Macro Markets

Creating Institutions for Managing Society's Largest Economic Risks

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Markets as Inventions

History of innovations in market structure shows irregular progress, marked by inventive activity

— First markets, replaced reciprocal gift giving (Polanyi, The Great Transformation, 1944)

— Stock markets, not possible until corporate law developed

— Futures markets, with clearing house, margin accounts, 1860s

— Financial futures (CME, currency futures, 1972)

— Options markets (CBOE, 1973)

— Cash settled futures markets (Eurodollar futures at CME, 1981)

— Stock index futures (KCBT 1982)

— Consumer price index futures (CSCE 1985, failed; Brazil 1987)

— Real estate futures (London Fox, 1991, CBOT, 1996?)

Markets as Accidents of History

— Currency futures awaited floating exchange rates in 1971

— Stock index futures blocked until 1981 SEC - CFTC agreement on jurisdiction

— CPI Futures were not approved until 1985, when there was no inflation

— London Fox attempt at property futures foiled by scandal

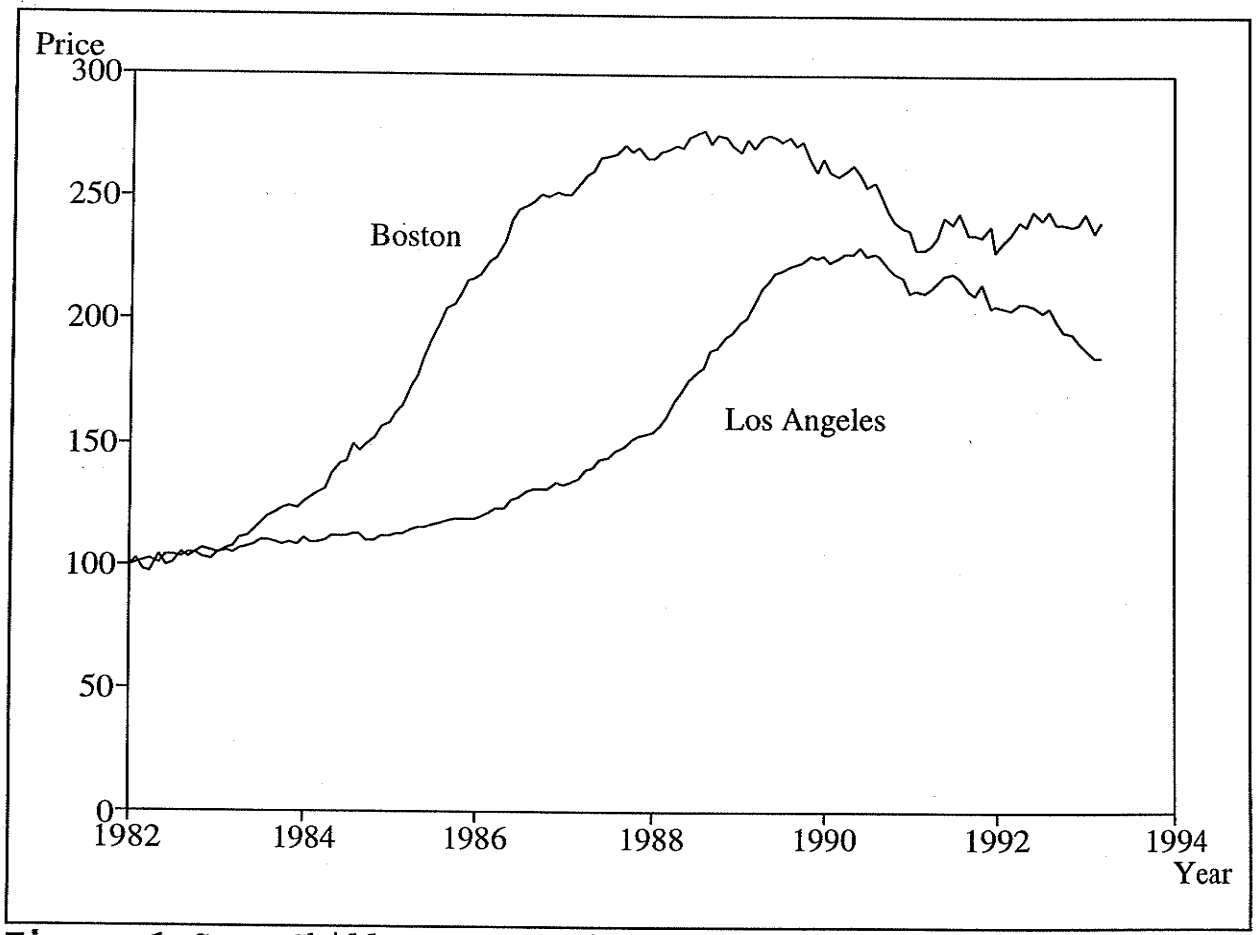

