Global Stock Markets in the Twentieth Century

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A B 6 T R A C T

L on g-term estim ates of ex p ected retu rn on eq u ities are ty p ica lly d eriv ed from U .6 . d a ta on ly. T h ere are rea so n s to su sp ect, h ow ever, th at th ese estim ates a re su b ject to su rv iv o rsh ip , as th e U n ited 6 ta tes is a rg u ab ly th e m o st su ccessfu l cap ita list sy stem in th e w orld . W e co llect a d atab ase of cap ita l ap p recia tio n in d ex es for S9 m arkets go in g b ack in to th e 1920 s. O ver 1921 to 1996, U .6 . eq u ities h ad th e h ig h est real retu rn of a ll cou n tries, at 4 .S p ercen t, versu s a m ed ia n of 0 .8 p ercen t for oth er cou n tries. T he h ig h eq u ity p rem iu m ob ta in ed fo r U .6. eq u ities th erefo re ap p ea rs to b e th e ex cep tio n ra th er th an th e ru le.

In a n ow -fam ou s article, M eh ra an d P resco tt (1985 ) argu e th at stan d ard gen eral eq u ilib - riu m m o d els can n ot ex p la in th e sixe of th e risk p rem iu m on U .6 . eq u ities, w h ich averages ab ou t 6 p ercen t over th e 1889 -1978 p erio d . T h ey sh ow th at on e w ou ld n eed a very la rge co effi cien t of risk aversion , la rgely in ex cess of th e u su al va lu e of tw o, to gen era te su ch a p re- m iu m . T h is u n settlin g resu lt h as sp arked a fl u rry of th eo retica l resea rch w h ich h as ex p lo red a ltern ativ e p referen ce stru ctu res, in clu d in g d rop p in g th e ex p ected u tility assu m p tio n an d

in tro d u cin g h ab it fo rm atio n . of stan d a rd m o d els.

6 u ch ep o rts, h ow ever, com e at th e cost of lo sin g th e in tu itio n

R a th er th an search in g fo r p referen ce stru ctu res th at fi t h isto rica ld ata, oth er ex p la n atio n s h ave fo cu sed on th e lim ita tio n s of th e d ata. R ietx (1988) p rop o ses a so lu tio n to th e p u xxle th at in vo lv es in freq u en tly o ccu rrin g ” crash es.“ A ssum in g a crash w h ere ou tput fa lls b y 50 (or 25 ) p ercen t of its va lu e w ith a p rob ab ility of 0 .4 p ercen t (or 1 .4 p ercen t), R ietx gen erates ”ex an te“ eq u ity p rem iu m s con sisten t w ith th ose ob served in th e U .6 . an d risk aversion of five (or ten ).

A rela ted argu m en t is ad van ced in B row n , G o etxm an n , an d R oss (1995 ), w h o cla im th at su rv iva l of th e series im p a rts a b ia s to ” ex p ost“ retu rn s. T h ey sh ow th at an ex an te eq u ity p rem iu m of xero can gen erate a h ig h ex p ost p ositiv e p rem iu m b y sim p ly con d itio n in g u p on th e m arket su rv iv in g an ab so rb in g low er b ou n d over th e cou rse of a cen tu ry. T h e im p lica tio n is th at risk aversio n can n ot b e in ferred fro m th e em p irica l an a ly sis of h isto rica l d ata w h ose ob serva tio n is con d itio n al u p on su rv iva l. W h ile th e R ietx (1988) a rg u m en t lea d s to h ig h er ex an te eq u ity p rem iu m s, the su rv iva l argu m en t p o in ts to b ia ses in ex p ost p rem iu m s.

U n fo rtu n a tely, th ese argu m en ts a re n early im p ossib le to so rt ou t b ased on a cen tu ry of U .6 . eq u ity d ata. C on sid er, for in stan ce, a 0 .4 p ercen t an n u al p rob ab ility of a la rge crash . W e w ou ld th en ex p ect on e crash to o ccu r every 250 years. E ven if w e ob served su ch a lo n g sam p le series, ou r estim ate of th e crash p rob ab ility w ou ld still b e su b ject to en orm ou s estim a tio n erro r.

T h e on ly so lu tio n to th is d ilem m a is to ex p an d th e sam p le b y co llectin g ad d itio n al cross- sectio n al d ata. In th is p ap er, w e reco n stru ct rea l cap ita l ap p recia tio n series for eq u ity m ar-

kets in S 9 cou n tries over m u ch of th e tw en tieth cen tu ry. W e in clu d e n ot on ly th ose m arkets th at su rv iv ed , b u t a lso th ose m arkets w h ich ex p erien ced b o th tem p orary an d p erm an en t in terru p tio n s. W e u se th is n ew d atab ase to estim ate th e lo n g-term retu rn s to in vestin g in g lo b al m arkets over th e tw en tieth cen tu ry.

T h e fi rst p a rt of ou r an a ly sis treats each m a rk et sep ara tely. In ep ect, it takes a ll sto ck m a rk et h isto ries as d raw s from on e u rn . U n d er th ese con d itio n s, w e sh ow th at th e p ro cess of d isca rd in g m arkets w ith in terru p tio n s creates serio u s b ia ses in th e m easu rem en t of ex p ected retu rn s. 6 u ch an ex p erim en t a ssu m es th at a ll m arkets h ave th e sam e sta tistica l ch a ra cter- istics. T h is fra m ew o rk is va lid w h en m a rk ets a re seg m en ted d u e, for in sta n ce, to cap ita l con tro ls. T h e assu m p tio n of con stra in ts on su ch d iv ersifi catio n is n ot u n rea son ab le for th e tim e p erio d und er stu d y.

T h is p ap er p rov id es th e fi rst com p reh en siv e lo n g-ru n estim ates of retu rn on eq u ity cap ita l acro ss a b ro ad ra n ge of m arkets. T o d ate, v irtu a lly th e on ly lo n g-ru n ev id en ce regard in g eq u ity ra tes of retu rn is d eriv ed from th e U n ited 6 ta tes, for w h ich w e h ave con tin u ou s sto ck p rice h isto ry go in g b ack to 1802. W e a re ab le to au gm en t th e U .6 . ex p erien ce w ith a w id e ra n ge of d ip eren t g lo b al eq u ity m arket h isto ries.

W e fi n d strik in g ev id en ce in su p p ort of th e su rv iva l ex p la n atio n for th e eq u ity risk p re- m iu m . O ver ou r sam p le p erio d , the U .6. has the h ig h est u n in terrup ted real rate of app re- cia tio n , at 4 .S p ercen t an n u a lly. F or o th er cou n tries, th e m ed ian real ap p recia tio n ra te is arou nd 0 .8 p ercen t. T h is stron g ly su ggests that estim ates of eq u ity p rem ium s ob ta in ed so lely from th e U .6 . m arket a re b ia sed u p w a rd b y su rv iv o rsh ip . A n a ltern a tiv e lin e of ex p la n a tio n is th at of fu n d am en ta lly d ip eren t risk p rem iu m s. W ith segm en ted m a rk ets, risk p rem iu m s are d eterm in ed b y lo cal m arket cond itio n s. T h us d ip ering ex p ected retu rn s cou ld b e due to d ip eren t in vestor ex p ectatio n s ab ou t risk or to d ip eren t risk aversio n .

B eyon d its p o ten tial va lu e for sh ed d in g lig h t on th e eq u ity p rem iu m p u xxle, th is g lob al database a llow s a b road in vestig atio n in to th e b ehav io r of eq u ity m arkets over the very lo ng ru n . W e h ave b een ab le to con stru ct m on th ly real an d d o lla r-va lu ed cap ita l ap p recia tio n ind ices for v irtu a lly a ll the eq u ity m arkets that ex isted du rin g the tw en tieth cen tu ry. T h is

en ab les u s to ex am in e m a rk ets in crisis an d to com p are th e b eh av io r of lo sin g m a rk ets to th e b eh av io r of w in n in g m a rk ets.

In th e secon d p art of th e stu d y, w e con stru ct a w orld m a rk et ap p recia tio n in d ex in o rd er to ex am in e the p oten tia l ex p erien ce of a d iv ersified g lo bal in vestor. T h is a llow s us to an a ly xe th e b en efi ts of in tern atio n al d iv ersifi catio n , com p arin g retu rn an d risk m easu res acro ss th e U .6 . an d th e g lob al p ortfo lio . W e estim a te th e retu rn th at su ch an in vestor w ou ld h ave earn ed h ad it b een p o ssib le to h o ld th e w orld m a rk et from th e early 1920 s. E ven th ou gh on e cou ld argue th at few in vestors cou ld h ave h eld g lo ba lly -d iv ersifi ed p ortfo lio s du rin g th ese tu rb u len t tim es, th is is still an in form ativ e ex p erim en t as a gu id e for fu tu re in vestin g.

T h is p ap er is organ ixed as fo llow s. 6 ectio n I m otiva tes th e search for d ip eren ces in retu rn on cap ita l. 6 ectio n II d escrib es th e con stru ctio n of th e g lo b al m a rk et d a ta b a se. 6 ectio n III com p ares th e p erfo rm an ce of g lo b al sto ck m a rk ets an d d iscu sses b ia ses ap ectin g th e con stru ctio n of a g lob al sto ck m arket in d ex . 6 ectio n IV con ta in s som e con clu d in g com m en ts.

# T h e Im p o rta n c e o f C om p o u n d G r o w th

In 6 ep tem b er 1626, P ierre M in u it, th e G overn or of th e W est In d ia C om p an y, p u rch a sed M an h a tta n Isla n d fro m th e lo cal In d ia n s for th e total su m of six ty gu ild ers, or ab ou t tw en ty - fou r d o lla rs. A t fi rst sig h t, th is seem s lik e th e d eal of th e cen tu ry.

Y et, slig h t d ip eren ces in th e tim e va lu e of m on ey over lo n g h orixo n s can resu lt in va stly d ip eren t con clu sion s. If on e com p ou n d s th is p ay m en t at a fi ve p ercen t ra te of in terest, it w ou ld h ave grow n in 1995 to ab ou t 1 .6 b illio n in cu rren t d o lla rs, w h ich seem s ex p en siv e for S 1 sq u are m iles of und evelo p ed la nd. C om p ound in g at th ree p ercen t, how ever, resu lts in a m u ch low er cu rren t p rice of 81 .S m illio n — a th ou san d fo ld d ip eren ce! T h is story sh ow s th at d ip eren ces in ra tes of retu rn on cap ita l can lea d to d ra stica lly d ip eren t n u m b ers w h en com p ound ed over lo ng horixo n s.

