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# Interdependencies in the Global Markets for Capital and Information: The Case of Smithkline Beecham plc

Carol A. Frost and Grace Pownall

*Carol A. Frost is Associate Professor at Washington University (St. Louis) and Grace Pownall is Professor at Emory University.*

**SYNOPSIS:** This study analyzes SmithKline Beecham plc's equity characteristics and accounting disclosures in the U.S. and the U.K. We examine non-accounting and accounting explanations for the price differences among SmithKline Beecham's (SK's) equities traded in the U.S. and the U.K., and investigate the claim that U.S. and U.K. accounting principle differences impair the ability of U.S. investors to assess the information contained in SK's earnings disclosures.

Several non-accounting factors are consistent with the observed price differences between SK's A Shares and Equity Units, including differential dividend cash flows, liquidity differences, and what financial analysts call "investor sentiment." In contrast, we find little support for the argument that U.S./U.K. accounting differences cause the price differences, or that U.S. investors are confused by SK's U.K. GAAP disclosures. It is true that SK's earnings based on U.K. GAAP have been greater than SK's U.S. GAAP earnings in every year since the merger, and that information about SK's U.K. GAAP earnings does not appear to be useful for predicting what SK's U.S. GAAP earnings will be. However, our stock price analyses indicate that U.S. investors use information about SK's U.K. GAAP earnings in valuing SK, and that the U.S. market response to SK's disclosures of U.K. GAAP earnings is similar to the U.K. market response. Thus, U.S. investors do not appear to be confused by U.S./U.K. GAAP differences, and in fact use information about U.K. GAAP earnings in their valuations of SK.

**Data Availability:** Data used in this paper are from publicly available sources.

## I. INTRODUCTION

The purpose of this paper is to explore information dissemination and price discovery in global capital markets by investigating the relations among equity characteristics (such as prices, trading activity, liquidity and shareholder clienteles) and firms' accounting disclosures. The investigation is conducted in the context of a single global firm, SmithKline Beecham plc (SK). SK is one of the world's largest health-care corporations, with equity listed in the U.K., the U.S. and Japan.

Several recent articles have noted large price and return differences between SK's equity traded on the New York Stock Exchange (NYSE) and the International Stock Exchange

in London (ISE) (e.g., *Accountancy* 1992; *Management Today* 1989). For example, *The Economist* (1991) reports: "SmithKline

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Beecham ...has just announced its third quarter results. The price of its shares increased by 2.5 percent in London; on Wall Street, by 6 percent. Despite the leap, SK still sells for far less in America than in Britain, and its managers are increasingly unhappy about it."

SK's Finance Director argues that a "communication difficulty" and "contradictory accounting standards" cause the discrepancy between U.S. and U.K. share prices (*Accountancy* 1992; Collum 1991). *The Economist* (1991) points out that because SK's earnings based on U.S. generally accepted accounting principles (GAAP) are lower than U.K. GAAP earnings, the U.K. shares may trade at higher prices than the U.S. shares.

Accounting explanations for SK's share price differences seem inconsistent with the notion that world capital markets are informationally efficient and globally integrated. Commentators assert (e.g. Scarlata 1993, Greenspan 1988) that global capital markets rapidly impound new information, that news affecting a company's equity in one location will be promptly reflected in that firm's share prices everywhere, and that the valuation implications of public information do not depend on where the information is released or where the equities trade.<sup>1</sup> However, there is scant evidence on characteristics of SK's equities and how the firm's disclosures become reflected in its equity prices worldwide.

We therefore focus on two questions. First, do non-accounting factors (such as dividend cash flows) rather than U.S./U.K. GAAP differences explain SK's share price differences? Second, do U.S. investors promptly use information in SK's disclosures, whether based on U.S. or U.K. GAAP, in their valuation decisions? We expect that non-accounting factors do explain SK's share price differences, and that U.S. shareholders do not behave as if they are confused by GAAP differences, but in fact use information about U.K. GAAP earnings in their valuation of SK.

Valid hypotheses tests concerning causes of observed price differences are difficult to design, since many interrelated factors influence SK's share prices, and isolating the

causal effect of any one factor is difficult. We therefore present relevant information for assessing whether selected explanations are plausible, but do not attempt to formally test hypotheses about those explanations.

The evidence in this study is relevant for evaluating timely disclosure and conformity of disclosure rules in international equity markets. Conformity of disclosure rules in the U.S., the U.K. and Japan require foreign-listed firms to immediately disclose locally what they disclose in their home market and other markets where their equities are traded.<sup>2</sup> However, foreign firms are not required to provide additional information in their timely disclosures that would help local investors interpret their announcements.

This study begins by documenting the prices, returns and trading volume of SK's equity securities to provide evidence on the nature of the company's so-called equity problems. We then investigate both non-accounting and accounting explanations for the observed price differences. Non-accounting explanations are related to dividend cash flows, share liquidity and investor sentiment. Accounting explanations are related to differences between U.S. and U.K. GAAP, differences between SK's U.S. and U.K. accounting disclosures, and differences in how U.S. and U.K. investors interpret those disclosures.

<sup>1</sup> Barriers to global financial market integration have also been discussed and analyzed extensively. See, for example, Aggarwal and Schirm (1995), Frankel (1994), Alexander et al. (1987), Gultekin et al. (1989) and Jorion and Schwartz (1986).

<sup>2</sup> The SEC requires foreign issuers in the U.S. to promptly furnish whatever information the issuer (1) is required to make public in its home country, (2) has filed with foreign stock exchanges on which its securities are traded, or (3) has distributed to its security holders (SEC 1984). The ISE requires foreign issuers to promptly furnish the Company Announcements Office all information publicly released to other stock exchanges (ISE 1993a, sec. 17.30), and the Tokyo Stock Exchange (TSE) requires foreign issuers to announce business results without delay after announcement in the issuer's home country (TSE 1991). The conformity of disclosure rules suggest that securities regulators assume that local investors do not have immediate or low-cost access (either directly or indirectly) to information disclosed overseas. Frost and Pownall (1995) provide evidence relevant for assessing this assumption.

In a final set of analyses we examine the U.S. and U.K. market responses to SK's accounting disclosures made in the two markets. The evidence is relevant for assessing the claim that U.S. investors have difficulty interpreting SK's accounting numbers, and for assessing whether U.S. investors use different information in making valuation decisions at the time of earnings announcements than do U.K. investors.

The rest of this paper is organized as follows. Section II presents evidence on SK's equities traded in the U.S. and the U.K.<sup>3</sup> Non-accounting and accounting explanations for the observed price differences among SK's different types of equity are examined in sections III and IV, respectively. Section V presents evidence on the U.S. and U.K. market responses to SK's earnings disclosures, and a summary and conclusions are in section VI.

## II. EQUITY CHARACTERISTICS

### A. Description of A Shares and Equity Units

SmithKline Beecham plc incorporated in the U.K. in July 1989 to combine the businesses of SmithKline Beckman Corp. in the U.S. and Beecham Group plc in the U.K. The company devised a complex share structure so that U.S. shareholders, who initially owned about 50 percent of the merged firm, would receive dollar dividends which would not be subject to withholding of U.K. Advanced Corporation Tax. "A Shares" were issued to U.K. shareholders, and "Equity Units" were issued to U.S. shareholders. Holders of A Shares and Equity Units have the same voting rights, and SK's Articles of Association contain special provisions to equalize the dividend rights of one A Share and one Equity Unit (e.g., see SK's 1993 Form 20-F, page 70).<sup>4</sup> Since A Shares and Equity Units are distinct equity types, conversion of an equity ownership claim from one type to another is not possible.

SK's A Shares and Equity Units began trading on the ISE and on the NYSE (as ADRs) on July 27, 1989, the merger date. Currently, A Shares, A Share ADRs, Equity Units, and Equity Unit ADRs are traded in London. Both types of ADR are listed on the NYSE, and A

Shares and Equity Units are traded OTC in the U.S. The company listed its A Shares on the Tokyo Stock Exchange (TSE) on December 4, 1991.