Figure 1 Case-Shiller Home Price Indices, monthly, January 1982 to March 1993, for Boston and Los Angeles, scaled to 100 in January 1982. Source: Case Shiller Weiss, Inc., Cambridge MA.

Index Participations

May - August 1989

American Stock Exchange: Equity Index Participations (EIPs)

Philadelphia Stock Exchange: Cash Index Participations (CIPs)

Perpetual Futures

$$s_t = f_t - f_{t-1} + d_t - r_{t-1} f_{t-1}$$

where f_t, f_{t-1} are perpetual futures prices at times t and t-1 respectively, d_t is dividends paid (or income index) at time t and r_{t-1} is the return of a competing asset between time t-1 and t.

$$\delta_t = E_t \delta_t^* \tag{11}$$

$$\delta_t^* \equiv -\sum_{j=0}^{\infty} \rho^j \Delta d_{t+j} \tag{12}$$

$$\xi_t = \delta_t - \rho\, \delta_{t+1} + \Delta d_t. \tag{13}$$

$$\delta_t - \delta_t^* = \sum_{j=0}^{\infty} \rho^j \xi_{t+k}. \tag{14}$$

$$var(\xi_t) = (1-\rho^2) var(\delta_t - \delta_t^*). \tag{15}$$

$$\delta_t = -e1'A(I-\rho A)^{-1} z_t \tag{16}$$

$$\xi_t = e1'(I-\rho A)^{-1} u_{t+1} \tag{17}$$

$$\text{var}(\xi_t) = e1'(I-\rho A)^{-1} \Omega (I-\rho A)^{-1'} e1. \tag{18}$$

Standard Deviations of Returns

GDP Futures Markets 1960-1990

Argentina	9.86%
Brazil	5.86%
Canada	2.56%
France	5.27%
Germany	4.39%
Japan	8.38%
Mexico	6.01%
Nigeria	10.74%
USA	1.62%

