choosing the CIF/FAS Margin. One solution to the first problem is simply to choose a reasonable CIF/FAS margin to convert CIF data to FAS data. That is, the adjustment should make sense in light of what is known, at least anecdotally, about freight and insurance charges, but should not bias statistical tests of the export understatement hypothesis.

The evidence suggests a true margin for the industrial countries well below the 10 percent traditionally used by the IMF in its *Directions of Trade Statistics (DOTS)* data on bilateral merchandise trade. For example, the U.S. Commerce Department reports that, for U.S. imports, the average CIF-FAS margin is 5.2 percent; the Bank of England estimates 5.0 percent for U.K. imports; the Bank of Netherlands estimates a 5.6 percent CIF/FAS margin for Dutch imports during 1980–87; and Geraci and Prewo (1977) found a 5.2 percent transport margin for intra-European trade in 1970.[17] For the 15 countries in DOTS (see footnote 14) which report both FAS and CIF import data, the computed margins for the 1980s range from 2.4 percent for Canada to 20 percent for Peru, Solomon Islands and Zambia.

In general, these computed CIF/FAS margins were lower for industrial than for nonindustrial countries and for countries whose trade is predominantly with nearby trading partners.[18] For example, Mexico, a nonindustrial country, has a relatively low 4.6 percent margin, while Australia, an industrial country, has a moderate, but higher 10.0 percent margin. Mexico's margin is kept low by short transport lines with the United States from which it obtains nearly two-thirds of its reported imports; Australia's margin is raised by its relatively long transport lines with North America and Europe from which it obtains more than half its imports.

In light of the reported estimates and the computed CIF-FAS ratios, the empirical tests in this article assume that the CIF/FAS margin for industrial countries is 5.2 percent, the same as the average computed by the Commerce Department for all U.S. imports.[19]

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[13]Another reporting valuation, FOB (Free On Board) is frequently used as a synonym for FAS as it will be here. Strictly, FAS and FOB differ by the amount of loading and cargo handling charges included in the latter.

[14]Of the 151 IMF member countries whose bilateral trading volumes are covered in the *Directions of Trade Statistics*, 15 countries report imports FAS: Australia, Bermuda, Canada, Dominican Republic, Mexico, Papua New Guinea, Paraguay, Peru, Poland, Romania, Solomon Islands, South Africa, Venezuela, Zambia, Zimbabwe. Moreover, the IMF's annual IFS Yearbook reports CIF/FAS margins for each of the member countries; however, these margins are multilateral and cannot be used to isolate the appropriate margin on imports from the United States.

[15]Since insurance and freight are services, they should not appear in the merchandise trade account; moreover, these services may be rendered by a domestic or a foreign seller. Thus, they must be removed from the import data in order to make valid comparisons. See Geraci and Prewo (1977) and Yeats (1978).

[16]For an important collection of theoretical and empirical papers on this issue, see Bhagwati (1974).

[17]The U.S. CIF/FAS margin was published in *Daily Report for Executives*, No. 159, August 19, 1987, p.2. The U.K. margin was obtained by telephone from Gordon Midgely of the Bank of England and the Dutch estimate was supplied by M. van Nieuwkerk and A.C.J. Stokman of De Nederlandsche Bank in private correspondence.

[18]Both of these tendencies concur with the findings of Geraci and Prewo (1977); however, their point estimates (based on 1970 OECD data) are much higher: for example, 13.8 percent for UK imports, 22.9 percent for Canadian imports and 18.3 percent for U.S. imports; however, their estimates were obtained from the ratio of CIF imports in country of destination to FAS exports in country of origin. If, as we argue here, exports are understated, their approximation to the CIF/FAS margin will be biased upward. See Yeats (1978).