O u r estim ates of th e rate of retu rn on eq u ity cap ita l are ty p ica lly b ased on a cen tu ry of U .6 . d a ta , w h ich rev ea ls an eq u ity p rem iu m of ab ou t six p ercen t. A s sh ow n in th is ex am p le, h ow ever, sm a ll d ip eren ces in ra tes of retu rn can h ave m om en tou s im p lica tio n s over th e lo n g

run. H ow m u ch fa ith can w e h ave in th is n um b er?

N ot m u ch , g iv en th e vo la tility of sto ck retu rn s. C on sid er fo r in stan ce a m arket w h ich grow s at a six p ercen t an n u al ra te w ith a sta n d a rd d ev ia tio n of tw en ty p ercen t. T h e q u es- tio n is, h ow m an y years d o w e req u ire to esta b lish th at g row th is p ositiv e w ith sta tistica l con fid en ce? U sin g the standard h-test at th e fi ve p ercen t lev el, w e req u ire th at th e sta tistic

u^

h = σ^ f √ N

0 .06

= 0 .20 f √ N

(1 )

b e grea ter th an tw o. T h is req u ires N to b e at lea st 44 years. In o th er w o rd s, w e n eed ab ou t ha lf a cen tu ry of retu rn s to b e con fid en t th at th is six p ercen t eq u ity p rem ium is p ositiv e. If th e ex p ected retu rn is th ree p ercen t in stea d , w e w ill n eed m o re th an 178 years of d ata to esta b lish sta tistica l sig n ifi can ce!

A n oth er p ro b lem is th at w e h ave rea son s to su sp ect th at estim a tes of retu rn on cap ita l from th e U n ited 6 ta tes a re ap ected b y su rv iva l. A t th e b eg in n in g of th e cen tu ry, activ e sto ck m arkets ex isted in a n um b er of cou n tries, in clu d ing R u ssia , F ran ce, G erm an y, J apan , an d A rgen tin a. A ll of th ese m arkets h ave b een in terru p ted fo r a n u m b er of rea son s, in clu d in g p o litica ltu rm o il, w ar, an d h y p erin fl atio n . A ssu m in g th ere w as som e p rob ab ility of d isru p tio n for th e U .6 . m arket, th is p rob ab ility is n ot refl ected in th e ob served U .6 . d ata. In tu rn , th is w ill b ia s ou r estim a tes of th e eq u ity p rem iu m .

A s sm a ll d ip eren ces in estim ates on eq u ity cap ita l h ave d ram atic im p lica tio n s for lo n g- term grow th , w e feel it is im p o rta n t to ex ten d ou r k n ow led ge of eq u ity p rem iu m s to a la rge cross-sectio n al sam p le of lo n g-term d a ta .

# A G lo b al S to c k M a rk e t D a ta b a se

T h e sta n d ard d ata sou rces on in tern atio n al sto ck p rices are M organ S tan ley C apstal

†n tern atson al P erspectsnes (M 6 C IP ) for d evelo p ed m a rkets an d th e †n tern atson al F sn an ce C orporatson (IF C ) fo r em erg in g m a rk ets. B o th are rela tiv ely recen t.

M 6 C IP sta rted to con stru ct eq u ity in d ices in J an u a ry 1970 fo r a sa m p le of 19 m arkets from in du stria l (d evelo p ed) coun tries. T h ese in d ices are bu ilt u sin g a un ifo rm m eth o d o lo gy

an d in clude in com e an d cu rren cy ep ects. A sim ila r ap p roach w as und ertaken b y the IF C , w h ich started to bu ild in 1980 ind ices for n ine em erg ing m arkets, w h ich w ere ex p and ed to 26 b y 1995.

B eyon d th ese d atab ases, u n fo rtu n a tely, th ere is little sy stem a tic in form a tio n on th e lo n g- term p erfo rm an ce of g lo b alsto ck m arkets. T h e U n ited 6 ta tes is a ra re ex cep tio n , as m on th ly sto ck m arket in d ices h ave b een con stru cted b y 6 tan d ard an d P o or's an d , p rio r to 1926 , b y A lfred C ow les (19S9 ), go in g b ack in to th e 1870 s.

F or the n on -U .6. data, w e m u st tu rn to a variety of sou rces. T he first is th e In ternatio n al M on etary F u n d (IM F ), w h ich pub lish es m on th ly sto ck p rice ind ices as rep orted b y the lo cal au th o rities in its †n tern atson al F sn an csal S tatsstscs (IF 6 ) p u b lica tio n . T h e p u b lish ed in d ices gen era lly rep resen t m on th ly avera ges, as op p osed to th e en d -of-m on th M 6 C IP an d IF C

data, and do not in clu d e d iv id en d s. T h e IM F a lso pub lish es p rice in d ices and ex ch an ge

ra tes, w h ich can b e u sed to com p u te real retu rn s an d d o lla r retu rn s. W e u se th e W h o lesa le P rice Ind ex (W P I) to d eflate nom ina l retu rn s, w h en ever ava ila b le. T h e W P I m easu re op ers a n um b er of advan tages. W P I ind ices gen era lly have lo nger h isto ries th an con sum er in d ices, are less ap ected b y d ip eren ces in d om estic con su m p tio n p a ttern s, an d a re m o re resp on siv e to m on eta ry d istu rb an ces th an o th er in fl a tio n m easu res.

O n e d raw b ack of th is d ataset is th at it d o es n ot a llow u s to m ea su re d irectly th e eq u ity p rem iu m , u sua lly d efin ed as the d ip eren ce b etw een th e total retu rn on sto ck s m in u s th e T reasu ry b ill ra te. D ecom p osin g th e total retu rn on sto ck s (R 6 ) in to cap ita l retu rn (C R 6 ) an d in com e retu rn (IR 6 ), an d th e T reasu ry b ill ra te (R 7 % ) in to the in flatio n com p on en t and th e real rate, w e can w rite

E q u ity P rem iu m = R 6 - R 7 %

= [C R 6

+ IR 6

] - [ In fl atio n + R ealR ate] (2 )

= [C R 6

* In flatio n ] + [ IR 6
* R eal R ate].

O u r m eth o d o lo gy m easu res th e cap ita l retu rn in ex cess of in fl a tio n , w h ich is th e fi rst b ra ck - eted term . T o th e ex ten t th at cross-sectio n al varia tio n s in th e seco n d b racketed term is sm a ll, th is a llow s com p ariso n s of eq u ity p rem iu m s across cou n tries. 6 om e ev id en ce on th e q u a lity of th is ap p rox im atio n w ill b e p resen ted la ter.

T h e fi rst IF 6 p u b lica tio n w as issu ed in 1948. P rio r to th e IM F , ou r sou rce is th e L eagu e of N ation s, w h ich co llected d ata on th e cap ital ap p recia tion of m arket in d ices in th e p erio d from 1929 th rou gh 1944. T h is co llectio n ep ort w as b rid ged b y th e U n ited N a tio n s from 1945 to 1948. F in a lly, th e †n tern atson al A bstract oƒ Z con om sc S tatsstscs p ub lica tio ns have sto ck m arket d ata go in g b ack to 1919 .

B y con n ectin g d ata fro m th ese so u rces, w e are ab le to recon stru ct h isto ries for a n u m b er of sto ck m arkets go in g b ack to th e early 1920 s. T h is is a ch a llen g in g ep ort, b ecau se of erratic

d a ta rep o rtin g . T h e IM F , for in sta n ce, p rov id es a C D -R O M w ith d ata sta rtin g in 1957 .

U n fo rtu n a tely, th is d atab ase su p ers fro m sam p le selectio n b ia ses, as a n u m b er of m arkets th at w ere fo llow ed in th e 1960s a re n ot con ta in ed in th e C D -R O M . D ata for th ese m a rkets h ave to b e co llected from th e IF 6 m on th ly p u b lica tio n s. M o re recen t em erg in g m a rket d a ta, w h en n ot ava ila b le from th e IF 6 p u b lica tio n , are ava ila b le from th e IF C d atab ase.

In ord er to m in im ixe su rv iv orsh ip b ia ses, w e fo llow a ll m arkets th at w ere rep orted b y th e L eagu e of N a tio n or th e IM F at an y p o in t d u rin g th e 1929 to 1970 p erio d . A fter 1970, a fl u rry of n ew m arkets op en ed (o r re-op en ed ). T h ese em erg in g m arkets, h ow ever, h ave rela tiv ely sh ort h isto ries an d a re n ot in clu d ed in th e d atab ase, as th ey h ave b een a lrea d y

ex ten siv ely an a ly xed . W e ob ta in a to ta l of S 9 m arkets. ab ou t 76 ,00 0 d a ta p o in ts.

A ll in a ll, th is in vo lv es a to ta l of

W h en ever d a ta so u rces d o n ot overla p , w e a ttem p t to lin k series b y com p a rin g an n u al averages. T h is is th e case for A u stria , for in sta n ce, w h ose p rice h isto ry w as in terru p ted b y th e A n sch lu ss (G erm an an n ex ation ) in A p ril 19S8 . F o rtu n ately, th e U N p u b lica tio n p rov id es an n u al averages fro m 1946 on an d go in g b ack to 19S5 . W e are th erefo re ab le to recon stru ct a lon g -term h isto ry for A u stria, a lb eit w ith an 8 -year gap d u rin g th e w ar.

In itia lly, w e b eg in b y co llectin g an n u al d ata. W e fi n d , h ow ever, th at th e m on th ly d ata crea te m ore p recise estim a tes. In p a rticu la r, w e n otice d iscrep an cies b etw een retu rn s u sin g m on th ly an d an n u al d ata . W e a lso fi n d th at m on th ly d a ta lea d to clean er lin kages b etw een va rio u s sou rces, w h ich is p a rticu la rly im p o rta n t as w e som etim es h ave to p atch series to - geth er. F in a lly, th e m on th ly d ata a llow u s to p erform even t stu d ies cen tered arou n d sp ecifi c

dates.