### B. Equity Prices and Returns

We obtained U.S. and U.K. market data for July 1989 to August 1994 from Tradeline for SK A Shares, Equity Units, A Share ADRs and Equity Unit ADRs. For each of the four equity types, we collected U.S. and U.K. daily transaction prices, bid-ask quotes and trading volume. Daily return vectors were calculated for each of the eight series using transaction prices for days during which the security traded in the market associated with that vector, and the midpoint of the bid-ask quote on non-trading days, all amounts expressed in U.S. dollars. We obtained daily prices for the FTSE 100 index (the primary ISE market index) from Tradeline, and for the Value Weighted NYSE/ASE index from CRSP.<sup>5</sup> The

<sup>3</sup> We analyzed SK's A Shares traded in Japan, its media disclosures released in Japan, and financial documents SK filed with Japan's Ministry of Finance (MOF). TSE daily prices and volume were obtained from Nikkei Telecom I for the period December 1991 to August 1994. However, A Shares trade so infrequently in Japan that several of the stock price analyses would not be meaningful. For example, from May 1, 1992 to May 1, 1993, A Shares traded in Japan on only 34 days. We therefore do not include evidence from Japan in discussion of our primary tests.

<sup>4</sup> For more information about SK's complex share arrangement, see *Management Today* (1989), *Accountancy* (1992), *The Economist* (1989, 1991), *European Chemical News* (1989), and SK's Forms 20-F filed with the SEC. At the merger date, an Equity Unit (EU) consisted of five B shares plus a preference share, which together were "equivalent" to five A shares. The shares were split and the EUs restructured in 1992 so that one A Share is now equivalent to one EU (in terms of ownership claim and shareholder rights).

<sup>5</sup> We use the Financial Times Stock Exchange (FTSE) 100 index as the U.K. market index because it accounts for about 70 percent of the total market value of all U.K. equities, and shows a very close correlation with the most broad index of the market (Lederman and Park 1991). Also, SK is a component of the FTSE 100 index. A comparable U.S. index is the Standard and Poor's 500 Index, which represents about 80 percent of the total market value on the NYSE, and is commonly considered the benchmark against which the performance of individual stocks is measured (Downes and Goodman 1990). However, because SK is not a component of the S&P 500, we chose the closely comparable NYSE/ASE CRSP value-weighted index, since it does have SK as one of its component stocks.

A Share and Equity Unit price vectors generated by OTC trading in the U.S. have numerous observations with bids only. These bid quotes were used as prices, but we report results from analyses of these equity types selectively, since the vectors probably contain substantial measurement error. Weekly returns for use in some analyses were constructed from the Wednesday observations each week, and monthly returns were constructed from observations at the last day of each month.

Table 1 presents evidence on price differences among several SK equity types, both within and across the U.K. and U.S. markets, for the full sample period (panel A) and for two subperiods, July 1989 to December 1991 and January 1992 to August 1994 (panel B). Our goal is to identify whether price differences exist between A Shares and EUs irrespective of the trading markets, and whether price differences exist between trading mar-

kets irrespective of the equity type. Analyzing price differences in two subperiods provides evidence on whether SK's equity prices are converging or diverging across time.

Rows 1–3 of table 1 show that A Share prices exceeded EU and EU ADR prices for all days in the sample period, in both cross-country and within-country comparisons. The mean price differences are all above U.S. \$5.00, or over 15 percent of the mean A Share price in the U.K. of U.S. \$32.84. Rows 4–7 of table 1 show that, in contrast, mean price differences between U.S. and U.K. A Shares (or ADRs) are close to zero, as are mean price differences between U.S. and U.K. EUs (or EU ADRs).<sup>6</sup> Thus, the systematic price differences are not between SK's U.S. and U.K. equities (when comparisons involve similar types of equity in the two markets), but rather between

<sup>6</sup> For parsimony, we do not present all possible comparisons in table 1. However, comparisons presented in table 1 are representative of those not shown.

**TABLE 1**  
**Share Price Differences Among SmithKline Beecham's Equity Securities<sup>1</sup>**

	<u>N</u>	<u>Mean</u>	<u>Median</u>	<u>Min.</u>	<u>Max.</u>	<u>Std. Dev.</u>
Panel A: Full Sample Period July 1989 to August 1994 (All Amounts are in \$U.S.)						
<b>A Shares and Equity Units</b>						
1. UK A Share minus US EU ADR	1334	5.34	4.69	1.29	11.36	2.34
2. US A Share minus US EU ADR	1066	5.56	4.92	0.92	11.59	2.47
3. UK A Share minus UK EU	1334	5.20	4.52	2.06	10.16	2.11
<b>A Shares</b>						
4. UK A Share minus US A ADR	1334	0.05	0.08	-3.00	2.36	0.53
5. UK A ADR minus US A ADR	1331	-0.02	0.00	-9.50	4.25	0.75
<b>Equity Units</b>						
6. UK EU minus US EU ADR	1334	0.14	0.12	-3.85	3.75	0.57
7. UK EU ADR minus US EU ADR	1331	0.06	0.00	-4.99	4.50	0.72

(Continued on next page)

TABLE 1 (Continued)

Panel B: Two Subperiods  
 Subperiod 1: July 1989 to December 1991  
 Subperiod 2: January 1992 to August 1994  
 (All Amounts are in \$U.S.)

		<u>N</u>	<u>Mean</u>	<u>Median</u>	<u>Min.</u>	<u>Max.</u>	<u>Std. Dev.</u>
<b>A Shares and Equity Units</b>							
1. UK A Share minus	period 1	635	6.28	6.31	1.41	10.94	2.36
US EU ADR	period 2	699	4.49	4.01	1.29	11.36	1.97
2. US A Share minus	period 1	367	7.74	8.12	0.92	11.59	1.78
US EU ADR	period 2	699	4.41	3.92	1.32	11.09	1.95
3. UK A Share minus	period 1	635	6.11	6.03	2.30	10.16	2.09
UK EU	period 2	699	4.38	3.97	2.06	9.26	1.76
<b>A Shares</b>							
4. UK A Share minus	period 1	635	0.01	0.06	-3.00	2.29	0.59
US A ADR	period 2	699	0.08	0.09	-2.50	2.36	0.46
5. UK A ADR minus	period 1	632	-0.04	0.00	-3.50	2.50	0.70
US A ADR	period 2	699	0.00	0.00	-9.50	4.25	0.80
<b>Equity Units</b>							
6. UK EU minus	period 1	635	0.17	0.21	-3.85	3.28	0.64
US EU ADR	period 2	699	0.11	0.09	-1.57	3.75	0.49
7. UK EU ADR minus	period 1	632	0.04	0.00	-3.62	3.38	0.73
US EU ADR	period 2	699	0.09	0.05	-4.99	4.50	0.70

UK A Share = A Shares traded on the ISE in the U.K.  
 UK EU = Equity Units traded on the ISE in the U.K.  
 UK A ADR = A Share ADRs traded on the ISE in the U.K.  
 UK EU ADR = Equity Unit ADRs traded on the ISE in the U.K.  
 US A ADR = A Share ADRs traded on the NYSE in the U.S.  
 US EU ADR = Equity Unit ADRs traded on the NYSE in the U.S.  
 US A Share = A Shares traded OTC in the U.S.

<sup>1</sup> Prices are close prices or midpoints of bid/ask spreads. Prices for A Shares traded OTC in the U.S. are bids. In comparisons of share and ADR prices, share prices are multiplied by 5 in order to make them comparable to ADRs. Data for the two week period surrounding the share split, July 13, 1992 through July 28, 1992 are deleted. Mean (median) prices of A Shares and EUs traded in the U.K. were U.S. \$32.84 (31.99) and \$28.47 (28.31), respectively.

A Shares and EUs, both between and within the U.S. and the U.K.<sup>7</sup> Note, however, that maximum price differences during this period (even for the same instrument across the two countries) are at least U.S. \$2.36.