USA GNP 1900 to 1992: 4.72%

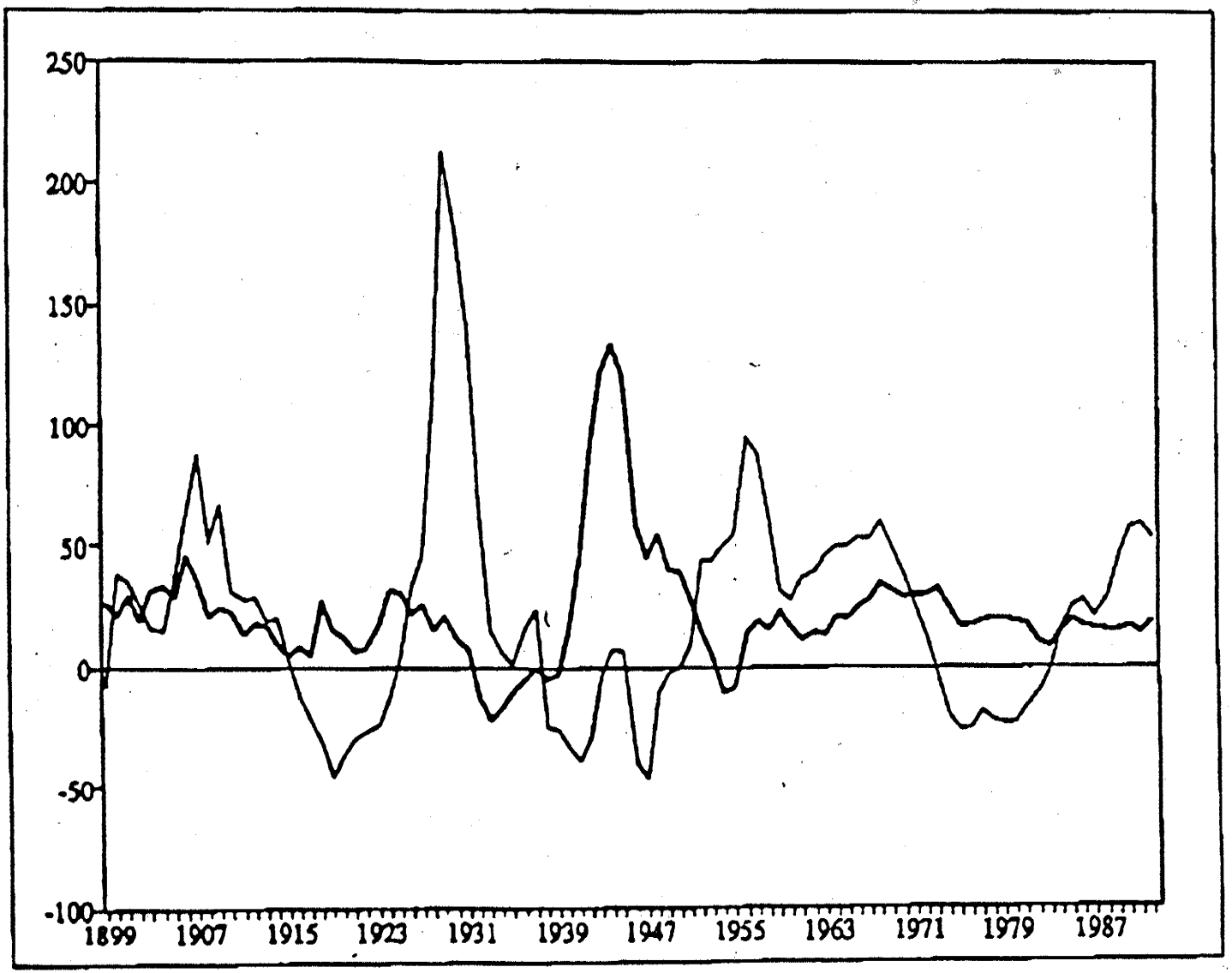

Figure 2 Ten-year growth rates (in percent) ending in year indicated. Heavy solid line: real per capita GNP. Solid line: real Standard and Poor dividends.