N o te th at, d esp ite a ll ou r ep o rts, th is d atab ase is still n ot free fro m selectio n b ia ses. T h e fi rst ty p e of b ia s o ccu rs w h en b ack fi llin g of an in d ex u ses on ly sto ck s th at are in ex isten ce at th e en d of th e sam p le. In th e case of A u stria , for in sta n ce, even th ou gh th e sto ck m a rk et h as recovered, som e com p an ies m ay have fared b ad ly or d isa p p eared du rin g th e w ar. T h erefore, a selectio n b ia s is indu ced if th ese com p an ies are n ot in clud ed in the ind ex .

T h e secon d ty p e of rem a in in g b ia s is m u ch m ore seriou s. T h e U N -IM F d a ta sou rces d o n ot a llow u s to lin k gap s for six cou n tries. In p a rticu la r, th ere ap p ea rs to b e n o lin k b etw een sto ck m arket p rices of G erm an y and J apan b efore and after the w ar in standard data sou rces. A s th ese tw o cou n tries d id n ot fa re w ell d u rin g th ese gap s, w e can su rm ise th at om ittin g th e gap s m isses im p o rta n t n ega tiv e in fo rm atio n . W e a ttem p t to co rrect for th is b y tu rn in g to oth er d ata sou rces for b ridg in g th ese gap s.

# E m p ir ic a l A n a l3 s is

## A . P erfo rm a n se o f J lo ba l S tosL M a rLets

W e ca lcu la te retu rns u sin g th ree d ip eren t n u m era ires: the lo cal cu rren cy, a real p rice in d ex , an d th e d o lla r. B ecau se of w id e d ip eren ces in in fl a tio n acro ss tim e an d cou n tries, w e p rim arily fo cu s on W P I-d efl ated retu rn s. R etu rn s in d o lla rs as a com m on cu rren cy sh ou ld g iv e sim ila r resu lts over th e lo n g ru n if ex ch an ge ra tes m ove in lin e w ith in fl a tio n d ip eren tia ls,

i.e. if P u rch asin g P ow er P arity ho ld s. D ip eren ces b etw een real and do lla r retu rn s, h ow ever, m ay b e in d u ced w h en ex ch an ge ra tes a re p egged b y cen tra l b an k s at a rtifi cia l lev els, or w h en o ffi cia l ex ch an ge ra tes d o n ot refl ect th e actu al rates facin g in tern atio n al in vesto rs.

T ab le I p resen ts geom etric retu rn s fo r S 9 m a rkets g ro u p ed b y reg io n s, com p ou n d ed an - n u a lly. T h ese resu lts a re strik in g. O f th e sam p le of S 9 cou n tries, real retu rn s are th e h ig h est for the U n ited 6 ta tes, at 4 .S 2 p ercen t p er ann u m . T h ere is no coun try w ith a h ig h er retu rn over th e total p erio d . T h erefo re, th e h ig h U .6 . eq u ity p rem iu m seem s to b e th e ex cep tio n ra th er th an th e ru le.

T h ese resu lts are p erh ap s b etter v isu a lixed in F ig u re 1 , w h ich p lo ts th e com p ou n d retu rn for each m a rket aga in st its ob served ” life“ sin ce 1921. L on ger liv es lea d to m o re p recise, less vo la tile, estim ates of ex p ected retu rn s. M ov in g to th e rig h t of the figu re, w e ob serve that th e U .6 . m a rket h as th e h ig h est rea lixed retu rn of a ll m a rkets.

T h e b o tto m of T ab le I sh ow s average an d m ed ian retu rn s for a ll cou n tries, as w ell as for a g ro u p of cou n tries fo r w h ich w e h ave d ata go in g to th e 1920 s. T h e m ed ian real retu rn s for a ll S9 cou n tries is 0 .75 p ercen t. B y w ay of con trast, w e a lso an a ly xe cou n tries w ith con tin u ou s h isto ries go ing back to th e 1920 s the m ed ia n retu rn for th is grou p is a lso m u ch h ig h er, at 2 .S 5 p ercen t. T h ese resu lts stro n g ly su ggest th at th e 4 .S p ercen t real cap ita l ap p recia tio n retu rn for th e U n ited 6 tates is h ig h ly u n u su a l. A s it is a lso on e of th e few series w ith ou t an y b reak , th is h ig h retu rn cou ld b e ascrib ed to su rv iva l.

A n a ltern ativ e ex p la n a tio n is th at th e U .6 . h ad a h ig h er lev el of risk th an an y o th er m a rk et over th e p erio d . In p erfectly in teg rated cap ita l m arkets, a h ig h eq u ity p rem iu m can sim p ly com p en sa te fo r a h ig h ø . O f cou rse, th is is a d iffi cu lt p rop ositio n to test d irectly sin ce su rv iv o rsh ip ap ects n ot on ly retu rn s b u t a lso cap ita l w eig h ts. E x p o st, th e m ost su ccessfu l in d ex w ill rep resen t th e la rgest sh a re of th e m arket.

O th er h ig h retu rn s, h ow ever, are ob ta in ed in som e cases. O ver 1921 to 1996, 6 w ed ish eq u ities d isp lay ed retu rns q u ite clo se to th e 4 .S 2 p ercen t ob ta in ed in the U .6 ., p erhaps not su rp risin g ly as 6w ed en a lso avo id ed m a jo r uph eava ls in th is cen tu ry. H ig h er retu rn s are ob serv ed over m o re recen t p erio d s. F or in sta n ce, G erm an y ex p erien ced a steep ru n -u p in p rices, 6 p ercen t in real term s, over th e p erio d 1950 to 1996 . B u t th is h igh retu rn m u st b e op set aga in st m ed io cre grow th u p to J u ly 1944 in ad d itio n , d u rin g th e fi ve-year b reak in ou r series, G erm an eq u ities fell b y 72 p ercen t in rea l term s. A s a resu lt, th e lo n g-term grow th of th e G erm an m arket is on ly 1 .9 1 p ercen t w h en eva lu ated over m ost of th is cen tu ry. T h e sto ry is sim ila r for J ap an , w h ere w e can ob serv e a sh arp d ip eren ce b etw een th e p o st-w ar retu rn of 5 .5 2 p ercen t an d th e p re-w ar retu rn of -0 .S 4 p ercen t. D u rin g th e 1944 -1949 b reak , th e m arket fell b y 95 p ercen t in rea l term s!

O th er m a rkets th at gap p ed , su ch as P ortu ga l, C h ile, an d P eru , a lso d id w ell recen tly, b u t

not so w ellw h en go ing b ack fu rth er in tim e. T h ese are ty p ica l ” re-em erg ing m arkets,“ w hose recen t p erform an ce ap p ea rs to b e, on th e su rfa ce, n o th in g sh o rt of stella r. O u r an a ly sis sh ow s th at th e p erfo rm an ce of th e sam e m arkets h as a lso b een m ed io cre at oth er tim es.

T ab le I a lso rep o rts d o lla r retu rn s. A s ex p ected , ra n k in gs for th is co lu m n a re very sim ila r to th o se ob ta in ed w ith rea l retu rn s. In gen era l, d o lla r retu rn s fo r o th er cu rren cies are slig h tly clo ser to U .6 . retu rn s th an real retu rn s. F or in sta n ce, th e d ip eren ce b etw een U .6 . eq u ities an d th e m ed ian is 4 .S 2 -0 .75= S .57 p ercen t w h en m easu red in real term s th e d ip eren ce is 6 .95 -4 .68= 2 .2 7 p ercen t in d o lla r term s. T h is d iscrep an cy refl ects th e slig h t d ep recia tio n of th e d o lla r, rela tiv e to its P u rch asin g P ow er P a rity va lu e, over th e sam p le p erio d .

W h ile geom etric retu rn s rep resen t retu rn s to a b u y -an d -h o ld stra teg y, it is a lso u sefu l to con sid er arith m etic averages, w h ich g iv e eq u al w eig h t to each ob servatio n in terva l. T ab le II p resen ts con ven tion al m easu res of an n u a lixed average (a rith m etic) cap ital ap p recia tion retu rn s an d stan d a rd d ev ia tio n s. D ata a re p resen ted in th e lo cal cu rren cy, in rea l term s, an d in d o lla rs. T h e tab le sh ow s th at th e 16 .2 p ercen t vo la tility of th e U .6 . m a rket is n ot p a rticu la rly h ig h w h en com p a red w ith o th er sto ck m a rk ets. T h erefore th e h ig h retu rn ob - ta in ed in th e U .6 . d o es n ot seem to com p en sate for h ig h er risk as m easu red b y vo la tility (w h ich w ou ld b e the app ro p ria te m easu re of risk und er segm en ted cap ita l m arkets).

T h e tab le a lso rep o rts th e resu lts from sta n d a rd sta tistica l tests of sig n ifi can ce of th e rea l cap ita l ap p recia tio n retu rn p rem iu m . A t th e 99 p ercen t lev el, w e can on ly reject th e h y p o th esis of a xero lo n g-ru n ap p recia tio n retu rn for th e U .6 . an d 6 w ed en . O ver sh o rter p erio d s, w e ob serv e sig n ifi can tly p ositiv e retu rn s for G erm an y an d J ap an in th e p o st-w ar p erio d . W h en avera ged w ith p re-w ar d a ta , h ow ever, th ese retu rn s lo ok less im p ressiv e.

## B . T h e K p est of D ividen d O m ission

T h e p rev io u s sectio n h as revea led a strik in g resu lt: lo n g-term retu rn s on th e U .6 . sto ck m a rk et ap p ear to b e grea ter th an th o se of an y o th er m a rk et d u rin g th is cen tu ry. O n e q u estio n th at arises is w h eth er th is resu lt cou ld b e d u e to th e om issio n of d iv id en d s. T o sh ed lig h t on th is issu e, T ab le III p resen ts p erform an ce n um b ers for m arkets for w h ich w e have d iv id end

d a ta .

T h e top of th e tab le rep o rts d a ta for th e m o re recen t M 6 C IP in d ices, w h ich m a in ly cover in d u stria l cou n tries sin ce 1971 . T h e tab le d isp lay s com p ou n d rea l retu rn s, w ith an d w ith ou t rein vestm en t of d iv id en d s. T h e d ip eren ce d u e to th e om issio n of d iv id en d s is sh ow n in th e th ird co lu m n . T h e fou rth co lu m n rep o rts th e avera ge lev el of in fl atio n . P resu m ab ly, th e resu lts in th e p rev io u s sectio n cou ld sim p ly refl ect a b ia s d u e to th e om issio n of d iv id en d s. F or th is b ia s to b e ep ectiv e, oth er m arkets m u st sy stem atica lly d isp lay a h ig h er in com e com p on en t of retu rn than th e U .6.