Evidence in rows 1–3 of panel B suggests that A Share/EU prices converged during the sample period. For all three comparisons presented, mean and median subperiod 2 A Share/EU price differences (January 1992 to

August 1994) are smaller than mean and median subperiod 1 A Share/EU price differences

<sup>7</sup> In a related analysis, Rosenthal and Young (1992) present evidence on "anomalous" price behavior of shares of the parents of Royal Dutch/Shell and Unilever NV/PLC. Both groups' corporate charters specify the division of distributable cash flows, implying an expected ratio for the market prices for their securities. The authors document persistent differences from the expected price ratios on both the NYSE and ISE. Also see Froot and Dabora (1995).

(July 1989 to December 1991). Mean price differences are significantly smaller in subperiod 2 than in subperiod 1, with all three subperiod differences (rows 1–3) significant at p-values of 0.0001, two-sided tests. This observed convergence in prices is discussed in section III.

Table 2 presents daily, weekly and monthly Spearman pairwise return correlations of SK's most actively traded equity types (A Shares and EUs in the U.K., and A Share ADRs and EU ADRs in the U.S.), and the U.S. and U.K.

market indices. All correlations are positive and significant at the 0.0001 level or better, two-sided tests. Panel A shows that the within-country daily return correlations of A Shares and EUs in the U.K., and A Share ADRs and EU ADRs in the U.S. are 0.90 and 0.81, respectively. The four pairwise cross-country correlations are lower, ranging from 0.58 to 0.67. Panel B of table 2 shows that the two within-country and four cross-country weekly return correlations are each larger

**TABLE 2**  
**Spearman Correlations of SmithKline Beecham plc's Stock Returns<sup>1</sup>**  
**December 1991 to August 1994**  
(Significance levels for all correlations are at .0001 or better)

**Panel A: Daily Returns**

	<u>UK A Share</u>	<u>UK EU</u>	<u>US A ADR</u>	<u>US EU ADR</u>	<u>FTSE 100</u>	<u>NYSE Index</u>
UK A Share	1.00					
UK EU	0.90	1.00				
US A ADR	0.67	0.62	1.00			
US EU ADR	0.58	0.60	0.81	1.00		
FTSE 100	0.46	0.42	0.36	0.31	1.00	
NYSE Index	0.20	0.20	0.37	0.41	0.33	1.00

**Panel B: Weekly Returns**

	<u>UK A Share</u>	<u>UK EU</u>	<u>US A ADR</u>	<u>US EU ADR</u>	<u>FTSE 100</u>	<u>NYSE Index</u>
UK A Share	1.00					
UK EU	0.95	1.00				
US A ADR	0.92	0.89	1.00			
US EU ADR	0.86	0.90	0.92	1.00		
FTSE 100	0.43	0.38	0.37	0.32	1.00	
NYSE Index	0.33	0.36	0.34	0.37	0.52	1.00

**Panel C: Monthly Returns**

	<u>UK A Share</u>	<u>UK EU</u>	<u>US A ADR</u>	<u>US EU ADR</u>	<u>FTSE 100</u>	<u>NYSE Index</u>
UK A Share	1.00					
US EU	0.97	1.00				
US A ADR	0.98	0.96	1.00			
US EU ADR	0.96	0.98	0.97	1.00		
FTSE 100	0.44	0.42	0.46	0.46	1.00	
NYSE Index	0.35	0.34	0.38	0.37	0.69	1.00

UK A Share = A Shares traded on the ISE in the U.K.

UK EU = Equity Units traded on the ISE in the U.K.

US A ADR = A Share ADRs traded on the NYSE in the U.S.

US EU ADR = Equity Unit ADRs traded on the NYSE in the U.S.

FTSE 100 = Financial Times Stock Exchange 100 Index in the U.K.

NYSE Index = CRSP NYSE/ASE value-weighted index in the U.S.

<sup>1</sup> Returns computations are based on equity prices and bid-ask quote midpoints expressed in U.S. dollars.

than the corresponding daily return correlation. The within-U.K. and within-U.S. weekly correlations of 0.95 and 0.92, respectively, and the cross-country correlations range from 0.86 to 0.92. The monthly correlations are higher still, ranging from 0.96 to 0.98.<sup>8</sup>

The correlations in table 2 are consistent with the view that the valuation of SK's equities may be similar in the U.S. and the U.K. In section V, we compare SK's U.S. and U.K. equity price responses to earnings disclosures in the two countries to provide further evidence on this issue.<sup>9</sup>

### C. Outstanding Shares and Trade Volume

Table 3 presents the number of outstanding A Shares, A Share ADRs, EUs, and EU ADRs in the U.S. (panel A) and the U.K. (panel B).<sup>10</sup> The table shows that the number of EUs traded in the U.S. as ADRs has declined steadily, falling from 1,210.5 million shares (or almost 50 percent of SK's total equity on the merger date in 1989) to only 703.0 million shares (or about 25 percent) as of February 26, 1993. One explanation for the flowback of SK shares to the U.K. is that the number of U.S. investors willing to hold the shares is so small that when a U.S. investor wants to sell SK shares, that investor is more likely to find a U.K. purchaser than a U.S. purchaser.<sup>11</sup>

Table 4 presents average daily trading volume of SK's equity in the U.S. and the U.K., and shows steady declines in trading volume in the U.S. (but not the U.K.). The table shows that average daily trading volume of A Share ADRs reported on the NYSE fell from 1,110 to 70 thousand shares between 1989 and 1993, and average daily trading volume of EUs traded as ADRs fell from 7,470 to 1,606 thousand shares during the same period.<sup>12</sup>

Numerous explanations have been proposed for the declining SK share activity in the U.S. and the flowback of shares to the U.K.<sup>13</sup> First, U.K. institutional investors may be more likely to hold SK shares because SK is included in the FTSE 100 index in London. If an institution's portfolio must match the FTSE 100 index, that institution will buy SK shares in proportion to SK's weighting in the

index. In contrast, SK's ADRs are not part of the Standard & Poor's 500 index or other major indexes in the U.S., so institutions may be less inclined to hold the ADRs. A further consideration is that U.S. investors interested in owning equity of pharmaceutical companies can choose among many U.S. pharmaceutical companies. In the U.K., there are far fewer domestic pharmaceutical companies.

Other explanations are related to investor sentiment. Some commentators propose that British investors are more positive about SK and more interested in holding SK stock than U.S. investors because, prior to the 1989 merger, Beecham Group plc was financially

<sup>8</sup> Frost and Pownall (1994) report that the mean and median weekly return correlations for 26 U.K. cross-listed firms are 0.84 and 0.90, respectively, with firm-specific correlations ranging from 0.28 to 0.94.

<sup>9</sup> In a diagnostic analysis, we computed daily, weekly and monthly pairwise return correlations shown in table 2 in two subperiods (as defined in table 1, panel B) to assess whether the correlations were stable during the sample period. We observed no systematic change in the inter-equity correlations between the subperiods, although the correlations of SK's equity instruments with the market indexes are lower in subperiod 2.

<sup>10</sup> SK does not disclose the number of A Shares owned by Japanese beneficial shareholders (which are held by Japan Securities Houses' U.K. custodians), and the amounts are therefore included in the U.K. figures reported in panel B of table 3.

<sup>11</sup> See Clements and Lim (1988) and Velli (1994) for further discussion of the flowback of shares issued in foreign markets, which occurred frequently during the 1980s but has been less common in recent years.

<sup>12</sup> We also analyzed trading volume of A Shares on the Tokyo Stock Exchange (TSE) using daily trade volume from Nikkei Telecom. In Japan, average A Share daily trading volume declined from 39,000 shares during the first month SK was listed on the TSE (December 1991) to 3,800 shares per day during calendar 1992, and down still further to 660 shares per day during 1993. Several commentators note that foreign shares are unpopular in Japan, and the average holdings and turnover of foreign shares are relatively low (see *The Economist* 1993 and ISE 1993b). See Evans (1994) and *The Economist* (1994) for discussion of factors such as high cost relative to the volume of shares traded that have caused an exodus of foreign listed firms from the TSE in recent years. The fact that only one Japanese analyst follows SK (from the London Office of Nomura Securities, based on data in Nelson's Publications 1993) is consistent with Japanese investors lacking interest in SK shares.