[19]This margin also conforms with anecdotal evidence on current U.S. shipping charges and insurance rates for both trans-Atlantic and trans-Pacific routes. In fact, it is actually somewhat high relative to examples of transport and insurance rates for ocean-shipped containers quoted in the St. Louis area in April 1988: $1400–$1600 pier-to-pier, for a 40-foot container (2680 cubic feet) Los Angeles to Yokohama, Japan. Examples of products a 40-foot container could transport include $1 million worth of small sporting firearms or $80,000 worth of liqueurs. With insurance at $4 per $1000 of declared value, these examples would have CIF/FAS margins of 0.6 percent and 2.4 percent, respectively. (I am indebted to Jerry Kausch, International Import-Export Services, St. Louis, for these examples). Bulk grain shipping rates, conversely, bracket the traditional 10 percent margin. From U.S. Gulf of Mexico ports to Rotterdam, the Netherlands, large deep draft bulk carriers of up to 110,000 tons displacement charge $15/metric ton (April 1988) and insurance of 0.15 percent of value. This implies a 4.95 percent CIF/FAS margin for soybeans, 16.3 percent for corn and 12.2 percent for hard red winter wheat given their April 1988 prices per metric ton, $248, $92 and $123, respectively. (I am indebted to John Muller of Bunge Grain Co., St. Louis, for these examples).

Table 2

Trade Discrepancies — Selected Areas and Country Imports from the World Compared with World Exports to Those Areas and Countries, 1980–86 (annual averages, billions of dollars)

	World exports to	Imports from the world by[1]	Discrepancy	Discrepancy as percentage of world exports to
Nonindustrial-131	$522.4	$492.1	$30.3	5.8%
Western Hemisphere	95.5	80.9	14.6	15.3
Egypt	11.8	8.6	3.2	27.1
Greece	12.0	9.1	2.9	24.2
Israel	7.4	9.1	−1.7	−23.0
Mexico	18.6	13.3	5.3	28.5
Panama	6.4	1.7	4.7	73.4
Phillipines	7.4	6.5	0.9	12.2
Singapore	27.0	24.5	2.5	9.3
South Africa	11.5	16.7	−5.2	−45.2
Industrial – 20[2]	1,240.9	1,260.6	−20.7	−1.7
Netherlands	80.1	64.1	16.0	20.0
Switzerland	36.0	31.8	4.2	11.7
Industrial-18[3]	1,124.8	1,166.6	−41.8	−3.7
Industrial-17[4]	843.1	873.8	−30.7	−3.6
United States	281.7	292.8	−11.1	−3.9

SOURCE: Data from *Directions of Trade Statistics, Yearbook 1987*, World exports and imports table.

[1]FAS imports estimated from CIF data using 10 percent CIF/FAS margin for nonindustrial countries and the *IFS Yearbook* CIF/FAS margin for industrial countries (see footnote 14).

[2]The 20 countries classified as industrial are Australia, Austria, Belgium-Luxembourg, Canada, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States. (Note that Belgium and Luxembourg are counted as one country.)

[3]Industrial countries less the Netherlands and Switzerland.

[4]Industrial-18 less United States.

Screening for Valid Import Data. The other empirical problem with using country-of-destination import data to estimate U.S. exports is that the import data may not be valid. If all countries' import data were equally valid, then an estimate of the worldwide U.S. export understatement could be obtained easily from data on imports from the United States for all 151 countries in *DOTS*. The IMF classifies 20 of these countries as "industrial" and the others as "nonindustrial."[20] Table 2 provides a comparative assessment of the validity or completeness of the import data of the nonindustrial and industrial countries.

An impartial basis for evaluating the validity of a country's import data is to compare its own data compiling total imports from all of the countries in the world with the sum of the data compiled by the IMF of all the individual countries' exports to that country. Since countries obtain revenues from

[20]The 20 countries classified as industrial by the IMF in its *DOTS* are Australia, Austria, Belgium-Luxembourg, Canada, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States. (Note that Belgium and Luxembourg are counted as one country.)

tariffs and police quotas on politically sensitive imports, a strong presumption exists that import data should be more complete — as in the U.S.-Canadian case — than export data. By this postulate, a country's trade data can be judged invalid if its reported FAS imports are less than the sum of world exports to it. For example, during the 1980s, as shown in table 2, the reported level of world exports to Mexico exceeded by 28.5 percent the level of FAS imports from the world reported by Mexico.[21] For Greece and the Phillipines, the corresponding shortfalls were 24.2 percent and 12.2 percent, respectively, while for Panama it was a whopping 73.4 percent. For nonindustrial countries in the Western Hemisphere, the understatement was 15.3 percent, while for all 131 nonindustrial countries, it averaged 5.8 percent. Such underreporting of imports in developing nations has been widely documented in the trade literature and often used as a measure of smuggling induced by tariff avoidance.[22]

These illustrations are not isolated; they reflect generally the characteristics of the nonindustrial countries' data. A more systematic analysis rejected all but 6 of the 131 nonindustrial countries' import data.[23] Given these problems, such data are not useful in testing the relationship between U.S. export understatement and the U.S. SD.