T ab le III clea rly sh ow s th at th is is n ot th e case. O ver th e 1970 -199 5 p erio d , th e d iv id en d ep ect for th e U .6 . w as 4 .1 4 p ercen t, w h ich is q u ite clo se to th e g ro u p average of 4 .2 5 p ercen t. T h erefore, th ere is n o in d ica tio n th at th e h ig h retu rn ob ta in ed for U .6 . eq u ities in T ab le I is due to d iv id end b ia s. If an y th in g, th e b ia s is in the op p osite d irectio n . F or ex am p le, J apan ese eq u ities, w h ich b y now con stitu te the la rgest m arket ou tsid e th e U .6 ., pa id an in com e retu rn of 1 .84 p ercen t over th e la st 25 yea rs, w h ich is m u ch low er th an th at of U .6 . eq u ities.

T h e b o tto m of th e ta b le rep o rts th e on ly lo n g-term d a ta w ith d iv id en d s th at w e a re aw are of. T o m a in ta in com p arab ility w ith th e orig in al d ata sou rces, w e h ave u sed th e C on su m er P rice In d ex (C P I) to d efl a te retu rn s, ex cep t for D en m a rk w h ere th e W P I is em p loy ed . In clud in g d iv id end s, the U .6. d isp lay s th e h ig h est real eq u ity retu rn s sin ce 1921 , at 8 .2 2 p ercen t. B rita in , an o th er lon g -term su rv ivo r, is a clo se secon d o th er m a rkets p rov id ed retu rn s th at a re low er b y 109 to SS 4 b asis p o in ts. A n oth er w ay to lo ok at th e d a ta is to n o tice th at th e ran k in g of retu rn s is essen tia lly th e sam e w ith an d w ith ou t d iv id en d s. T h erefore, th ere is n o ev id en ce th at the p erform an ce of U .6 . eq u ities is artificia lly h ig h b ecau se of rela tiv ely low U .6. d iv id end pay m en ts.

## C . K vid en se o n th e K qu ity P rem iu m P u xxle

T h e d ata w e p resen t th us far d o n ot ex p licitly so lv e the eq u ity p rem iu m pu xxle, as th eoretica lly form u la ted . 6 trictly sp eak ing , the eq u ity p rem iu m pu xxle con cern s th e sp rea d of ex p ected to ta l retu rn on th e m a rk et p o rtfo lio of eq u ities over th e retu rn of a risk less

secu rity. 6 iegel (1994) p o in ts ou t th at d efau lts on ” risk less“ govern m en t secu rities h ave o ften o ccu rred in p erio d s of g lo b al stress— w h ich of cou rse ra ises th e q u estio n of w h at th e risk less a sset m ig h t actu a lly b e an d w h eth er th e sty lixed , sin g le econ om y, tw o-asset form u la tio n of th e eq u ity p rem ium pu xxle is robu st.

In th e ab sen ce of a risk less asset w h ich is im m u n e to th e crisis even ts im ag in ed b y R ietx (1 988 ), it seem s rea son ab le to su b stitu te p h y sica l sto ra ge of go o d s (i.e. in fl atio n rates for T -b ill rates). In th is case, u sin g real retu rns as a p rox y for the eq u ity p rem iu m clea rly su p p orts th e h y p oth esis th at th e ex p o st ob serv ed U .6 . p rem iu m is h ig h er b ecau se th e U .6 . w as a w in n er. T h is ev id en ce, in tu rn , is con sisten t w ith th e ” su rv iva l“ h y p o th esis su ggestin g th at th e m agn itu d e of ex p ost ob serv ed eq u ity retu rn s m ay b e h ig h er th an th eir ex an te ex p ectatio n .

Is th ere an y ev id en ce in th e d ata su p p ortin g th e R ietx (1988 ) h y p o th esis th at th e ex an te eq u ity p rem iu m is as h ig h as su p p osed ? T h e issu e is w h eth er th ere w as som e p rob ab ility of th e U .6 . m arket ex p erien cin g a la rg e cra sh . In fact, th is p rob lem is ak in to th e ” p eso p rob lem “ in th e fo reig n ex ch an ge m arket, w h ere p eso forw a rd ra tes ap p ea red to b e b ia sed fo reca sts of fu tu re sp ot ra tes over sh o rt sam p le p erio d s, essen tia lly b ecau se th ey accou n t for a n on -xero p rob ab ility of d eva lu atio n th at is n ot ob served . M ore gen era lly, p eso p rob lem s can b e in terp reted as a fa ilu re of th e p arad ig m of ra tio n al ex p ectation s econ om etrics, w h ich req u ires th at th e ex p ost d istrib u tio n of en d ogen ou s varia b les b e a go o d ap p rox im atio n to th e ex an te d istrib u tio n th at agen ts th in k m ay h ap p en . T h e fa ilu re m ay n ot b e th at of th e econ om ic agen t, b u t th at of th e econ om etrician , w h o on ly an a ly xes series w ith con tin u ou s h isto ries. U n u su al even ts w ith a low p robab ility of o ccu rren ce b ut severe ep ects on p rices, su ch as w ars or n atio n a lixa tio n s, are n ot lik ely to b e w ell rep resen ted in sam p les an d m ay b e to ta lly om itted fro m su rv iv ed series.

O u r cro ss-sectio n ald a ta p rov id e ev id en ce ab ou t m a jor m arket cra sh es n ot p resen t in U .6 . d ata. W e h ave a sam p le of 24 m arkets for w h ich w e h ave d a ta in 19S1 , say. O u t of th ese, on ly seven ex p erien ced n o in terru p tio n (th e U .6 ., C an ad a, th e U .K , A u stra lia , N ew Z ea la n d , 6w ed en , and 6w itxerla nd ). 6 even ex p erien ced a tem p orary su sp en sio n of trad ing , less than

a yea r. T h e ten rem a in in g m arkets su p ered a lo n g-term clo su re. E ven th ou gh th ese even ts are n ot in d ep en d en t, th ey in d ica te th at m arket fa ilu re is n ot a rem ote p ossib ility. U n d er th e assu m p tio n th at m arket risk s are ” p riced“ ind iv idua lly, rath er than und er the assu m p tio n of in teg ratio n , th e freq u en cy of fa ilu re w ou ld p rov id e clea r ju stifi catio n for a p eso p ro b lem ex p lan a tio n .

W h ile it is en tirely p ossib le th at th e m agn itu d e of th e ob served eq u ity p rem iu m is d u e b oth to su rv iva l b ia s an d to the ” p ricing “ of an in freq u en tly o ccu rring crash, it is d iffi cu lt to b eliev e th at th e ex an te p rem iu m for th e U .6 . sh ou ld b e h ig h er th an for o th er m a rk ets. T h e in creased p rob ab ility of a la rge crash m ay ex p la in a h ig h er average eq u ity p rem iu m , b u t if p ast crash freq u en cy is an y in d ica tio n of fu tu re crash p rob ab ility, th en th e R ietx (1988 ) h y p oth esis w ou ld su ggest th at m arkets w ith m ore in terru p tio n s sh ou ld h ave a h ig h er eq u ity p rem iu m . If w e b eliev e th at th e m agn itu d e of th e eq u ity p rem iu m s fo r each cou n try is rela ted to th e ex p ost h isto rica l real ap p recia tio n , th en th e op p osite ap p ea rs to b e th e case. A b sen t su rv ival ep ects, th e R ietx (1988 ) h y p o th esis is in con sisten t w ith cross-section al d ip eren ces in h isto rica l g lo b al eq u ity m arket retu rn s. In th e n ex t sectio n , w e in vestig ate th e p ossib ility th at m arkets an ticip a te m a jor cra sh es.

T ab le III p rov id es ad d itio n al ev id en ce on th e eq u ity p rem iu m p u xxle b y com p arin g th e p erfo rm an ce of U .6 . eq u ities d u rin g th e recen t p erio d w ith lon ger term , 1871 -1920 C ow les d a ta . T h e la st lin e in th e ta b le sh ow s th at th e h ig h real cap ita l retu rn ob ta in ed th is cen tu ry w as m u ch h ig h er th an in th e p rev io u s 50 yea rs— S .S8 p ercen t d u rin g 1921 -1 995 aga in st 0 .2 7 p ercen t d u rin g 1871 -1920. 6 ieg el (1992) a lso p o in ts ou t th at th e U .6 . eq u ity p rem iu m w as particu la rly h ig h du rin g th is cen tu ry. P ut d ip eren tly, th is la rge p rem iu m seem s not on ly la rge in a cross-cou n try com p ariso n , but a lso b y h isto rica l standard s. 6 ieg el con clu d es that ” in vesto rs in ...1 872 d id n ot u n iv ersa lly ex p ect th e U n ited 6 ta tes to b ecom e th e g rea test econ om ic p ow er in th e n ex t cen tu ry.“ If so, retu rn s on U .6 . eq u ities th is cen tu ry can n ot b e v iew ed as rep resen tative of g lob al sto ck m a rkets.

## D . D isa p pea ra n se a s a n K ven t

T o u n d ersta n d h ow risk p rem iu m s resp on d to th e p ro b ab ility of m a jo r m arket cra sh es,

w e can ex am in e th e b eh av io r of m a rkets a rou n d in terru p tio n s. 6 am p le selection of m arkets w ill crea te a b ia s if th e p erfo rm an ce of in terru p ted m a rk ets is sy stem a tica lly p o or b efo re th e b reak . B y th e sam e token , fa llin g sto ck p rices p rio r to a m arket b reak m ay b e in d ica tive of in vestor assessm en t of in creasin g p rob ab ility th at th e m arket w ill fa il.

T o test th is h y p o th esis, w e ad op t th e even t-stu d y m eth o d o lo gy b y con stru ctin g an eq u a lly -w eig h ted in d ex w h ere rea l retu rn s a re a lig n ed on th e in terru p tio n d ate. W e id en tify a sam p le of 25 b rea k s for w h ich th e d a ta series w ere clea rly in terru p ted . T ab le IV id en tifi es each of th ese even ts. M an y w ere of a g lo b al n atu re, su ch as th e 6 econ d W o rld W ar, or th e d ep ressio n of th e early 19 S 0 s. A n u m b er of even ts, h ow ever, w ere cou n try -sp ecifi c, in vo lv in g a b an k in g crisis or p o litica l tu rm o il.