<sup>13</sup> For example, see *Management Today* (1989), *Accountancy* (1992), *The Economist* (1989, 1991) and *European Chemical News* (1989).

**TABLE 3**  
**Number of SmithKline Beecham Outstanding A Shares, Equity Units, A Share ADRs and Equity Unit ADRs (in millions)<sup>1</sup>**

(Share Amounts are adjusted for the 1992 share split and Equity Unit restructuring)

	<u>A Shares Traded As A Shares</u>	<u>Equity Units Traded as Equity Units</u>	<u>A Shares Traded as ADRs (5 A Shares per ADR)</u>	<u>Equity Units Traded as ADRs (5 Equity Units per ADR)</u>
<b>A. In the U.S.</b>				
1989				
(Mar 12, 1990)	0.4	—	11.5	1,210.5
1990				
(Mar 5, 1991)	0.4	0.08	9.5	1,063.0
1991				
(Mar 27, 1992)	0.3	0.09	10.0	835.5
1992				
(Feb 26, 1993)	0.4	0.06	10.0	703.0
1993				
(Mar 1, 1994)	2.6	0.1	NR	NR
<b>B. In the U.K.</b>				
1989				
(Mar 12, 1990)	1,329.4	192.5	0	2.5
1990				
(Mar 5, 1991)	1,341.8	488.4	0	2.0
1991				
(Mar 27, 1992)	1,345.2	939.1	0	4.5
1992				
(Feb 26, 1993)	1,360.9	1,309.4	0	2.0
1993				
(Mar 1, 1994)	1,368.5	1,309.9	NR	NR

<sup>1</sup> Reported in SK's 1989–1993 Forms 20-F. SK did not disclose ADR data for 1993.

NR = SK did not disclose ADR data for 1993.

**TABLE 4**  
**Average Daily Trading Volume of SmithKline Beecham Equities (in thousands)<sup>1</sup>**  
 (Share amounts are adjusted for the 1992 share split and Equity Unit restructuring)

	<u>LONDON</u>		<u>NYSE</u>	
	<u>A Shares Trading as A Shares</u>	<u>Equity Units Trading as Equity Units</u>	<u>A Shares Trading as A Shares (5 Shrs/ADR)</u>	<u>Equity Units Trading as ADRs (5 EUs/ADR)</u>
1989	7,160	1,905	1,110	7,470
1990	5,074	1,268	340	4,955
1991	2,610	1,465	125	3,060
1992	4,448	2,457	95	2,230
1993	4,405	3,296	70	1,606

<sup>1</sup> ISE and NYSE data from SK's 1989–1993 Forms 20-F. 1989 data are for July 27 (the SK merger date) through December 31, 1989.



stronger and had a more favorable reputation than SmithKline Beckman Corp. in the U.S. (e.g., *The Economist* 1991). Also, even in the 1990s, U.S. investors' portfolios have remained strongly biased towards domestic securities (Tesar and Werner 1994). This home bias in portfolio decisions might further explain reduced interest in SK in the U.S.

### III. NON-ACCOUNTING EXPLANATIONS FOR EQUITY PRICE DIFFERENCES

#### A. Cash Dividends

As noted in section II, SK's Articles of Association contain provisions to ensure that gross dividends paid on one A Share will be equivalent, with limited exceptions, to dividends paid on one Equity Unit. However, payment dates, currency, amounts of dividends withheld and tax liabilities vary according to type of issue (share vs. ADR), location (U.K. vs. U.S.) and tax status of the shareholder, so that an equivalent dividends assumption may not be appropriate. This raises the possibility that the consistently higher price of A Shares relative to EUs reflects greater dividend cash flows for at least some A Share holders than for EU holders.

SK declares and pays quarterly dividends on A Shares in pounds sterling net of the U.K. Advanced Corporation Tax (ACT).<sup>14</sup> U.K. entities not subject to tax can reclaim the withheld amounts from Inland Revenue in the U.K. Dividends on the Preference Shares contained in Equity Units are paid by a U.S. subsidiary of SK in U.S. dollars.<sup>15</sup> U.K. taxes are not withheld from the Preference Share dividends.

A Share ADR holders who are qualifying U.S. residents are generally eligible to receive the "ACT Related Tax Credit," but are subject to a U.K. withholding tax of 15 percent of the gross dividend amount (SK 1993 Annual Report). Withheld amounts can be offset by reduced income taxes paid to the U.S. government. However, dividend cash flows to tax-exempt entities in the U.S. are larger for EUs (ADRs or shares) than for A Shares (ADRs or shares), since a tax credit or deduction in the U.S. is not available for the 15 percent with-

held from A Share dividends. In addition, qualifying U.S. holders of EUs or EU ADRs may be able to use the 70 percent dividends received deduction, but similar deductions may not be claimed by U.S. holders of A Shares or A Share ADRs. Consideration of these factors might suggest a higher price for EUs than for A Shares in the U.S., which is opposite to the observed difference.

For U.K. shareholders, tax effects suggest an opposite effect—a higher price for A Shares than for EUs. Cash dividends on A Shares are paid net of ACT, as noted above, but entities not subject to tax can reclaim the ACT from the government (Alexander and Archer 1991), and U.K. taxpayers have no further income tax liability for the dividend. Dividends paid by SK's U.S. subsidiary to EU holders do not have ACT withheld, but are subject to a 15 percent withholding rate (Coopers & Lybrand 1994). U.K. tax-exempt entities are not able to offset the amounts withheld with a lower income tax liability.

In summary, although SK EU and A Share cash dividends are intended to be equivalent, tax-exempt entities in the U.S. probably favor EUs and EU ADRs, and tax-exempt entities in the U.K. probably favor A Shares and A Share ADRs. The extent to which trading activity by these investor classes influences the prices of SK's equities is unknown, but consideration of the tax aspects of SK cash dividends suggests that A Share and EU after-tax dividend cash flows vary among different investor groups in the U.S. and the U.K., and these cash flow differences might result in equilibrium prices that vary between A Shares (which are held and traded primarily in the U.K.) and EUs (which are held and traded in both the U.K. and the U.S.).

<sup>14</sup> The ACT rate was 25 percent in 1993. See Alexander and Archer (1991) for discussion of the ACT.

<sup>15</sup> SK's Forms 20-F describe tax consequences and other information about cash dividends which may be paid on the A Shares, and on each of the two components of Equity Units (B Shares and Preference Shares). Since the 1989 merger, SK has paid cash dividends on A Shares, SK Corp. (a U.S. subsidiary) has paid dividends on Preference Shares, but SK has *not* paid any dividends on B Shares.

## B. Share Liquidity and Execution Costs

Differences between A Share and EU liquidity and execution costs might also explain the price difference between the two equity types. Liquidity refers to the ability to trade quickly at prices that are reasonable in light of underlying demand/supply conditions (Schwartz 1991). Empirical measures of liquidity include an asset's average bid-ask spread, the frequency with which an asset trades, average trade size, trade volume and number of investors (e.g., Schwartz 1991; NYSE 1994; Wells 1991, 1993). Amihud and Mendelson (1986) develop a theoretical model linking expected returns and liquidity, and provide empirical support for the view that more liquid assets earn lower expected returns (also see Amihud and Mendelson 1989; Diamond and Verrecchia 1991; Reinganum 1990). Thus, we expect to observe a lower price for a

share type that is less liquid, but otherwise similar to some other type of share.