Applying the same criterion to the industrial country data results in a general acceptance of the validity of the import data for 18 of the 20 countries. Only the data of the Netherlands and Switzerland are rejected (discrepancies statistically significant at 1 percent level). Excluding these two countries more than doubles the average percentage discrepancy between imports from the world and world exports to the industrial countries from −1.7 percent to −3.7 percent. These two countries have a long tradition of re-exporting imported goods, referred to as "merchanting" in the Dutch data; re-exported goods are omitted from their import data. Consequently, world exports to them exceed their recorded net imports by substantial amounts, as the table shows.[24]

The exclusion of re-exported goods suggests that some U.S. exports may simply be unrecorded anywhere. That is, if a U.S. shipment to the Netherlands that is re-exported by a Dutch merchant to France is not reported as a Netherlands' import from the United States, but is measured solely as a Dutch export to France, foreign import data understate U.S. exports. The omission of the re-exported goods would cause the import-based estimate of U.S. exports to be understated; however, it would not cause errors in the two countries' own international data.[25]

Given the evidence of inaccurate import data illustrated in table 2, the estimates of the U.S. export understatement and tests of its hypothesized relationship to the U.S. balance of payments discrepancy employ a data set that includes 17 of the industrial countries: only the Netherlands, Switz-

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[21]The full discrepancy between the U.S. and Mexican data is further complicated by the U.S. Commerce Department's rough estimate that exports to Mexico are underreported by about 10 percent. (I am indebted to Gerald Kotwas, Assistant Chief Foreign Trade Division of Census Bureau, U.S. Department of Commerce, for this estimate.)

[22]See Bhagwati (1974), especially Part III — "Partner-Country Data Comparisons and Faked Invoicing." Sometimes, the errors are positive: Probably resulting from ineffective embargoes, the level of imports from the world by South Africa has exceeded acknowledged world exports by an average of 33.7 percent during the 1980s. Similarly, the level of Israeli imports has exceeded acknowledged world exports to Israel by 22.6 percent during the 1980s.

[23]The general testing of the nonindustrial countries was accomplished using a three-part screen:

(1) Availability of data on imports from the United States in each year, 1960–86; (2) Substantial trade volume with the United States (annual imports from the U.S. of at least $400 million 1980–86); and (3) Imports (FAS) reported from the world at least as large as reported world exports to the country.

Only 6 of the IMF 131 nonindustrial countries passed this screen: Indonesia, Israel, Korea, South Africa, Trinidad-Tobago and Venezuela. These countries accounted for only about 20 percent of U.S. exports to nonindustrial countries and about 7 percent of total U.S. exports in 1986.

[24]Net imports are imports less re-exported goods. The Netherlands, for example, does not count a landed shipment of merchandise as a Dutch import if it neither a) changes title to a Dutch resident, nor b) crosses the border (i.e. — passes through customs). Hence, goods landed in the Netherlands and reexported apparently have been counted by exporting countries as an export to the Netherlands; however, according to the Bank of the Netherlands, which compiles the Dutch trade data, the Netherlands has not counted them as an import.

[25]In principle, since the Netherlands and Switzerland report net exports as well as net imports, the omission of U.S. exports to any of them should be captured in their exports to other countries being similarly understated relative to the importing country's data; that is, the sum of the two discrepancies should be approximately zero. This offsetting does occur in the data for Switzerland but not for the Netherlands trade data (billions of dollars) 1980–86 averages:

	Discrepancy between world exports and country imports	Discrepancy between world imports and country exports	Sum
Netherlands	16.00	1.55	17.55
Switzerland	4.20	−5.05	−0.85

Table 3

U.S. Balance of Payments Statistical Discrepancies, Observed and Adjusted, 1960–86 (billions of dollars)