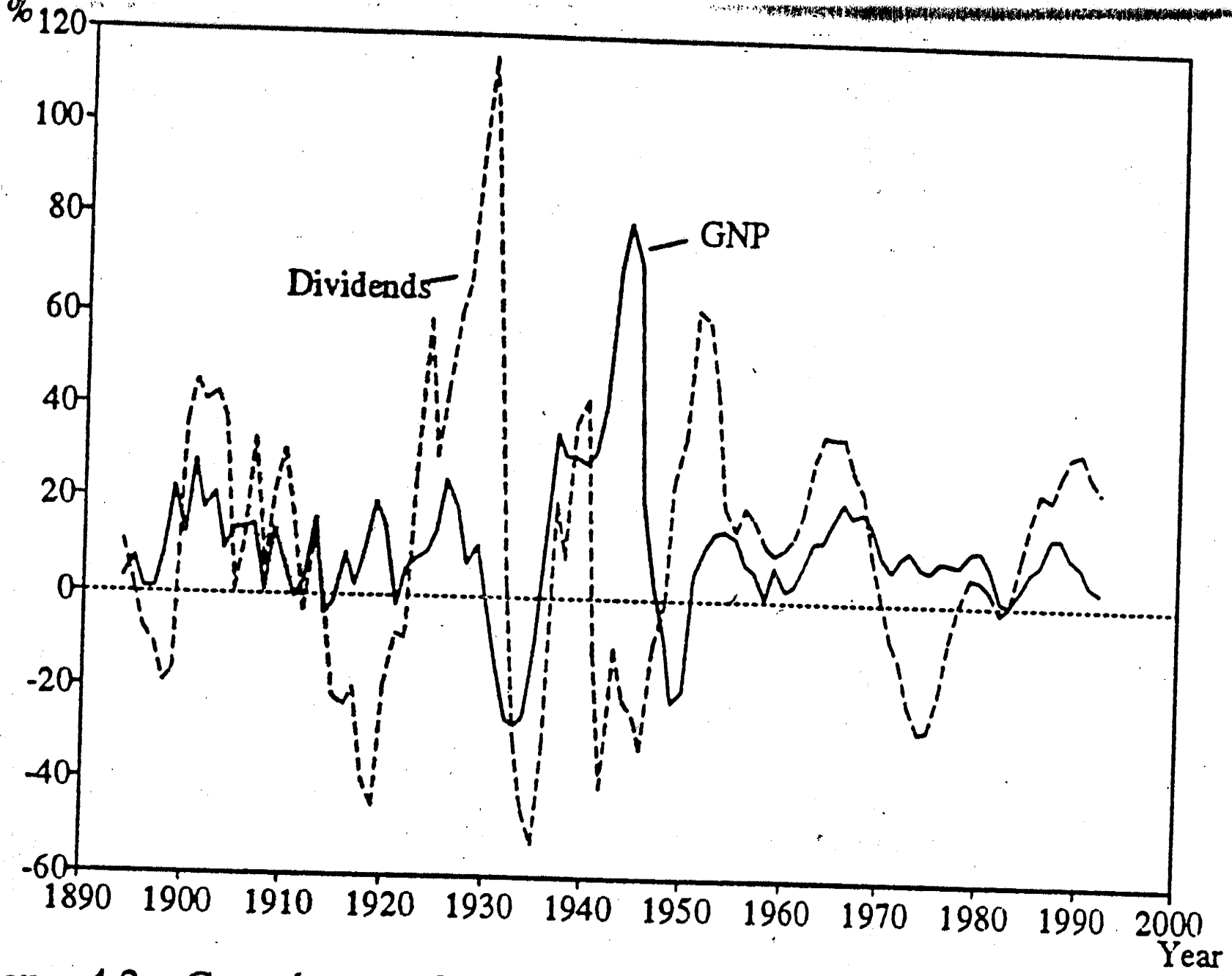

Figure 4.2. Growth rates for five year periods ending in year shown for real dividends (dashed line) and real per capita U. S. GNP, 1894-1992. Source: Standard and Poor's, Shiller (1989) and U. S. D

$$U_c = \sum_{t=1}^{T} u_{ct} \tag{1}$$

$$u_{ct} = \text{constant}_c + \frac{1}{x_{0c}} \bar{x}_{ct} - \frac{\alpha}{x_{0c}^2} \text{var}(x_{ct}) \tag{2}$$

$$\text{var}(x_{ct}) = \boldsymbol{\Omega}_{cct} + \bar{\boldsymbol{\beta}}_c' \bar{\boldsymbol{A}}' \Omega_t \bar{\boldsymbol{A}} \bar{\boldsymbol{\beta}}_c + 2 \bar{\boldsymbol{\beta}}_c' \bar{\boldsymbol{A}}' \boldsymbol{\Omega}_{ct} \tag{3}$$

$$\bar{\boldsymbol{\beta}}_c = -(\bar{\boldsymbol{A}}' \boldsymbol{\Omega}_c + \boldsymbol{TP} x_{0c})$$

$$\bar{\boldsymbol{\beta}} = -(\bar{\boldsymbol{A}}'\boldsymbol{\Omega} + T\boldsymbol{P}\boldsymbol{\iota}'\boldsymbol{x}_0) \tag{5}$$

$$\boldsymbol{P} = -\bar{\boldsymbol{A}}'\Omega\boldsymbol{\iota}(T\boldsymbol{\iota}'\boldsymbol{x}_0\boldsymbol{\iota})^{-1} \tag{6}$$

$$S = \sum_{c=1}^{C} w_c U_c \tag{7}$$

$$S = tr(w(T\ln(\boldsymbol{x}_0) - T\boldsymbol{x}_0^{-1}\bar{\boldsymbol{\beta}}'\boldsymbol{P}\boldsymbol{\iota}' - \frac{1}{2}\boldsymbol{x}_0^{-2}(\boldsymbol{\Omega} + \bar{\boldsymbol{\beta}}'\bar{\boldsymbol{\beta}} + 2\bar{\boldsymbol{\beta}}'\bar{\boldsymbol{A}}'\boldsymbol{\Omega}))). \tag{8}$$