Table 5 presents ISE trade data for SK's A Shares and EUs for the two years ending June 30, 1992 and 1993, and shows that A Shares exhibit greater liquidity than EUs as measured by number of trades, number of shares traded, number of shareholders and inside bid-ask spread in both years. For example, table 5 shows that there are over 40 times as many A Share holders as EU holders (e.g., 108,628 and 2,508 shareholders respectively in 1992), and between five and seven times as many trades for A Shares than for EUs, depending on the year. The inside bid-ask spread, which is a measure of execution costs as well as liquidity (since the spread is the execution cost of a round trip), ranges from two to five times as large for EUs than for A Shares, depending on the year. Although many

**TABLE 5**  
**SmithKline Beecham plc Equities Traded in London:**  
**Market Value, Trade Volume, Shareholders and Inside Bid-Ask Spread<sup>1</sup>**

	TOTAL TRADE VOLUME						
	Equity Market Value at Year-End (£ Mill.)	Value <sup>2</sup> (£ Mill)	Number of Trades <sup>3</sup>	Number of Shares Traded Milled <sup>4</sup>	Average Shares Per Trade	Number of Shareholders at Year-End	Inside Bid-Ask Spread (%) at Year-End <sup>5</sup>
A. For Year Ending June 30, 1992							
A Shares	6,065	5,319	64,065	635.11	9,913	108,628	0.2
Equity Units	5,365	2,602	8,821	347.39	39,382	2,508	1.1
B. For Year Ending June 30, 1993							
A Shares	6,003	5,398	72,130	1,101.25	15,268	111,936	0.5
Equity Units	5,120	2,940	14,482	686.33	47,392	2,772	1.0

<sup>1</sup> Data are from the 1992 and 1993 editions of the *Quality of Markets Companies Book*, ISE (1992, 1993b). The 1991 edition of the *Companies Book* does not contain separate data for Equity Units, and publication of the *Companies Book* series ended with the 1993 edition.

<sup>2</sup> Value is the total money value of securities traded (i.e., price multiplied by the number of shares bought and sold).

<sup>3</sup> Number of trades is the total number of trades transacted in a period.

<sup>4</sup> Number of shares traded is the total number of shares traded in a period.

<sup>5</sup> Inside Bid-Ask spread is the difference between the best (highest) bid price and the best (lowest) offer price among all market makers quoting a security. In this table, the spread is expressed as a percentage of the mid-price.

trades on the ISE occur inside the spread (Schwartz 1991), differences in the published quotes should indicate differences in execution costs for at least some of the transactions.<sup>16</sup>

### C. Investor Sentiment

As noted above, SK equity appears to be more highly valued by U.K. investors than by U.S. investors, and U.S. investors' interest in SK has been steadily declining since SK was formed in 1989. Since almost all SK equity held in the U.S. is in the form of EU ADRs, investor sentiment in the U.S. primarily affects EU prices, and we expect depressed EU prices in the U.S. to depress EU prices in the U.K. Thus, the lower price of EUs and EU ADRs relative to A Shares and A Share ADRs is consistent with the weaker interest in SK in the U.S. than in the U.K.<sup>17</sup>

## IV. ACCOUNTING EXPLANATIONS FOR EQUITY PRICE DIFFERENCES

Commentators argue that U.K. investors value SK shares more highly than U.S. investors because of differences between U.S. and U.K. accounting principles, differences in the accounting disclosures made by SK in the U.S. and U.K., and U.S. investors' difficulty interpreting what is actually disclosed by SK.<sup>18</sup> For example, Hugh Collum, SK's finance director, has suggested that non-U.K. investors have difficulty valuing SK shares due to U.S./U.K. accounting principle differences, and that SK needs to "keep talking to (shareholders about the (accounting) differences" and that "these accounting anomalies will one day sort themselves out, but probably not in our lifetime" (*Accountancy* 1991; Collum 1991).

Consistent with Mr. Collum's claims, U.S./U.K. GAAP differences have caused SK's U.S. GAAP-based earnings to be lower than SK's U.K. GAAP-based earnings for every fiscal year since the 1989 merger. For instance, the initial merger was accounted for under U.K. GAAP using a method similar to pooling of interests, but did not qualify as a pooling under U.S. GAAP. As a result, over 2.5 billion

pounds sterling of goodwill was recognized and is being amortized under U.S. GAAP from the initial merger, but no goodwill resulted from the transaction under U.K. GAAP. In addition, U.S. GAAP requires the amortization of goodwill from SK's subsequent acquisitions over several years, but in the U.K. SK immediately wrote off the goodwill from each subsequent transaction against shareholders' equity. As a result of these and other differences, SK's 1993 net income according to U.K. GAAP was 295 million pounds sterling greater than under U.S. GAAP, or about 36 percent of SK's U.K. GAAP net income of 813 million pounds sterling.<sup>19</sup>

Table 6 summarizes the differences between SK's U.S. and U.K. GAAP-based annual net income for 1989–1993, from SK's Form 20-F reconciliation footnote disclosures. The table shows that accounting differences related to goodwill amortization and use of purchase (versus pooling) accounting for the 1989 merger reduce U.S. GAAP-based earnings relative to U.K. GAAP-based earnings in all five years. The table shows other significant differences which vary in amount and direc-

<sup>16</sup> Assessing the liquidity supplied by the U.S. market to trading in EUs is difficult because SK provides little information about trade activity of SK's equity in the U.S. However, SK's 1992 Form 20-F indicates that as of early 1993 there were far fewer EU and EU ADR holders in total (18,136 holders) than A Share and A Share ADR holders in total (114,160). Also, transaction costs for EU trading are higher than for A Shares to the extent that trades are cross-country or across equity types (Shares vs. ADRs).

<sup>17</sup> Investor sentiment and several other factors might explain the convergence in prices shown in table 1, panel B. For example, the steady decline in trade volume of SK shares in the U.S. might lessen the influence of differences in investor sentiment in the U.S. relative to the U.K. Also, investor sentiment in the U.S. might be gradually shifting to a more positive view about SK. Differences in A Share/EU equity characteristics, and relative proportions of different types of shareholder groups might also be changing.

<sup>18</sup> As noted earlier, lower valuation of SK shares by U.S. investors would cause downward price pressure on EU ADRs, the primary equity type outstanding in the U.S. (see table 4). Downward pressure on EU ADR prices in the U.S. would, in turn, be expected to result in lower prices of EUs and EU ADRs in both the U.S. and the U.K., relative to A Shares, whose price primarily reflects valuation in the U.K.

<sup>19</sup> See Weetman and Gray (1991) for related evidence.

**TABLE 6**  
**SmithKline Beecham plc**  
**Summary of Differences Between U.S. and U.K. GAAP-Based Net Income<sup>1</sup>**  
 (All Amounts in Millions of Pounds Sterling)

	<u>1993</u>	<u>1992</u>	<u>1991</u>	<u>1990</u>	<u>1989</u>
Net Income per U.K. GAAP	813	728	638	847	130
US GAAP Adjustments (net of tax):					
Elimination of SmithKline results prior to combination	0	0	0	0	-144
Combination transaction and SmithKline restructuring costs	0	0	0	0	281
Goodwill	-13	-11	-12	-88	-26
Intangible Assets	-50	0	0	0	0
Deferred Taxes	-3	35	26	-3	-30
Purchase accounting:					
Amortization of intangible assets	-101	-86	-85	-85	-60
Amortization of goodwill	-67	-67	-67	-67	-28
Depreciation and other	-4	-5	-10	-7	-42
Foreign currency hedging	146	-185	0	0	0
Post-retirement benefits	-203	0	0	0	0
Other, net	0	-24	-16	32	6
<b>Net Income per U.S. GAAP</b>	<b>518</b>	<b>385</b>	<b>474</b>	<b>629</b>	<b>87</b>

<sup>1</sup> Information is from reconciliation footnote disclosures in SK's 1989-1993 Forms 20-F filed with the SEC.

tion of effect from year to year, related to foreign currency hedging, post-retirement benefits, treatment of intangible assets and deferred taxes.

The argument that differences between SK's U.K. GAAP net income and U.S. GAAP net income lead to pricing differences between the U.K. and U.S. (and hence lower prices for EUs than for A Shares) seems implausible, since it implies that investors' valuation of SK depends more on accounting numbers than on assessed economic value. Two other accounting- and disclosure-related explanations for lower share valuations in the U.S. are more plausible. First, SK might disclose less information in the U.S., or its U.S. disclosures might be less timely relative to U.K. disclosures. As a result, U.S. investors might believe they are disadvantaged relative to U.K. investors in terms of access to timely information about SK. Second, U.S. investors might have difficulty in interpreting SK's financial infor-

mation due to unfamiliarity with U.K. accounting principles.