F ig u re 2 p lo ts th e tim e-series of th e p o rtfo lio va lu e, sta rtin g on e year b efore th e b reak . It sh ow s p rices fa llin g on average b y 21 p ercen t rela tiv e to th eir p eak . T h e h-test b ased on th e stand ard d ev ia tio n of m on th ly changes in th e p rev io u s year is -4 .9 5 for th is n um b er, w h ich is h ig h ly sig n ifi can t. H ow ever la rge, th is fa ll of 21 p ercen t in real term s u n d erstates th e tru e lo ss of va lu e to eq u ities. D u rin g W o rld W ar II, in p a rticu la r, p rices w ere kep t a rtifi cia lly h ig h th rough p rices con tro ls an d d id not rep resen t tran sactio n p rices as liq u id ity d ried up . E ven tu a lly, rea lity ” k ick ed “ in . F ig u re S com p a res th e p erfo rm an ce of m arkets so rted b y

cou n try in vo lv em en t d u rin g th e w a r. A s th e fi gu re sh ow s, th e ad ven t of th e w ar led to a sh arp fa ll of ab ou t 20 p ercen t in th e va lu e of eq u ities of A llied cou n tries (in clu d in g th e U 6 , C anada, the U .K . an d C om m on w ea lth cou n tries) for th e n ex t tw o m on th s. A sim ila r fa llw as su p ered b y n eu tra l cou n tries (6 w ed en an d 6 w itxerla n d ). T h e in d ex for o ccu p ied cou n tries, in con tra st, reg istered stea d y ga in s, w h ich w ere on ly w ip ed ou t la ter as sto ck p rices started to refl ect tra n sactio n p rices an d as in fl a tio n b ecam e ap p a ren t. F iv e yea rs la ter, th e in d ex m oved b elow th at of A llied cou n tries, as w e w ou ld h ave ex p ected . In rea lity, th e in d ex sh ou ld h ave b een even low er if w e h ad accou n ted for th ose m arkets th at d isa p p ea red in th e p ro cess (su ch as G erm an y, H u n ga ry, an d C xech o slova k ia .)

T ab le IV a lso d eta ils th e p erform an ce arou nd each ind iv idua lb reak . A ll m arkets sup ered a su b sta n tia l d ro p b efore th e b reak , rea ch in g 69 p ercen t for A rgen tin a. O n e ex cep tio n w as

P o la n d , w h ich ex p erien ced a slig h t p rice in crea se, p ossib ly b ecau se th e series w as sto p p ed in J u ly, th ree m on ths b efore P o la nd w as in vad ed , or b ecau se th e adven t of the w ar w as unan ticip ated . A s ex p la in ed b efo re, the p rice d rops in G erm an y and o ccu p ied E u rop e w ere a lso un u sua l, for artificia l reason s. In a ll oth er cases, the even t creatin g the m arket clo su re w as an ticip ated .

In elev en of th ese cases, th e U N -IM F eq u ity series a re in terru p ted w ith ou t resta rtin g la ter (or th ere is n o con tin u ou s series spann ing th e in terru p tio n ). T h ese cases in clude G er- m an y, J ap an , E astern E u rop ean cou n tries taken over b y th e 6 ov iet U n io n , G reece, E gy p t, C h ile, A rg en tin a, an d P o rtu ga l. 6 om e of th ese w ere th e resu lt of a fo reig n o ccu p a tio n an d w id esp rea d d estru ctio n d u e to w a r. In E gy p t an d C h ile, th e sta te to ok con tro l of th e econ - om y. T h e B u enos A ires 6 to ck E x change, th e o ld est in L atin A m erica , v irtu a lly d isa pp eared as a resu lt of in fl a tio n an d in terest rate p o licies in th e la te 1960 s rep orted ly, in vesto rs lo st a ll in terest in th e m arket. T h ese are p recisely th e situ atio n s w h ere w e w ou ld ex p ect eq u ities to fa re m o st b ad ly.

W e h ave to tu rn to oth er d ata sou rces to b rid ge th ese ” p erm an en t“ b reak s. W e fi n d th at, over th e 1944 -1 949 b reak in J ap an , eq u ities fell b y 95 p ercen t in real term s. F or G erm an y, w e fi n d th at eq u ities fell b y 84 p ercen t in real term s over 1944 -19 50. A n o th er ex am p le is th e P o rtu gu ese sto ck m arket, w h ich clo sed in A p ril 1974 as a m ilita ry ju n ta to ok over th e cou n try, reop en ed in M a rch 1977, th en trad ed in term itten tly. T h e sto ck p rice series su p ered a fa ll of 86 p ercen t in rea l term s d u rin g th e in terru p tio n in tra d in g. In con tra st, m ost of th e lo ss for th e C h ilea n sto ck m a rk et o ccu rred b efore th e in terru p tio n th e m arket recovered som ew h at over th e 1971 -1974 b reak , as th e m ilita ry ju n ta reversed th e so cia list p o licies of th e A llende govern m en t. F u rth erm ore, th ese n u m b ers p rob ab ly und erestim ate the tru e lo ss in va lu e b y ig n orin g com p an ies th at fa iled d u rin g th e in terru p tio n , as in d ices are b ack fi lled from com p an ies q u oted b efo re an d a fter th e b reak .

G o in g b ack to F ig u re 2 , w e h ave sep a ra ted m arkets th at w ere tem p orarily in terru p ted from th o se th at d isa p p ea red , or ” d ied “, la ter. M arkets th at b ecam e ex tin ct d rop p ed b y 27 p ercen t th e year b efo re th e b rea k m arkets th at su b seq u en tly recov ered d ro p p ed b y 16

p ercen t on ly b efore th e b reak . T o th e ex ten t th at th e even t cau sin g th e b rea k w as an ticip ated , th e m arket seem s to h ave b een ab le to gau ge th e grav ity of u n fo ld in g even ts. P rice d eclin es b efore b reak s a re con sisten t w ith in creasin g d em an d for risk com p en sa tio n for a catastrop h ic even t.

## K . A J lo ba l S tosL Cn d ex

T h e g lo b al eq u ity d ata p rov id e a u n iq u e op p o rtu n ity to con stru ct a g lo b al eq u ity in d ex

– an in d ex w h ich for th e fi rst tim e in clu d es d efu n ct as w ell as su rv iv in g cou n tries an d ex ten d s b ack 75 years. B ecau se w e h ave n o d a ta on m a rket cap ita lixa tio n go in g b ack th at far, w e assign w eig h ts b ased on G ro ss D om estic P ro d u ct (G D P ). A n n u al G D P in fo rm ation is ob ta in ed from M itch ell (1992, 199S, 1995) an d con verted to U .6 . d o lla rs u sin g an n u al averages. A t th e b eg in n in g of each d ecad e, w e con stru ct a cro ss-sectio n of n a tio n al G D P s, w h ich a re u sed to con stru ct in itia l w eig h ts.

T o m in im ixe reb a la n cin g, w e ad op t a p ortfo lio va lu e-w eig h ed ap p roach . O u r g lo b al in d ices a re th erefore sim ila r to m a rket cap ita lixa tio n in d ices, ex cep t th at th e w eigh ts a re reset to G D P w eig h ts at th e b eg in n ing of each d ecad e. A va lu e-w eig h ted sch em e is m ore app ro p ria te for m easu rem en t of in vestor retu rn s w h en su rv iva l is an issu e. A s ou r an a ly sis in th e p rev io u s sectio n d em on stra tes, m a rk ets th at d ie ten d to h ave less w eig h t w h en th ey d o so.

T h e in d ices rep resen t th e retu rn an in vestor w ou ld h ave earn ed h ad it b een p o ssib le to h o ld th e m a rket sin ce th e 1920 s. T h is is a h y p oth etical ex p erim en t, h ow ever, sin ce it w ou ld h ave b een d iffi cu lt to m a in ta in su ch a p ortfo lio . C on stra in ts on cro ss-b ord er cap ita l fl ow s, an d on liq u id a tio n of eq u ity p o sitio n s w ere acu te d u rin g crises— p recisely th e tim es w h en th e ab ility to d iv ersify w as m ost b en efi cia l. In th is p erio d , in vestors w ere som etim es in vo lu n tarily sep a ra ted fro m th eir assets, d u e to ex p rop ria tio n s or n a tio n a lixa tio n s. A s a resu lt, it is n ot clea r w h eth er, for ex am p le, a U .6 . in vestor cou ld h ave con tin u ed to h o ld G erm an or Jap an ese eq u ities d u rin g th e W o rld W ar II.

T ab le V p resen ts th e G D P w eig h ts at th ree p o in ts in tim e: 1920 , 1950, an d 1990 . T h e tab le revea ls a n um b er of in teresting ob servatio n s. T he U n ited 6 ta tes accoun ts for ab out h a lf of th e w o rld 's ou tp u t u n til th e 1950 s th e p rop ortion h as sin ce d eclin ed to ab ou t S 0

p ercen t. T h is d eclin e is due to faster grow th in oth er cou n tries su ch as J apan and G erm an y. J apan, in particu la r, has xo om ed from 4 p ercen t of w orld G D P to 16 p ercen t du rin g th is cen tu ry, even after d ip p in g b elow 2 p ercen t after th e w ar.

T h e G D P -b ased w eig h ts can b e com p ared to sto ck m a rk et cap ita lixa tio n -b a sed w eig h ts, w h ich a re rep o rted in th e la st co lu m n . W e ob serve th at th e sto ck m a rk et cap ita lixa tio n p ercen tages of th e U .6 ., th e U .K ., Jap an an d 6 ou th A frica a re gen era lly g rea ter th an th at of oth er cou n tries. C on tin en tal E u ro p e, for in stan ce, h as h ad a h isto ry of rely in g on b an k len d in g rath er th an ra isin g fu n d s th rou gh cap ita l issu es. O vera ll, h ow ever, th e G D P w eig h ts a re rou gh ly of th e sam e ord er of m agn itu d e as m arket w eig h ts.