	1960–86			1960–74			1975–86		
Data	Mean	Standard error	t-test[1]	Mean	Standard error	t-test[1]	Mean	Standard error	t-test[1]
SDHAT	$7.11	$2.32	3.07**	−$1.43	$0.64	2.25*	$17.78	$3.05	5.82**
SDTOT	9.03	2.69	3.36**	−1.07	0.58	1.83	21.64	3.44	6.28**
SDAI[2]	3.24	1.80	1.80	−2.84	0.75	3.76**	10.85	2.63	4.12**
SDAINC[3]	5.67	2.28	2.28*	−2.50	0.69	3.64**	15.88	3.13	5.08**

[1]Test of statistical significance of mean SD; ** indicates significance at 1 percent level and * indicates significance at 5 percent level.
[2]SDTOT adjusted by U.S. export discrepancy with industrial countries other than the Netherlands and Switzerland.
[3]SDTOT adjusted by U.S. export discrepancy with industrial countries other than Canada, the Netherlands, and Switzerland.

erland and, of course, the United States are omitted. A detailed description and listing of the data are contained in the appendix.

TESTS OF THE UNDERSTATED U.S. EXPORT HYPOTHESIS

Testing the proposition that U.S. merchandise exports have been understated employs the discrepancy between country-of-destination import data and U.S. export data to determine how much, if any, of SDTOT can be accounted for by underreporting of U.S. merchandise exports.[26] First, the country-of-destination import data are used (analogously to the Commerce Department's use of Canadian import data) to revise the U.S. balance of payments statistical discrepancy data; the mean of the revised SD series is then tested for statistical significance. Second, regression analysis is used to test whether the export adjustment variable significantly explains the U.S. statistical discrepancy.

The Adjusted U.S. Balance of Payments Statistical Discrepancy

The U.S. balance of payments statistical discrepancy, as reported in the U.S. balance of payments data, SD, is net of the U.S.-Canadian trade discrepancy. The inclusive measure of the discrepancy is the appropriate form to test its relationship to export underreporting, since neither U.S. data are adjusted nor is any country excluded *a priori* on the basis of an assumed relationship. Therefore, we use SDTOT, the inclusive measure as in chart 1,

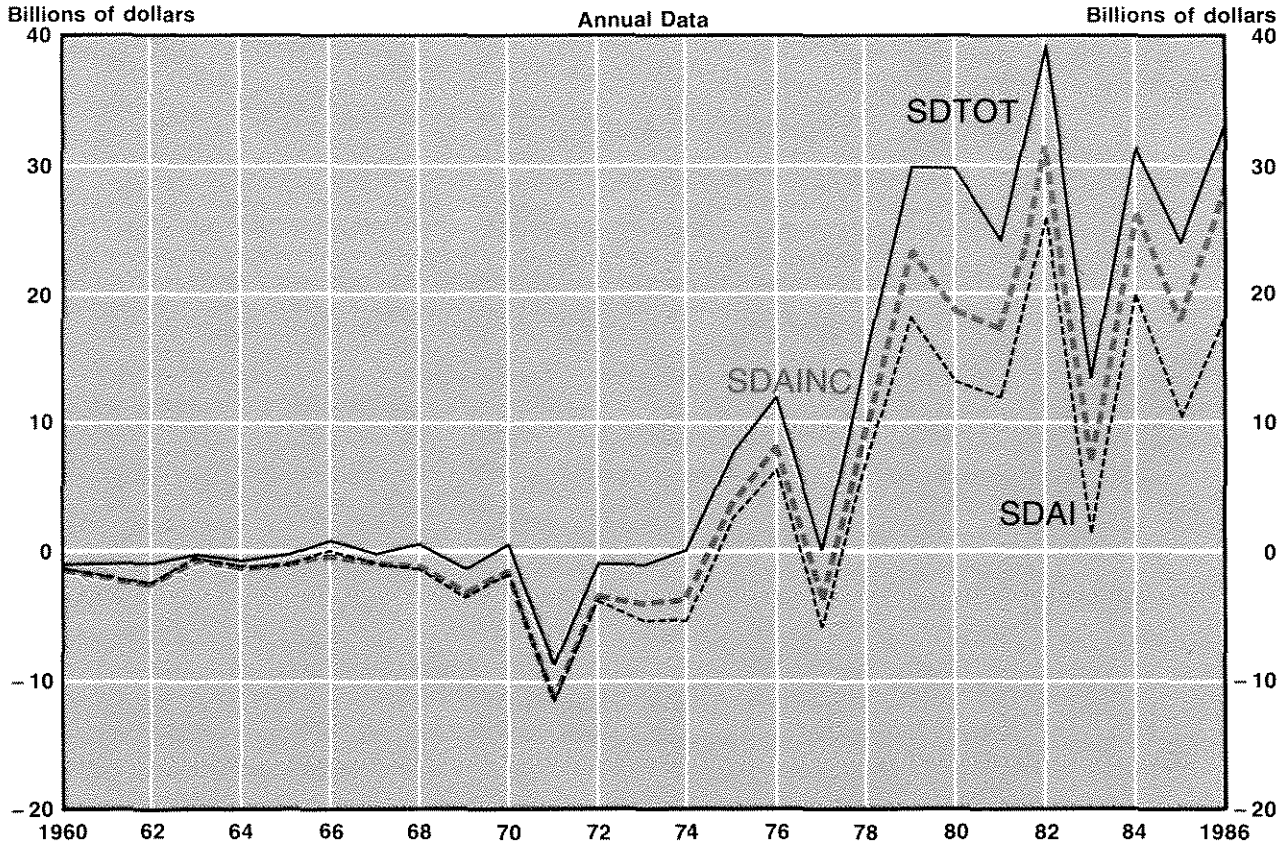
$$(6)\quad SDTOT_t \equiv SDHAT_t - RAUSCA_t,$$