To determine what SK actually disclosed in the U.S. and the U.K., we analyzed its media disclosures and documents filed with securities regulators in the two countries from July 1989 to May 1993. U.K. disclosures include the complete set of SK filings made with the ISE Company Announcements Office (CAO) and media disclosures.<sup>20</sup> U.S. disclosures include SK's SEC filings and disclosures from full text searches of Dow Jones News

<sup>20</sup> CAO filings include: (1) disclosures made to comply with the ISE timely disclosure and conformity of disclosure rules; (2) interim and annual financial reports; and (3) company announcements. We obtained media disclosures from a full text search of *The Financial Times*, Reuters News Service, and the Press Releases database available on Reuters Textline. *The Financial Times* is the U.K.'s major daily business newspaper, and Reuters News Service is widely regarded as the most comprehensive, most widely used news source in the U.K.

Service (DJNS) and PR Newswire (PRN).<sup>21</sup> We searched the U.S. and U.K. disclosures for earnings announcements (EAs) and management forecasts, and noted disclosure date, fiscal period referenced, accounting principles used, currency and reconciliations of accounting results based on U.K. GAAP to U.S. GAAP. In both the U.S. and the U.K., quarterly and annual earnings were first disclosed in press releases. U.S. and U.K. EAs were similar in content, based on U.K. GAAP, and published on the same day for all fiscal periods. SK reported current period earnings in both pounds sterling and U.S. dollars (but earnings for the prior period were reported only in pounds) in all but one of the EAs.<sup>22</sup>

SK disclosed U.S. GAAP-based earnings in SEC filings, but not in any media announcements. SK disclosed quarterly U.S. GAAP earnings in Forms 6-K for six of the 11 quarters in the sample period, with a mean reporting lag (days between fiscal period end and filing date) of 58 days (reporting lag for U.K. GAAP quarterly earnings disclosed in press releases averaged 33 days in both the U.S. and the U.K.). Annual U.S. GAAP earnings were disclosed in Forms 20-F filed with the SEC on average 100 days after fiscal year-end, compared with a mean reporting lag of 62 days (in both the U.S. and the U.K.) for initial disclosure of annual earnings based on U.K. GAAP in press releases. Thus, SK's U.S. GAAP-based earnings disclosures (quarterly and annual) were made on average several weeks later than disclosures of U.K. GAAP-based numbers, its U.S. GAAP-based quarterly earnings disclosures were less frequent than U.K. GAAP disclosures, and were not widely disseminated in the form of press releases.<sup>23</sup>

Evidence in table 6 indicates that a number of accounting principle differences cause SK's U.S. GAAP annual earnings to be less than its U.K. GAAP earnings, and the nature of these differences and their magnitude vary substantially from year to year. This evidence suggests that predicting what SK's U.S. GAAP earnings will be for a given year, using U.K. GAAP-based earnings for that same year, is difficult. To provide further evidence on

whether U.S. investors might be able to predict U.S. GAAP numbers based on SK's U.K. GAAP press releases, we compared SK's U.K. GAAP and U.S. GAAP annual and interim earnings changes. If U.K. and U.S. GAAP earnings are different but changes in earnings are similar, U.S. investors might be able to estimate the change in U.S. GAAP earnings at the time U.K. GAAP earnings are disclosed. Table 7 presents U.K. GAAP earnings per share (EPS) and percentage earnings change (PEC), computed as this period's EPS minus EPS one year ago divided by EPS one year ago, for fiscal quarters for which SK disclosed earnings. Similar figures are presented for EPS and PEC based on U.S. GAAP earnings.

<sup>21</sup> DJNS carries articles published on the "Broad Tape," *The Wall Street Journal* and *Barron's*, and is a comprehensive corporate news source in the U.S. PRN is a media relations wire service that publishes press releases submitted by its members for a fee based on number of words in the release and requested distribution (regional, national, international, etc.).

<sup>22</sup> We also analyzed SK's media disclosures and documents filed with the Ministry of Finance (MOF) in Japan. We were unable to obtain a complete set of MOF filings, even after an exhaustive search which included correspondence with the Mitsui Trust and Banking Co., Ltd., SK's stock transfer agent in Japan, and discussions with staff at SK, the MOF, the TSE and several document vendors. We obtained media disclosures by searching (1) News Telecom, (2) Reuters Textline Far East; (3) Jiji News Wire; (4) Japan Economic Newswire; and (5) the Japan Economic Daily. News Telecom is a Japanese language historic text search database published by Nihon Keizai Shimbun ("Nikkei"), and is the most comprehensive database of news published in Japan. Analysis of disclosures obtained through these sources indicates that SK did not release any EAs in Japan, although Nikkei reporters did file three stories about SK's earnings from London. The absence of media accounting disclosures in Japan suggests a low investor and analyst demand for information about SK, and is consistent with the infrequent trading of SK shares on the Tokyo Stock Exchange.

<sup>23</sup> SK disclosed earnings and sales forecasts in the U.S. and the U.K. but not in Japan. SK's U.S. quantitative forecasts differed from the U.K. forecasts in content and frequency. SK staff explained to us that corporate policy is to not release quantitative forecasts on a regular basis. However, if analysts' earnings forecasts are out of line, SK issues a forecast to correct market expectations. SK also made numerous qualitative forecasts (seven in the U.S. and ten in the U.K.), and the forecasts released in both countries were generally released on the same day in the U.S. and the U.K. and were similar in content.

Table 7 shows that SK's annual and interim U.K. GAAP PECs vary substantially during fiscal 1990, ranging from -12.2% to 59.4%, but are less variable during 1991 and 1992, ranging from 11.6% to 22.2%. In contrast, U.S. GAAP PECs are highly variable throughout the sample period, ranging from -76.4% to 420.9%. U.K. GAAP and U.S. GAAP earnings do not appear to move together. For example, for each quarter in 1991 U.K. GAAP earnings were higher than the one-year-ago amounts, as evidenced by positive PECs. In contrast, U.S. GAAP quarterly earnings in 1991 were lower than in 1990, so that U.S. investors might not be able to predict SK's earnings based on U.K. GAAP earnings.

## V. ANALYSIS OF SMITHKLINE BEECHAM'S EQUITY RETURNS ON EA DATES

If U.S. investors have difficulty interpreting U.K. GAAP-based financial information, and if they do not infer changes in SK value by observing share price changes of SK's equity in the U.K., then we expect to observe weak U.S. share price responses to SK's announcements of U.K. GAAP earnings. On the other hand, if U.S. investors are not confused by U.K. GAAP EAs, and if they can interpret SK's disclosures quickly and at low cost (or if they infer SK's value by observing SK's equity price changes in the U.K.), then we expect to observe significant U.S. market responses to SK's U.K. GAAP EAs.

TABLE 7  
SmithKline Beecham Earnings Per Share  
According to U.K. and U.S. GAAP

Fiscal Period End	U.K. GAAP EPS (in pounds)	Percentage Earnings Change <sup>1</sup>	U.S. GAAP EPS (in pounds)	Percentage Earnings Change <sup>1</sup>
3/31/93 (Q1)	0.150	12.0%	• <sup>2</sup>	• <sup>2</sup>
12/31/92 (An.)	0.546	14.0	0.288	-19.1%
12/31/92 (Q4)	0.152	18.8	•	•
9/30/92 (Q3)	0.136	13.3	0.264	14.8
6/30/92 (Q2)	0.124	11.7	0.214	59.7
3/31/92 (Q1)	0.135	11.6	0.093	27.4
12/31/91 (An.)	0.480	17.1	0.357	-24.7
12/31/91 (Q4)	0.128	16.4	•	•
9/30/91 (Q3)	0.121	22.2	0.230	-38.5
6/30/91 (Q2)	0.110	18.3	•	•
3/31/91 (Q1)	0.121	12.0	0.073	-40.7
12/31/90 (An.)	0.410	12.0	0.474	420.9
12/31/90 (Q4)	0.110	59.4	•	•
9/30/90 (Q3)	0.099	20.7	•	•
6/30/90 (Q2)	0.093	2.2	•	•
3/31/90 (Q1)	0.108	-12.2	0.123	-2.4
12/31/89 (An.)	0.365	0.0 <sup>3</sup>	0.091	-76.4 <sup>3</sup>
12/31/89 (Q4)	•	•	•	•
9/30/89 (Q3)	•	•	•	•

<sup>1</sup> Percentage Earnings Change is this period's earnings per share (EPS) minus EPS one year ago, divided by EPS one year ago.