B ia ses can b e in tro d u ced in th e m easu red p erform an ce in a n u m b er of w ay s. T h e fi rst is back filling , an d th e secon d is d ue to in terru p tio n s. T h ere is not m u ch the research er can d o ab ou t b ack fi llin g if the series are the on ly on es ava ila b le. A s for in terru p tio n s, the p ro b lem is th at d a ta b efo re th e in terru p tio n a re com m on ly ig n o red . In terru p tio n s can b e of tw o ty p es: tem p o ra ry clo su re of an ex ch an ge, w ith th e series startin g aga in la ter, or p erm an en t in terrup tio n of th ese series, w ith n o in fo rm atio n ab ou t the con tin u ity of p rices across th e in terrup tio n.

W e take tw o app ro ach es to the con stru ctio n of the g lo b al in d ex :

1. O u r ” su rv iv ed m arkets“ in d ex in clu d es a ll m a rk ets sin ce th e la st in terru p tio n , w h ich can b e a tem p o ra ry b reak or a p erm an en t clo su re on ly m arkets in ex isten ce at th e en d of th e sam p le are con sid ered . A s of D ecem b er 1996, w e h ave a to ta l of S2 m arkets ou t of th ese, on ly 18 h ad con tin u ou s h isto ries to D ecem b er 1940, for in stan ce.
2. O u r ”a ll m a rkets“ in d ex ex ten d s th e sam p le to a ll m arkets in ex isten ce in ou r sam - p le, in clu d in g retu rn s b efo re tem p orary an d p erm an en t clo su res. A s of D ecem b er 1940, th is ” com p reh en siv e“ series y ield s 29 m arkets, ad d in g A u stria , B elg iu m , an d F ra n ce (w h ich su f- fered a tem p orary in terru p tio n of tra d in g d u rin g W orld W ar II), C h ile, G erm an y, J ap an , P ortu ga l, U ruguay, an d th ree m arkets that su p ered a p erm an en t b rea k du rin g the w ar: C xechoslova k ia , H u ngary and R om an ia .

W e ex p ect th e b ia s to d ecrea se as w e m ove from (i) to (ii). T h e d iffi cu lt p a rt, of cou rse, is to estim a te m a rk et lo sses d u rin g a p erm an en t in terru p tio n su ch as w ar or n a tio n a lixa tio n . W e h ave elev en o ccu rren ces of p erm an en t b reak s (or ” d eath s“) ou t of ou r sam p le of S 9 m arkets. F or som e of th ese, su ch as G erm an y, Jap an , P o rtu ga l, w e are ab le to trace th e fa ll in va lu e, w h ich w e even ly sp read over th e tim e p erio d of th e in terru p tio n . T h is sm o o th in g p reserv es th e geom etric retu rn, but indu ces an artificia lly low vo la tility an d th erefore in creases th e arith m etic retu rn . W e sh ou ld n ote, h ow ever, th at th e sam e p ro b lem o ccu rs w h en rep o rted p rices a re con tro lled or d o n ot rep resen t tran saction d ata. F or th e few rem a in in g m a rkets w h ich su p ered a p erm an en t in terru p tio n , w e assu m e th at th e m arket fell b y 75 p ercen t th e fo llow in g m on th .

T ab le V I p resen ts th e p erfo rm an ce of th e va rio u s g lo b al sto ck in d ices. W e fo cu s on p erform an ce d ata fi rst an d w ill d iscu ss vo la tility la ter. O ver th e la st 76 years, th e U .6 . sto ck m arket p rov id ed an arith m etic cap ita l retu rn of 5 .4 8 p ercen t, m easu red in real term s. Its geom etric g row th w as 4 .S 2 p ercen t over th is p erio d . F ig u re 4 p lo ts th e p erfo rm an ce of th e U .6 ., g lo b a l, an d n on -U .6 . real cap ital g row th in d ices (u sin g th e com p reh en sive series).

T h e d ip eren ces in the p erform an ce of the g lo b al in d ices p o in t to th e im p ortan ce of ac- cou n tin g for lo sin g m a rkets. T h e ” su rv ived m arkets“ in d ex h as a com p ou n d retu rn of 4 .SS p ercen t it on ly accou n ts for m a rkets in ex isten ce in 1996 an d ex am in ed sin ce th eir la st b reak . T h e ”a ll m a rk ets“ in d ex h as a com p ou n d retu rn of 4 .0 4 p ercen t it accou n ts for a ll m a rkets an d a ttem p ts to in terp o la te retu rn s over m a jor b reak s in th e series. G o in g from th e fi rst to th e secon d estim ate sh ou ld m ove u s clo ser to a tru e, u n b ia sed m easu re of lo n g-term retu rn .

A t fi rst sig h t, th e d ip eren ce b etw een th e lo n g-term p erfo rm an ce of th e U .6 . in d ex an d of th e g lo b al com p reh en siv e in d ex ap p ea rs to b e sm a ll, at on ly 29 b asis p o in ts. T h is resu lt m ay ap p ear p u xxlin g in lig h t of th e ev id en ce in T ab le I th at a ll n on -U .6 . m arkets h ave h ad low er lo ng-term grow th than the U .6 ., often sig n ifi can tly so. O ne reason for the narrow d ip eren ce lies in th e tem p o ral varia tio n in w eigh ts. C on sid er th e J ap an ese m arket, for in stan ce. In th e fi rst h a lf of th e cen tu ry, th e p erform an ce of J ap an ese eq u ities w as m ed io cre. B u t th en , th e m a rk et ca rried a w eigh t of less th an 4 p ercen t in th e g lob al in d ex . In th e secon d h a lf of

th e cen tu ry, h ow ever, J ap an ese eq u ities ou tp erfo rm ed U .6 . eq u ities, p recisely at a tim e w h en th eir w eig h t in the ind ex w as rising , reach in g 16 p ercen t in 1990 . A n oth er reason is the la rge w eig h t in th e U .6 . m arket at th e b eg in n in g of th e cen tu ry. C on sid er, for ex am p le a 8100 in vestm en t in g lo b al sto ck s sta rtin g in 1921 . F rom th e G D P w eig h ts in T ab le V , th e am ou n t to a llo cate to U .6 . sto ck s w as 846 .17. O ver th e n ex t 76 years, th is am ou n t grew to 81149, u sin g th e 4 .S2 p ercen t U .6 . grow th ra te. L et u s m ake n ow an ex trem e assu m p tion , w h ich is th at a ll of th e m on ey in vested ou tsid e th e U .6 . is lo st. U sin g th e 81149 -to -8100 ra tio , th e rate of g row th is still S .26 p ercen t. T h e la rge in itia l sixe of th e U .6 . m arket th erefo re en su res th at th e grow th on th e g lob al in d ex m u st b e w ith in 100 b asis p o in ts of th e U .6 . grow th nu m b er.

T h e la st co lu m n in T ab le V I sh ow s th at a d ip eren ce of 29 b asis p o in ts can b e q u ite sig n if- ica n t over 76 yea rs. A ssu m in g a d o lla r in vested in th e U .6 . in d ex an d in th e com p reh en siv e g lob al in d ex , th e in vestm en t w ou ld h ave g row n to 27 .S an d 21 .9 in real term s, w h ich is a su b sta n tia l d ip eren ce.

T ab le V I a lso show s that a non -U .6. sto ck m arket ind ex , based on our ” com p reh en siv e“ m easu re, h as grow n at th e rate of S .S 9 p ercen t, w h ich is a fu ll 9 S b asis p o in ts b elow U .6 . eq u ities. If one ig nores su rv iv orsh ip issu es, how ever, th e retu rn of the N on -U .6. in d ex ap p ears to b e 4 .0 9 p ercen t. 6u rv iva lb ia s th erefore indu ces a d ip eren ce of 70 b asis p o in ts in th is ind ex , w h ich is q u ite su b stan tia l w h en accum u la ted over 76 years.

T ab le V II p resen ts sim ila r d a ta, m ea su red in n om in al U .6 . d o lla rs. O ver 1921 to 1996, th e com p ou n d cap ita l retu rn on U .6 . eq u ities w as 6 .9 5 p ercen t. T h e retu rn on th e g lo b al su rv iv ed in d ex w as 7 .S 2 p ercen t th e retu rn on th e g lo b al com p reh en siv e in d ex w as 7 .2 5 p ercen t. 6 im ila rly, th e avera ge retu rn on th e n on -U .6 . in d ex w as 7 .0 0 p ercen t an d 6 .7 5 p ercen t. H ere th e su rv iva l b ia s is on th e ord er of 25 b asis p o in ts.

A s in T ab le I, w e ob serve th at th e d ip eren ce b etw een U .6 . an d n on -U .6 . retu rn s is sm a ller w h en retu rn s a re m easu red in d o lla rs in stead of in real term s. In fact, th e retu rn on th e u n b ia sed g lob al in d ex is n ow varia tio n in w eigh ts an d th e real ap p recia tio n of m ost o th er cu rren cies d iscu ssed p rev io u sly. A lso , th e retu rn on th e va lu e-w eig h ted g lo b al in d ex ap p ea rs

n ot to o sen sitiv e to th e su rv iv orsh ip issu e.

T ab les V I an d V II a lso p rov id e estim a tes of th e vo la tility of th e vario u s in d ices. U sin g real retu rn s, th e vo la tility of th e U .6 . in d ex w as 15 .8 p ercen t. A ll oth er in d ices d isp lay ed low er vo la tility. F or in stan ce, th e vo la tility of th e n on -U .6 . in d ices w as ab ou t 10 p ercen t, w h ich is m u ch low er th an th at of th e U .6 . m a rket a lo n e, refl ectin g th e fact th at th e p o rtfo lio is sp rea d over a g rea ter n u m b er of m a rk ets, th u s b en efi tin g fro m im p erfect co rrela tio n s across m a rk ets. N ex t, th e risk of ou r g lo b al in d ices is a lso d riv en b y co rrela tio n s. O ver th e la st 76 yea rs, th e co rrela tio n co effi cien t b etw een retu rn s on th e U .6 . in d ex an d on th e com p reh en siv e

N on -U .6 . in d ex w as 0 .46 0 in real term s an d ab ou t th e sam e 0 .4 52 in d o lla r term s. A s a

resu lt of low er vo la tility for foreig n m arkets an d a low correla tio n co effi cien t, th e risk of th e g lo b alp ortfo lio is su b stan tia lly low er th an th at of U .6 . eq u ities. T h e ” com p reh en siv e“ g lo b al in d ex , for in stan ce, d isp lay ed a vo la tility of 11 .0 5 p ercen t. B ased on th ese lo n g-term series, th e m a in b en efi t of go in g in tern atio n al ap p ea rs to b e risk red u ctio n ra th er th an in crea sed retu rn s.