where $RAUSCA_t$ is the reconciled adjustment to the U.S.-Canadian merchandise trade balance.[27] In other words, $SDTOT_t$ is the statistical discrepancy that would exist if U.S. merchandise trade with Canada had been compiled, unadjusted, in the

[26]Since underreported service exports, conjectured in Heller (1984) and documented in Stekler (1984), also form part of ε in identity 5, a portion of SDs should depend on non-merchandise export errors.

[27]See the data appendix for a more detailed explanation of SDTOT. It may appear to be possible to test the relationship between the data on the U.S. statistical discrepancy either with or without the Canadian errors — SDTOT and SDHAT, respectively — against corresponding data on the U.S. export underreporting (compiled from the IMF *DOTS*) with or without the Canadian component — XDI17 and XDINC, respectively. Yet, this cannot be accomplished consistently because the corresponding data are not available. SDTOT contains the U.S. errors as compiled and, likewise, XDI17 contains the U.S.-country-of-destination discrepancies as compiled; however, the adjustment RAUSCA to obtain SDHAT from SDTOT in identity 6 removes less than the total U.S.-Canadian export discrepancy but also deletes some import discrepancies. This distinction can be seen in table 1 by comparing the column of undocumented U.S. exports against the difference between the U.S. and the reconciled bilateral trade balance. In each year, RAUSCA, the difference between the U.S. compiled and the reconciled trade balance, is a smaller adjustment than the undocumented exports. Moreover, as can also be seen in the table, the undocumented exports agreed upon between the two countries' customs authorities do not incorporate the year's full difference between the U.S. and the Canadian measures of northbound trade as obtained from the IMF *DOTS*. Consequently, RAUSCA adjusts the statistical discrepancy in a fashion that does not correspond with deleting the *DOTS* Canadian export discrepancy from the total 17-country *DOTS* U.S. export discrepancy. While the agreed-upon changes predominantly reflect northbound trade statistics, southbound trade (U.S. imports) data are also affected. Data separating RAUSCA into northbound and southbound changes are not available. Nonetheless, there is a high correlation between RAUSCA and the bilateral U.S.-Canadian export discrepancy from *DOTS* during 1970–86: .943; moreover, a regression of SDTOT on XDINC, reported in table 4, has results similar to the regressions based on equation 7.

Chart 2
U.S. Balance of Payments Statistical Discrepancies, Total and Adjusted



NOTE: The adjusted statistical descrepancies are SDTOT less the estimated U.S. export discrepancy: SDAI is adjusted by the 17-country discrepancy; SDAINC is equal to SDAI with Canada omitted.

same fashion as merchandise trade with other countries.