$$S = tr(w(\ln(x_0) + \frac{x_0^{-2}}{2}(\bar{\beta}'\bar{\beta} - \Omega))) \quad (9)$$

$$L = \bar{A}'\Omega\bar{M}wx_0^{-2}\bar{M}'\Omega\bar{A} - \lambda(\bar{A}'\Omega\bar{A} - 1) \quad (10)$$

$$\Omega\bar{M}wx_0^{-2}\bar{M}'\Omega\bar{A} = \lambda\Omega\bar{A} \quad (11)$$

$$\bar{M}'\Omega\bar{M}\bar{\beta}' = -\lambda\bar{\beta}' \quad (12)$$

TABLE 2B
WEIGHTS (A) ON COUNTRY GROWTH RATES
FOR PRINCIPAL COMPONENTS
MEAN-VARIANCE UTILITY CASE

COUNTRY	PC1	PC2	PC3	PC4	PC5
CANADA	-2.42e-11	-4.07e-10	5.392e-10	-4.98e-10	7.360e-10
MEXICO	-8.25e-11	-5.93e-10	5.844e-10	5.043e-10	5.872e-09
USA	3.565e-10	7.236e-10	1.785e-10	6.389e-10	-3.80e-10
BRAZIL	-5.48e-11	-1.08e-09	1.893e-09	-1.20e-09	-2.09e-09
INDIA	9.242e-11	-8.02e-10	-1.45e-09	-3.39e-09	8.275e-10
JAPAN	-7.09e-10	3.224e-10	-7.11e-11	-1.01e-09	-4.16e-10
FRANCE	-1.40e-10	-4.94e-10	1.511e-10	-1.46e-10	1.034e-09
GERMANY, WEST	-1.47e-10	-1.03e-09	-9.59e-10	3.088e-09	-1.63e-09
ITALY	-1.41e-10	-6.08e-10	-1.65e-10	4.301e-10	2.439e-09
UNITED KINGDOM	5.594e-12	-4.94e-10	-1.90e-10	-4.41e-10	-1.56e-09

TABLE 2C
CONSUMER SURPLUS PER PC AS PERCENT OF GDP
TWENTY YEAR CASE

COUNTRY	PC1	PC2	PC3	PC4	PC5
CANADA	67.78%	1.40%	11.49%	0.02%	0.05%
MEXICO	5.06%	2.39%	20.34%	2.29%	18.11%
USA	35.36%	2.46%	0.03%	0.02%	0.01%
BRAZIL	23.94%	22.00%	126.95%	1.73%	3.49%
INDIA	126.52%	8.70%	22.42%	10.90%	0.07%
JAPAN	539.25%	5.31%	0.16%	0.10%	0.02%
FRANCE	7.58%	0.08%	0.49%	0.09%	0.24%
GERMANY	12.00%	23.16%	15.07%	8.11%	0.80%
ITALY	12.27%	2.72%	0.56%	0.51%	0.69%
UNITED KINGDOM	51.59%	0.07%	1.58%	0.16%	0.98%

COUNTRY	PC6	PC7	PC8	PC9	TOTAL
CANADA	0.59%	0.04%	0.35%	1.46%	83.18%
MEXICO	1.23%	0.23%	0.93%	0.05%	50.62%
USA	0.00%	0.00%	0.00%	0.00%	37.88%
BRAZIL	0.01%	0.30%	0.05%	0.06%	178.53%
INDIA	0.09%	0.11%	0.00%	0.00%	168.81%
JAPAN	0.01%	0.00%	0.00%	0.00%	544.87%
FRANCE	0.03%	0.29%	1.69%	0.06%	10.56%
GERMANY	0.26%	0.07%	0.00%	0.00%	59.48%
ITALY	3.56%	0.45%	0.03%	0.01%	20.80%
UNITED KINGDOM	0.24%	2.62%	0.25%	0.01%	57.50%