T ak in g in to accou n t su rv iv orsh ip d ecreases retu rn s slig h tly, b u t a lso d ecreases vo la tility. T h is is p artly due to th e (artificia l) in terp o la tio n of retu rns w h en m arkets are clo sed,but a lso b ecau se of th e ad d ition al d iversifi cation d u e to th e in clu sion of m ore m arkets. W e m easu re th e tra d e-op b etw een risk an d retu rn w ith th e 6 h arp e ra tio , d efi n ed as avera ge m on th ly retu rn s d iv id ed b y th eir vo la tility. T h ese are rep orted in th e th ird co lu m n s of T ab les V II an d V II. W ith real retu rn s, th e 6 h arp e ra tio of th e g lo b al in d ex is 0 .1199 , h ig h er th an th at of U .6 . eq u ities, at 0 .0999 . W ith d o lla r retu rn s, th e 6 h arp e ra tio of th e g lo b al in d ices is ab ou t 0 .1845 , a lso h ig h er th an th at of U .6 . eq u ities, at 0 .1 4SS. T h ese d ip eren ces, h ow ever, are n ot statistica lly sig n ifi can t.

6 y stem a tic d ip eren ces in retu rn can b e a ttrib u ted to tw o cla sses of ex p la n a tio n s. T h e fi rst is su rv iv o rsh ip , an ex p ost ex p la n a tio n . T h e seco n d are ratio n a l, ex an te, d ip eren ces in risk p ro fi les. F or ex am p le, if m arkets can b e v iew ed as in teg ra ted , a h ig h er retu rn for U .6. eq u ities cou ld b e ex p la in ed b y th e fa ct that the U .6. m arket has a h ig h er w orld ø . In d eed , over th e 1921 -1 996 p erio d , U .6 . eq u ities h ad th e h ig h est b eta, w ith a va lu e of 1 .24.

A reg ressio n of real retu rn s on rea l b eta s revea ls a co rrela tio n of 0 .5 S, w h ich is sig n ifi can tly p o sitiv e.

T estin g th is p rop ositio n is n ot stra ig h tfo rw ard , sin ce estim a tio n of ø w ith resp ect to th e w orld ind ex d ep ends up on su rv iva l issu es as w ell. H ad th e ou tcom e of the 6 econd W orld W ar b een d ip eren t, fo r ex am p le, th e ø of th e U .6 . on th e w orld in d ex w ou ld lik ely h ave b een d ip eren t. T he regressio n is a lso at icted b y d ata and econom etric p rob lem s. T h e varia b les are estim ated over d ip eren t p erio d s an d th u s h ave q u ite d ip eren t sam p lin g varia b ility. In ad d itio n , th e b eta s th at in clu d e p erio d s of p rice con tro ls or in freq u en t tra d in g are n ot relia b le. It seem s th u s d iffi cu lt to d isen tan g le th e h ig h er sy stem a tic risk ex p la n a tio n from su rv iv orsh ip to ex p la in th e h ig h retu rn s on U .6 . eq u ities.

T o und erstand th e m om en tous im p lica tio n s of d ip eren ces in lo ng-term rates of retu rn re- p o rted h ere, con sid er th e fo llow in g ex p erim en t. F irst, let u s record th e cu rren t cap ita lixa tio n of n on -U .6 . eq u ity m arkets, w h ich w as ab ou t 89 ,000 b illio n b y th e en d of 1996. F rom T ab le V I, th ese m a rk ets h ave g row n at an average rate of S .S 9 p ercen t, w h ich is less th an th e 4 .S 2 p ercen t grow th rate for th e U .6 . G o in g b ack to 1921, th is im p lies th at th e m arket cap ita l- ixa tio n of n on -U .6 . eq u ities w as 89 ,0 00 b illio n d iv id ed b y (1 + S .S 9 % ) , w h ich am ou n ts to 8714 b illio n in cu rren t d o lla rs.

N ex t, a ssu m e th at a ll m arkets h ad g row n at th e U .6 . rate of g row th . T h e m arket va lu e of th ese eq u ities w ou ld th en b e 8714 b illio n tim es (1 + 4 .S2 % ) , w h ich am ou n ts to 817 ,7 75 b illio n . In oth er w ord s, th e op p ortu n ity cost of grow in g at ab ou t S .4 p ercen t in stead of th e 4 .S p ercen t U .6 . clip w as 88 ,7 75 b illio n in to d ay 's d o lla rs. F oreig n m arkets w ou ld b e d ou b le th eir cu rren t sixe if th ey h ad g row n on ly 1 p ercen t fa ster th an th ey d id ! V iew ed in th is con tex t, su rv ival b ia ses of 70 b asis p o in ts reco rd ed in T ab le V I a re q u ite sig n ifi can t.

# IV . C o n c lu sio n

”F in an cial a rch aeo lo gy “ in vo lv es d igg in g th rou gh ream s of fi n an cia l d a ta in search for an sw ers. 6om etim es th is in vo lv es rely ing up on p o or q u a lity d ata to d raw in feren ces ab out m a rk ets in sta tes of crisis. E ven so, th ese d a ta p rov id e in va lu ab le in form a tio n to h elp

u n d ersta n d lo n g-term h isto ries of cap ita l m arkets. If on e relies on h isto rica l d ata as th e b a sis for estim a tes of lo n g-term m a rk et grow th , th ere is n o rea son to lo ok at U .6 . d a ta on ly. T h is is w h y ou r pap er p a in ts a b ro ad p ictu re of the p erform an ce of g lo bal sto ck m arkets over m o re th an 75 years of a tu rb u len t cen tu ry for fi n an cia l m arkets.

T h e m a in lesso n from ou r lo n g-term d ata is th at g lo b al cap ita l m arkets h ave b een sy s- tem a tica lly su b ject to d ram atic ch an ges over th is cen tu ry. M a jor d isru p tio n s h ave at icted n early a ll the m arkets in our sam p le, w ith th e ex cep tio n of a few su ch as the U n ited 6 ta tes. M a rk ets h ave b een clo sed or su sp en d ed d u e to fi n an cia l crises, w a rs, ex p ro p ria tio n s, or p o- litica l u p h eava l.

N o d ou b t th is ex p la in s ou r find in g th at th e 4 .S p ercen t real cap ita l ap p recia tio n retu rn on U .6. sto ck s is rath er ex cep tio na l, as oth er m arkets have ty p ica lly had a m ed ia n retu rn of on ly 0 .8 p ercen t. T h ese resu lts su ggest th at th e la rge eq u ity p rem iu m ob ta in ed in th e U .6 . is at lea st p a rtly d u e to con d itio n in g estim a tes u p on th e b est p erfo rm in g m a rk et. T h is con d itio n in g m ay a lso crea te tim e-va ria tio n in ex p ected retu rn s. W e ex p ect, for in sta n ce, m a rk ets th at h ave d on e w ell to ex h ib it m o re m ean -reversio n th an oth ers, sin ce p erio d s of la rge lo sses m u st b e fo llow ed b y p erio d s of u p sw in gs.

T h is lin e of an a ly sis trea ts each m arket sep a ra tely. A n o th er ap p roach is to track th e h y p o th etica l p erfo rm an ce of a d iv ersifi ed g lo b al in vestm en t. In terestin g ly, w e fi n d th at th e p erfo rm an ce of a g lo b a lly -d iv ersifi ed p o rtfo lio is m u ch clo ser to th e p erfo rm an ce of U .6 . eq u ities, avera g in g 4 .0 p ercen t. T h is is p artly d u e to th e fact th at m arkets w ith la rg e cap ita lixa tio n at th e b eg in n in g of th e cen tu ry p erform ed w ell. T h is resu lt a lso refl ects th e b en efi ts of d iv ersifi catio n , w h ich sp read s th e risk of d ram atic even ts over a la rge p ortfo lio .

W h eth er sim ila r d isru p tio n s w ill h ap p en aga in is an op en q u estio n . B y n ow , h ow ever, it sh ou ld b e clea r th at if w e fa il to accou n t for th e ” lo sers“ as w ell as th e ” w in n ers“ in g lo b al eq u ity m a rk ets, w e are p rov id in g a b ia sed v iew of h isto ry w h ich ig n ores im p o rta n t in form a tio n ab ou t actu al in vestm en t risk .

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# Fo o tn o te s

× J orio n is w ith th e U n iv ersity of C a lifo rn ia at Irv in e G o etxm an n is w ith th e Y a le 6 ch o ol of M anagem en t. W e than k sem ina r p articipa n ts at the U n iv ersity of C a lifo rn ia at L os A n geles, C arn eg ie-M ello n, Ind ia n a U n iv ersity, th e L ondon B u sin ess 6 ch o o l, th e 6 to ck ho lm 6 ch o ol of E con om ics, th e U n iv ersity of H ou sto n , th e U n iv ersity of M ich ig an , th e U n iv ersity of N otre D am e, th e U n iv ersity of 6 ou th ern C a lifo rn ia , th e 1997 E u rop ean F in an ce A sso cia tion

m eetin g s, an d th e 1997 W estern F in an ce A sso cia tion m eetin gs fo r u sefu l com m en ts. T h e referee an d th e ed ito r, R en ´e 6 tu lx, a lso p rov id ed va lu ab le com m en ts. A b le resea rch su p p ort w as p rov id ed b y R ob in B ro ok s. G eo rg e B ittlin gm ayer k in d ly p rov id ed a cop y of th e G erm an data. T h is research receiv ed fi nan cia l supp ort from the In stitu te for Q uan tita tiv e R esearch in F ina n ce, for w h ich w e are gratefu l.

6 ee E p stein an d Z in (1991 ) for n on -ad d itiv e u tility fu n ctio n s an d C on stan tin id es (1987 ) for h ab it form a tio n . B an sal an d C o lem an (1996) su ggest th at liq u id ity serv ices p rov id ed b y cash p artly ex p la in w h y retu rn s on cash are so low .