<sup>2</sup> Dots denote missing values. We believe these observations were neither announced in the financial press nor filed with the SEC in the U.S.

<sup>3</sup> These percentage earnings changes are calculated using restated EPS values from 12/31/88 (before the merger) which were contained in the 12/31/89 annual earnings announcements and the 20-F filed with the SEC in the U.S.

To examine this issue, we compared abnormal returns to benchmark returns during short windows around EA dates to determine the significance of stock price responses to EA events in each country. We measured abnormal returns using a squared, standardized residual method similar to that used by Chari et al. (1988). We used two-factor market models in the U.S. and the U.K. as models of each of SK's equities' normal returns, and estimated each model over the period July 1989 to August 1994. The two market returns included in each model are the FTSE 100 and the Value Weighted NYSE/ASE index from CRSP.<sup>24</sup>

We computed residual variance over the sample period for each equity return series (denoted by subscript  $i$ ) and, for each three-day EA interval ( $k$ ), we computed a squared residual deflated by residual variance. We standardized this measure by the number of days in the announcement period to yield an abnormal return variable for each event,  $AR_{ikA}$ . We used a non-announcement period benchmark, computed as the squared, standardized residual ( $AR_{ikNA}$ ), against which to compare the announcement period abnormal return statistic. We averaged these statistics across the  $k$  EAs for equity  $i$  during the period to get  $AR_{iA}$  and  $AR_{iNA}$ . The difference between  $AR_{iA}$  and  $AR_{iNA}$ ,  $DIF_i$ , measures the average stock price response of return series ( $i$ ) to SK's EAs. The expected of  $DIF_i$  is zero under the null of no information content (see Frost and Pownall 1994 and Chari et al. 1988 for further discussion of this approach and computational formulas).

Table 8 presents results of this analysis, and shows that the stock price response to SK's U.K. GAAP earnings disclosures is significantly different from zero at the .01 level or better (two-sided tests) based on both parametric t-tests and non-parametric Wilcoxon Signed Rank tests for all SK equities. Table 8 also presents results from several cross-equity statistical comparisons, which do not support the hypothesis that the U.S. A Share ADR price response to EAs is less than the U.K. A Share response, or that the U.S. EU ADR price response to EAs is less than the U.K. EU price

response. The evidence in table 8 thus supports the view that U.S. investors are not confused, and that SK's U.S. equity prices rapidly respond to new information disclosed by SK in its media earnings disclosures.<sup>25</sup>

In a final analysis we estimated two-factor market models conditional on the release of SK's U.K. EAs made simultaneously in the U.S. and the U.K., and U.S. GAAP reconciliations contained in Forms 20-F filed with the SEC. In each model, the U.K. GAAP earnings information variable takes on the value of the U.K. GAAP PEC on the EA dates, zero otherwise, and the U.S. GAAP earnings variable takes on the value of the U.S. GAAP PEC on SEC filing dates, zero otherwise. We estimated separate models for A Share and EU ADRs in the U.S., and for A Shares, A Share ADRs, EUs and EU ADRs in the U.K. jointly using Generalized Least Squares to control for the heteroscedasticity and cross-correlation in the residuals from the two-factor conditional market model (see Frost and Pownall 1995 for a similar application).

This analysis is presented in table 9, with results using one-day and three-day event

<sup>24</sup> We estimated single-factor market models (using EU and A Share ADRs in the U.S. and A Shares in the U.K.) in several diagnostic analyses designed to assess the extent to which estimated betas are sensitive to the U.S. market index used (NYSE/ASE CRSP index versus the S&P 500), return interval (daily, weekly, monthly) and subperiod (subperiod 1 is July 1989 to December 1991; subperiod 2 is January 1992 to August 1994). For daily and weekly return intervals, estimated betas using the S&P 500 index (which range from 0.654 to 0.894) are less than comparable betas estimated using the NYSE/ASE index (which range from 0.802 to 1.164). Betas estimated using monthly returns do not differ between the two U.S. market indexes, in both U.S. EU ADR and A Share ADR market models. Estimated U.S. betas are generally the largest (and closest to 1.0 on average) when monthly return intervals are used. Estimated betas using U.S. data are stable across the two subperiods, but when estimated using U.K. data are about twice as large in subperiod 1 as in subperiod 2 (the difference varies in magnitude depending on the return interval).

<sup>25</sup> We repeated the analyses presented in table 8 using one-day and five-day return windows. Results using five-day windows are similar to results using three-day windows presented in table 8, but significance levels are slightly stronger or slightly weaker, depending on type of equity. Results using one-day windows were weaker for all six equities analyzed.

**TABLE 8**  
**Stock Price Responses to SmithKline Beecham plc's**  
**Earnings Announcements in the U.S. and the U.K.**

	$AR_A$ <sup>1</sup> Mean (Median)	$AR_{NA}$ <sup>2</sup> Mean (Median)	DIF <sup>3</sup> Mean (Median)	Parametric t-test Statistic <sup>4</sup>	Wilcoxon Signed Rank Statistic <sup>5</sup>
<b>A. In the U.S.</b>					
1. A Share ADR	2.77 (1.51)	0.59 (0.41)	2.18 (0.99)	2.88***	22***
2. EU ADR	3.88 (2.60)	0.82 (0.40)	3.06 (2.13)	3.07***	17***
<b>B. In the U.K.</b>					
3. A Share	2.68 (1.86)	0.79 (0.56)	1.88 (0.66)	2.95***	20***
4. EU	2.75 (1.54)	0.80 (0.62)	1.95 (0.655)	3.00***	17***
5. A Share ADR	1.39 (0.96)	0.44 (0.22)	0.94 (0.60)	2.72***	21***
6. EU ADR	2.14 (1.18)	0.66 (0.52)	1.48 (0.73)	3.05***	24***
<b>C. Cross-Equity-Comparisons</b>					
7. U.S. A Share ADR minus U.K. A Share				0.70	83
8. U.S. EU ADR – U.K. EU				1.55*	54**
9. U.S. A Share ADR – U.S. EU ADR				-1.73**	44**
10. U.K. A Share – U.K. EU				-0.28	79

\*, \*\*, \*\*\* indicate significant at the .10, .05, and .01 level, respectively, one-sided tests.

<sup>1</sup>  $AR_A$  is the announcement period abnormal return measure as the squared, standardized two-factor market model residual computed over the three-day period days -1, 0, and +1 relative to the EA date. The two factors are the return on the FTSE 100 Index in the U.K. and the return on the Value Weighted CRSP NYSE/ASE Index in the U.S. Return computations are based on equity prices expressed in U.S. dollars.

<sup>2</sup>  $AR_{NA}$  is the non-announcement period benchmark return, measured as the squared, standardized market model residual computed over the three-day period days, -8, -9, and -10 relative to the EA date.

<sup>3</sup> DIF is an EA-specific measure of the difference between announcement period abnormal returns and non-announcement period benchmark returns ( $AR_A - AR_{NA}$ ).

<sup>4</sup> For each equity type, the t-statistic tests the null hypothesis that the mean DIF equals zero. It is computed by dividing the mean DIF by 1/n times its standard deviation. The t-statistic in row 7 tests the null hypothesis that mean U.S. A Share ADR DIF equals mean U.K. A Share DIF. The statistic is computed by dividing the sample mean of the difference in DIF's by its standard deviation divided by the sample size (18).