Using the discrepancy in the U.S. exports to the industrial countries' (less the Netherlands and Switzerland) $XDI17_t$, an adjusted statistical discrepancy, $SDAI_t$, was computed:

$$SDAI_t \equiv SDTOT_t - XDI17_t.$$

See the appendix for details. To assess the possibility that only the U.S.-Canadian export discrepancy is meaningful in the analysis of SDTOT, adjusted SDs both with and without the Canadian discrepancy — SDAI and SDAINC, respectively, — are computed and reported in table 3. The mean and standard errors of means for SDHAT, SDTOT, SDAI and SDAINC are displayed in table 3 for the full period 1960–86 and for the two subperiods, before and after 1975.

The reported discrepancy in the balance of payments, SDHAT, averaged about $7 billion while SDTOT averaged about $9 billion during the 1960–86 period, both statistically significant; however, each was comparatively small and negative during 1960–74 and large and positive during 1975–86. The industrial country adjusted SDs, SDAI and SDAINC, are smaller but still substantial and statistically significant in both subperiods. As chart 2 shows, the industrial country discrepancy (XDI17) accounts for about half of the total discrepancy since 1975. Chart 2 also shows that the non-Canadian component of the export discrepancy is large and persistent.

Table 4

Regression Analyses of Total Statistical Discrepancy's Relation to Industrial Countries Export Discrepancy

	Estimated Coefficients[1]				Summary Statistics			Hypotheses Tests[2]	
Specification	Intercept (a)	Dummy (b)	Export discrepancy slope (c)	Export discrepancy dummy (d)	$\bar{R}^2$	DW	$\hat{\rho}$	Specification F-test	Slope coefficients ≤ 1.0[4] t-test
i	−4.78		2.39		.82	2.42	−.22	N/A	6.46**
	(2.85)**		(11.10)**						
ii	−4.68	4.32	2.04		.82	2.41	−.22	ii vs. i: 0.96	2.48*
	(2.78)**	(0.98)	(4.88)**						
iii	−1.41		0.01	2.16	.86	3.05	−.53	iii vs. i: 7.99**	5.72**
	(0.74)		(0.02)	(2.83)**					
iv	−0.62	−4.61	−0.25	2.74	.86	3.18	−.59	iv vs. i: 4.38*	3.67**
	(0.30)	(0.91)	(0.27)	(2.74)*				iv vs. ii: 7.52*	
								iv vs. iii: 0.82	
v[5]	−1.32		−0.07	2.24	.91	—	—	N/A	9.36**
	(1.13)		(0.13)	(4.62)**					
vi[6]	0.20		−0.77	4.45	.77	2.13	−.19	N/A	5.01**
	(0.07)		(0.46)	(3.18)**					

[1]The letters under the coefficient-column headings refer to the coefficients in equation 6; absolute value of t-statistics appear in parentheses beneath estimated coefficients; * indicates significance at 5 percent level and ** indicates significance at 1 percent level.

[2]*Indicates rejection at 5 percent level; ** indicates rejection at 1 percent level.

[3]Test of null hypothesis that added variables in unrestricted specification are zero.

[4]One-tail test of null hypothesis that slope coefficient is less than or equal to 1.0. In i and ii, the test reported is for full period; in iii-vi, the test reported is for slope coefficient (c + d) for period 1975–86.

[5]Specification v is specification iii with corrected for serial correlated residuals. AUTOREG procedure in SAS.

[6]Specification vi is specification iii with the U.S.-Canadian export discrepancy removed from the independent variable; see footnote 25.

Regression Analysis of the Relation Between SD and XD

The mean SDs reported in table 3 for each subperiod are each statistically significant, and the industrial country-based adjustment fails to reduce SDTOT to a level insignificantly different from zero. Consequently, the non-zero means of the adjusted SDs imply that other errors remain, including underreported service exports not included in the *DOTS* merchandise trade data as well as unreported merchandise exports to countries not included in XDI17. Thus, it is still unclear that the U.S. merchandise export discrepancy is substantively related to the SDTOT. A direct way to test this hypothesis can be inferred from identity 5.