<sup>5</sup> The Wilcoxon signed rank statistics test the same hypotheses as those described in note 4 above. Refer to Siegel (1956, 81-83) for computational details. The statistic in row 7 is based on the Wilcoxon Matched-Pairs Signed-Ranks Test described in Siegel (1956).



windows in panels A and B respectively. The estimated regression models are all significant at the .0001 level or better, with adjusted R-squares ranging from 0.02 for A Share ADRs trading in the U.K. (three-day window) to 0.19 for EU ADRs trading in the U.S. (both one-day and three-day windows). All estimated coefficients (in both panels) for the U.S. and U.K. market returns are significant at the .05 level or better (one-sided tests throughout). The estimated U.K. GAAP earnings response coefficients are all positive, but significance levels vary depending on whether a one-day or three-day return window is used in the analysis. Results for SK equities trading in the U.K. are stronger in panel A (one-day return window) where significance levels for the estimated earnings response coefficient are all at .05 or better. The U.S. equity results are stronger in panel B (three-day return window), where significance levels are .01. Therefore, evidence in table 9 is consistent with the view that both U.K. and U.S. investors use information about SK's U.K. GAAP earnings to value SK shares.<sup>26</sup>

Evidence in table 9 also indicates that SK's equity returns are positively correlated with SK's U.S. GAAP earnings changes on the SEC filing dates. Panel A of table 9 shows that for three of the six SK equities analyzed, the estimated U.S. GAAP coefficient is significant at the .10 level, even though the estimation is based on only five U.S. GAAP SEC filing dates (for related evidence, see McQueen 1993).

## VI. SUMMARY AND CONCLUSIONS

In this study we explored international information dissemination and price discovery by analyzing SmithKline Beecham plc's equity characteristics and accounting disclosures in the U.S. and the U.K. We examined non-accounting and accounting explanations for the price differences among SK's equities traded in the U.S. and the U.K.

A summary of our results is as follows. First, although there are substantial price differences (some negative, some positive) on at least some days between U.S. and U.K. A Shares and between U.S. and U.K. EU ADRs, we observe significant and systematic differ-

ences between A Shares and Equity Units (without respect to the market), both of which trade in the U.K. (primarily as shares) and in the U.S. (primarily as ADRs). We find that A Share prices exceeded EU prices for all days in the sample period in both within-country and cross-country comparisons, and that the mean price differences for all A Share/EU comparisons are above U.S. \$5.00, or over 15 percent of the mean A Share price in the U.K. In addition, maximum share price differences between U.S. and U.K. A Shares, and between U.S. and U.K. EUs all exceeded \$2 (U.S.) for the full sample period and both subperiods.

Our analysis suggests that several non-accounting factors may explain the large price difference between SK's A Shares and Equity Units. First, although SK EU and A Share cash dividends are intended to be equivalent, tax-exempt entities in the U.S. receive greater dividend cash flows from EUs and EU ADRs than from A Shares and A Share ADRs, and tax-exempt entities in the U.K. receive greater dividend cash flows from A Shares and A Share ADRs than from EUs and EU ADRs. These and other dividend cash flow differences for different investor classes and SK equity types might explain at least some of the A Share and EU price difference. Second, A Shares traded in the U.K. are substantially more liquid than EUs traded in the U.K. based on a number of measures. For example, in 1992 and 1993 there were about 40 times as many A Share holders as EU holders in the U.K., and trade frequency was more than five times greater for A Shares than for EUs. Thus, to the extent that liquidity is positively correlated with share price, a larger price for A Shares relative to EUs is to be expected. More favorable investor sentiment towards SK in the U.K. than in the U.S. is a third non-accounting explanation for A Share price relative to EU prices. Since U.S. investors hold primarily EU ADRs, a weaker interest in SK equities in the U.S. will depress EU prices in aggregate.

<sup>26</sup> A second possibility is that U.S. investors infer changes in the value of SK's equity by observing U.K. share price response to EAs.

**TABLE 9**  
**Conditional Market Models for SmithKline Beecham's**  
**A Shares, Equity Units, and ADRs in the U.S. and the U.K.<sup>1</sup>**

$$\text{Model: } R_{it} = \alpha_i + \beta_{i1}R_{mtUK} + \beta_{i2}R_{mtUS} + \delta_i PEC_{UK} + \alpha_i PEC_{us} + \varepsilon_{it}^2$$

**Panel A: One-day Return**

Time Series	Intercept	U.S. Market Beta	U.K. Market Beta	U.K. GAAP Earnings Response Coefficient	U.S. GAAP Earnings Response Coefficient
US Equity Unit ADR	-0.000 (-0.18)	1.014 (12.62***)	0.270 (5.50***)	0.019 (0.95)	0.003 (0.77)
UK Equity Unit ADR	0.000 (0.03)	0.196 (2.09**)	0.332 (5.81***)	0.065 (2.82***)	0.007 (1.47*)
US A-Share ADR	-0.000 (-0.24)	0.761 (10.28***)	0.319 (7.08***)	0.025 (1.38*)	0.004 (1.34*)
UK A-Share ADR	0.000 (0.18)	0.237 (2.19**)	0.266 (4.02***)	0.054 (2.04**)	0.007 (1.34*)
UK A-Share	-0.000 (-0.18)	0.347 (4.66***)	0.458 (10.08***)	0.049 (2.69***)	0.003 (0.94)
UK Equity Unit	-0.000 (-0.14)	0.372 (4.64***)	0.454 (9.27***)	0.046 (2.31***)	0.003 (0.96)

**Panel B: Three-day Return**

US Equity Unit ADR	-0.000 (-0.65)	1.001 (12.49***)	0.265 (5.43***)	0.036 (3.15***)	0.001 (0.60)
UK Equity Unit ADR	0.000 (0.02)	0.186 (1.98**)	0.326 (5.71***)	0.025 (1.83**)	0.001 (0.47)
US A-Shares ADR	-0.000 (-0.58)	0.748 (10.13***)	0.313 (6.98***)	0.030 (2.85***)	0.001 (0.359)
UK A-Share ADR	0.000 (.241)	0.229 (2.11**)	0.260 (3.94***)	0.016 (1.02)	0.000 (0.16)
UK A-Share	-0.000 (-0.30)	0.338 (4.53***)	0.454 (10.02***)	0.025 (2.36***)	0.000 (0.052)
UK Equity Unit	-0.000 (-0.38)	0.361 (4.50***)	0.449 (9.21***)	0.031 (2.72***)	0.000 (0.31)

\*, \*\*, \*\*\* indicate significant at the .10, .05, and .01 level, respectively, one-sided tests.

<sup>1</sup> T-statistics to test whether the OLS coefficients are equal to zero are given in parentheses under the coefficients.

<sup>2</sup> This model is a two factor market model conditional on: (1) the release of UK GAAP earnings announcements simultaneously in the U.S. and the U.K. and (2) U.S. GAAP reconciliations, where the two factors are the return on the Financial Times Stock Exchange 500 Index in the U.K. and the return on the Value Weighted CRSP NYSE/ASE Index in the U.S. The six returns series (A-Shares and Equity Units, A-Share ADRs and Equity Unit ADRs, each trading in the U.S. and the U.K.) are indexed by *i* and trading days are indexed by *t*. PEC is the percentage earnings change calculated as this period's earnings minus earnings one year ago divided by earnings one year ago where  $PEC_{UK}$  is calculated from the amount disclosed in UK GAAP in pounds and  $PEC_{US}$  is calculated from US GAAP in pounds as disclosed in the reconciliations contained in the four Form 20-Fs filed during the period.

Further analysis indicates that accounting-related factors probably do not explain SK's A Share/EU price differences. SK's earnings based on U.K. GAAP have been greater than SK's U.S. GAAP earnings in every year since the merger, and information about SK's U.K. GAAP earnings does not appear to be useful for predicting what SK's U.S. GAAP earnings will be. However, our stock price

analyses indicate that U.S. investors use information about SK's U.K. GAAP earnings (on EA dates) in valuing SK, and that the U.S. market response to SK's disclosures of U.K. GAAP earnings is similar to the U.K. market response. Thus, U.S. investors do not appear to be confused by U.S./U.K. GAAP differences, and in fact use information about U.K. GAAP earnings in their valuations of SK.

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