Identity 5 implies that a regression of SDTOT on XDI17 should have an intercept not significantly different from zero and a positive, unitary slope coefficient if each of three conditions are met:

1. the discrepancy is due entirely to CAB errors, ε;
2. these errors arise totally from merchandise trade export omissions; and
3. U.S. errors in reported exports to nonindustrial and the three omitted industrial countries are negligible.

Allowing for shifts in this relationship between the two subperiods, 1960–74 and 1975–86, we have

$$(7)\quad SDTOT_t = a + b\lambda_t + c\,XDI17_t + d\lambda_t XDI17_t + \eta_t,$$

$$\lambda_t = \begin{cases} 0, & t < 1975 \\ 1, & t \geq 1975. \end{cases}$$

Equation 7 provides three tests of the relation of SDTOT to XD. First, it permits tests of the relevance of the U.S.-industrial country export discrepancy in the significance of the coefficients c

and d on XDI17: If unreported U.S. exports of merchandise to industrial countries have been the sole source of SDTOT, c should be statistically significant and not significantly different from unity. On the other hand, if either unreported U.S. service exports or merchandise exports to countries not included in XDI17 also matter, then c (or c + d) should be significantly larger than unity. If XDI17 is irrelevant to SDTOT, neither c nor d will be significantly different from zero. Second, equation 7 permits testing for the differences in the two subperiods by means of the dummy variable λ. Third, it permits a test of omitted variables' relevance in the significance test of the intercept: If the intercept is not significantly different from zero, then either omitted variables are highly correlated with XDI17 or they have zero means. The results of the regression estimates and these specification tests are reported in table 4.

The estimates of specifications (i) – (iv) test the relevance of the subperiod dummy λ. The F-tests for the three specifications with intercept or slope dummies (ii, iii, iv) against the null hypothesis of no dummies (i) indicate that (iii), the specification with the slope dummy, rejects the null hypothesis and is not rejected by the specification with both slope and intercept dummies (iv). Uniformly, however, the strong form of the hypothesis — that is, only the 17 industrial country merchandise exports are relevant and, consequently, that the coefficient on XDI17 is 1.0 — is rejected by the t-test in the last column of the table.

Two additional specifications, v and vi, are also reported in table 4. The specification tests require the use of the same data in the alternative specifications i, ii, iii, iv. Yet, their Durbin-Watson statistics indicate that specifications iii and iv have negatively serially correlated residuals. Since this biases the estimated standard errors of their coefficients, a corrected estimate of the preferred specification iii, designated as specification v, is also reported in table 4. A comparison of v with iii shows only negligible differences. Finally, specification vi is a regression of SDTOT on the non-Canadian export discrepancy, XDI17NC. The significance of the estimated coefficient d refutes the contention that only the Canadian export discrepancy is related to SDTOT.

These test results demonstrate that the U.S. export discrepancy with the industrial countries has a statistically significant relation with the balance of payments discrepancy; that is, the claim that U.S. merchandise export underreporting is a cause of the statistical discrepancy is not rejected. The industrial country merchandise export discrepancy is not the whole story since the coefficient is greater than unity; however, the *DOTS* nonindustrial data are of no avail in explaining it.[28] Consistent with the IMF study findings (see pp. 10–11), the leading candidate for addition to the model seems to be U.S. service exports.[29]

Finally, the coefficients on neither the intercept nor its dummy variable are significantly different from zero in the preferred specifications (iii, v, vi). This suggests that if any variables have been omitted — for example, service exports — they are either highly correlated with the U.S.-industrial countries' merchandise export discrepancy or have a mean of zero.

CONCLUSION

U.S. merchandise exports have been underreported during 1960–86, primarily during 1975–86. This underreporting, measured by country-of-destination merchandise imports from the United States, parallels the export discrepancy documented by the U.S. Commerce Department for U.S. exports to Canada since 1970. An estimated export correction based on industrial countries' imports from the United States reduced the statistically significant U.S. balance of payments discrepancy from $9 billion to $3.2 billion for 1960–86 and from $21.6 billion to $10.9 billion for the 1975–86 subperiod. Moreover, regression tests of the industrial-country import-based adjustment explain most of the variation in SDTOT during the last 12 years. These results indicate that U.S. exports of merchandise and services have been larger than reported and, consequently, that U.S. merchandise and current account deficits have been smaller than reported since the mid-1970s.

[28]Regression tests parallel to those reported in table 4 were also run on a sample including the selected nonindustrial countries described in footnote 23. Tests of the explanatory power of the nonindustrial countries against the null specifications omitting them established that the sample of nonindustrial countries did not add explanatory power to specifications restricted to industrial countries.

[29]See also Heller (1984) and Stekler (1984).

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Appendix
Data Sources for the U.S. Export Discrepancy and the U.S. Balance of Payments Statistical Discrepancy

The bilateral import and export data were compiled from the IMF Directions of Trade Statistics tape and the U.S. balance of payments statistical discrepancy was obtained from International Financial Statistics tape.

The U.S. export discrepancy was estimated using 17 industrial countries — the 20 countries classified as industrial by the IMF less the Netherlands, Switzerland and, of course, the United States. The estimated U.S. export discrepancy for the 17-country sample of industrial countries, XDI17, was obtained as follows:

$$XDI17_t \equiv \sum_{j=1}^{17} (MUS_{tj}/1.052) - XUS_{tj},$$

where

MUS_{tj} ≡ CIF imports of country j from the United States in year t.

XUS_{tj} ≡ FAS exports of the United States to country j in year t.

The included countries in XDI17 are: Australia, Austria, Belgium-Luxembourg, Canada, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Japan, New Zealand, Norway, Spain, Sweden and the United Kingdom.

The U.S. balance of payments statistical discrepancy, SD_t, was obtained from the IFS tape of the IMF. Since the reconciled adjustment to the bilateral U.S.-Canadian merchandise trade balance is removed from the data (1970–86), the annual U.S.-Canadian reconciliation, $RAUSCA_t$, is subtracted from the reported SD, $SDHAT_t$, to get $SDTOT_t$. That is, from identity 4,

$$SDHAT_t \equiv -[C\hat{A}B_t + K\hat{A}B_t] + RAUSCA_t,$$

so that

$$SDTOT_t \equiv SDHAT_t - RAUSCA_t.$$

$RAUSCA_t$ was obtained from U.S. Department of Commerce (1987b), table 14. Prior to 1970, $RAUSCA_t$ is zero, so $SDHAT_t$ and $SDTOT_t$ are equal.

Source Data and Constructs (billions of dollars)

Year	USCAB	SDHAT	SDTOT	XDI17	XDI17NC[1]
1960	$2.82	−$1.02	−$1.02	$0.5422	$0.5851
1961	3.82	−1.00	−1.00	1.0101	0.9723
1962	3.38	−1.11	−1.11	1.3890	1.4175
1963	4.40	−0.36	−0.36	0.1014	0.2399
1964	6.82	−0.91	−0.91	0.2590	0.3888
1965	5.41	−0.42	−0.42	0.5876	0.6523
1966	3.03	0.63	0.63	0.5828	0.6600
1967	2.59	−0.22	−0.22	0.7807	0.5358
1968	0.59	0.46	0.46	1.7465	1.4384
1969	0.42	−1.46	−1.46	2.0261	1.6202
1970	2.33	−0.17	0.43	2.3949	2.0144
1971	−1.45	−9.76	−8.86	2.7078	2.2254
1972	−5.78	−1.95	−0.95	2.8999	2.2613
1973	7.07	−2.60	−1.20	4.1984	2.7936
1974	1.92	−1.52	−0.02	5.3438	3.6280
1975	18.13	5.88	7.58	4.9660	3.6362
1976	4.17	10.53	11.93	5.6111	3.5931
1977	−14.49	−2.05	−0.05	5.8041	5.5742
1978	−15.45	12.59	15.09	7.9439	3.4205
1979	−0.97	25.45	29.85	11.5811	6.0699
1980	1.84	25.01	29.71	16.5480	10.7420
1981	6.87	19.96	24.06	12.2240	6.5639
1982	−8.64	36.12	39.22	12.9268	8.1274
1983	−46.28	11.18	13.38	12.0168	6.0545
1984	−107.09	26.81	31.41	11.1532	4.6521
1985	−116.43	17.87	23.87	13.3568	5.9909
1986	−141.46	24.06	33.66	15.4334	4.6719

[1]XDI17–XDCANADA