B u rn side an d M cC u rdy (1992 ) p rov id e a go o d rev iew of th e eq u ity p rem ium pu xxle.

A sim ila r argu m en t is ad van ced b y G o etxm an n an d J orion (1996 ). T h ey argu e th at m an y so -ca lled ” em erg in g m a rk ets“ are in fact ” re-em erg in g m arkets“ as th ey h ave lo n ger h isto ries th an com m on ly b eliev ed . F ew an a ly sts, h ow ever, b o th er to tra ck th e h isto ries of m arkets th at h ave d isa p p ea red .

F or ev id en ce on lon g -term U .6 . d ata, see W ilson an d Jon es (1987 ), 6 ch w ert (1990 ), 6 ieg el (1992) an d G o etxm an n an d Ib b otson (1994 ). T h ere is som e lo n g-term ev id en ce fro m th e U .K . m arkets, for in stan ce, see G o etxm an n (199 S ), D eL on g an d G rossm an (199S ), an d G o etxm an n an d Jo rio n (1995 ). P a rso n s (1974 ), M irow sk i (1981 ), an d N eal (1987, 1990) p rov id e d ata on th e A m sterd am an d L on d on ex ch an ges in th e eig h teen th cen tu ry.

R ela tiv e to m o re m o d ern d a ta , th e IF 6 d ata su p er fro m tw o d raw b ack s: p ossib le n on - com p arab ility in th e con stru ctio n of th e series an d u se of m on th ly avera ge in stea d of en d - m on th p rice. T h e C ow les in d ices, th e stan d ard d ata sou rce b efore 1926 for U .6 . d a ta,

h ow ever, h ave sim ila r d raw b ack s sin ce p rices are m easu red as th e average of h ig h an d low va lu es d u rin g th e m on th .

T h ere are a few in stan ces w h ere w e h ave to u se C on su m er P rice In d ex d ata (e.g ., p ost- 1947 d a ta for B elg iu m , F ran ce, N ew Z ea la n d , P eru , an d Israel.) B ecau se n om in al p rices in G erm an y w ere d isto rted d u rin g th e h y p erin fl a tio n p erio d , w e m ea su re n om in al p rices d u rin g 1921 -2 S in go ld m a rk s.

A lfred C ow les, found er of the C ow les C om m issio n for R esearch in E conom ics, w as ap par- en tly th e fi rst sch o la r to d o cu m en t tim e-series d a ta on g lo b al sto ck m arkets. W e lea rn ed of th e L eagu e of N atio n s d ata from th e ap p en d ix to h is 19 S 9 p u b lica tio n w h ich lists p erio d ica l so u rces for sto ck m a rk et d a ta in 20 d ip eren t cou n tries. A recen t sou rce of g lo b al sto ck m ar- ket in form ation w h ich u ses th e L eagu e of N ation s d a ta, as w ell as in fo rm a tio n fro m oth er h isto rical sou rces, is th e G lo b al F in an cial M arkets d atab ase co llected b y B ryan T ay lo r, w h ich w e lea rn ed of after su b m issio n of th is p ap er for p u b lica tio n . T ay lo r's d atab ase covers sim ila r m a rk ets to ou rs th ere a re, h ow ever, som e d ip eren ces in th e d a ta so u rces an d in p a rticu la r d u rin g th e b reak s. F or in stan ce, w e fi n d th e G erm an sto ck p rice d ata co llected b y G ielen (1 994 ) to b e an ex cellen t sou rce for recon stru ctio n of th e G erm an m a rk ets d u rin g th e ea rly p a rt of th e 20 th cen tu ry.

T h e m easu rem en t of ex ch an ge rates a lso p roves q u ite d iffi cu lt. T h e L eagu e of N a tio n s, for in stan ce, rep o rts ra tes in p ercen ta ge of th eir 1929 go ld p arity va lu e, fro m w h ich cu rren t sp ot ra tes rela tiv e to th e d o lla r h ave to b e recon stru cted . M an y cu rren cies a lso ch an ged u n its or d en om in a tio n d u rin g th is cen tu ry. A rou n d W o rld W ar II, tra d in g in som e cu rren cy p a irs w as eith er n on -ex isten t or su b ject to h eav y govern m en ta l con tro l.

T h e on ly m arket w e d elib erately om it is L eb an on , for w h ich w e cannot fi nd in flatio n data.

T h e d ip eren ce can b e p a rticu la rly p ro n ou n ced over sh ort p erio d s w h en th e d ata a re m on th ly or an n u al avera ges. A s an illu stra tio n , com p a rin g retu rn s on th e 6 & P in d ex to ta l retu rn s series over 1926 -194 5, w e fi n d th e an n u al grow th to b e 7 .2 p ercen t an d 6 .6 p ercen t, resp ectiv ely for m on th ly an d an n u al d ata.

W e h ave p erm an en t gap s in th e series for C h ile, G erm an y, J ap an , P eru , P ortu ga l, an d A rgen tin a. T h e gap for C h ile is fi lled u sin g d ata from p u b lica tio n s fro m th e C h ilea n C en tral B an k . T h e gap for G erm an y is covered u sin g d ata sp liced b y G ielen (1994 ). T h e gap for J ap an is b rid ged u sin g B an k of Jap an (1966) d ata. T h e gap for P eru is fi lled u sin g d ata receiv ed b y th e L im a sto ck ex ch an ge. T o cover th e gap fo r P o rtu ga l, w e u se in fo rm atio n from th e P ortu gu ese C en tra l B an k . O vera ll, A rgen tin a is th e on ly rem a in in g cou n try w ith a p erm an en t b reak over J u ly 1965 to D ecem b er 1975, w h ich is th e fi rst d ate for w h ich w e have data from th e IF C . W e h ave b een unab le to fi nd d ata to b rid ge th e gap .

U ruguay and C xech oslova k ia h ad h ig h er retu rn s than U .6 . eq u ities, but th is w as over sh o rter p erio d s d u rin g w h ich cu rren cies w ere su b ject to con tro ls. H en ce, th ese retu rn s a re not rep resen tativ e.

6 in ce p rice data are m on th ly averages, it sh ou ld b e noted that th e rep orted standard d ev ia tio ns are low er th an from u sin g m on th -end data. In add itio n , averag ing indu ces sp u rio u s p o sitiv e au to co rrela tio n in th e retu rn series.

D ata sou rces are as fo llow s. F or th e U .6 . m a rket, Ib b otson (1995) an d p rior to th a t, C ow les (19S 9 ) for th e U .K ., B arclay s d eZ o ete W ed d (199S ) for 6 w itxerlan d , W y d ler (1989 ) for 6 w ed en , F ren n eb erg an d H an sson (1992 ) an d for D en m a rk , T im m erm an (1992 ). A ll of th e d a ta h ave b een u p d ated to 1995 u sin g th e M 6 C IP in d ices.

In G erm an y, Ita ly, an d G erm an -o ccu p ied territo ries, d ea lin g in sh ares w ere su b ject to strict con tro ls, ran g in g from ta x es on p ro fi ts an d cap ita l ga in s to th e ratio n in g of p u rch ases an d to the com p u lso ry d ecla ratio n of secu rities h o ld ing s. In June 1942 , for in stan ce, th e sa le of G erm an sh ares b ecam e p roh ib ited , u n less th ey w ere fi rst op ered to th e R eich sb an k . T h e R eich sb an k h ad th e op tio n to b u y th em at D ecem b er 1941 p rices in ex ch an ge for b on d s th at rem a in ed in th e b an k 's p ossessio n . It is n o w on d er th at th is con fi sca to ry sy stem led to a sh a rp fa ll in tra d in g activ ity. T h ere w ere a lso rig id p rice con tro ls in J ap an d u rin g th e w ar see for in stan ce A d am s an d H osh ii (1971 ). T h erefore m an y of th ese p rice in d ices d o n ot rep resen t m a rk et-d eterm in ed p rices.

T h e in d ex for o ccu p ied cou n tries in clu d es B elg iu m , C xech oslova k ia , F ran ce, D en m ark , F in la nd, G erm an y, H u ngary, Ita ly, N eth erla nd s, and N orw ay.

T h e B an k of J ap an (1 966 ) estim a tes th at th e m a teria l d am age d u e to W o rld W ar II w as to red u ce n atio n al w ea lth from 25 S to 189 b illio n yen , w h ich is a fa ll of 64 b illio n yen (n ot accou n tin g fo r h u m an lo sses), or ab ou t 815 b illio n . F or com p ariso n p u rp oses, th e m arket va lu e of eq u ities in 1945 w as ab ou t 40 b illio n yen .

T h e m arket lo st 54 p ercen t in th e year to A p ril 1971 d u rin g th e A llen d e ascen t to p ow er, b u t th en in creased b y 62 p ercen t la ter, w h ich is on ly a p a rtia l recov ery. A ssu m in g a sta rtin g va lu e of 100 , th e m a rk et fell to 46 , th en recovered to 1 .6 2 tim es 46 , or 74 , en d in g w ith a n et lo ss in va lu e rela tiv e to th e startin g p o in t.

T h e m a rk ets ap ected w ere C xech oslova k ia , E gy p t, G reece, H u n ga ry, P o la n d , an d R om an ia . T h e 75 p ercen t im p u ted d rop is in lin e w ith th e fa ll in va lu e of m arkets w h ich su p ered a sev ere b reak d ow n . T h e a rb itra rin ess of th e ch a rg e is m itig ated b y th e fact th at a ll of th ese m a rk ets a re rela tiv ely sm a ll.

A s for th e m easu rem en t of vo la tilities, correla tio n s m ay b e to o low b ecau se of th e sm o oth - in g of the series du rin g the b rea k s. H ow ever, the correla tio n w ith the su rv iv ed series w as very clo se, at 0 .51 0 in real term s an d 0 .520 in d o lla rs. T h is su ggests th at th e b ias is n ot la rge.

U sin g th e p erfo rm an ce tests d evelo p ed b y Job son an d K ork ie (1981 ).

G o etxm an n an d J orio n (1995) a lso sh ow th at su rv ival sh ou ld in d u ce oth er ep ects of in ter- est, su ch as p red icta b ility b ased on d iv id en d y ield s.

**F igu re h. R e a l R e tu rn s o n G lo b a l 7 to ck M a rk e ts.** T h e fi gu re d isp lay s average real retu rn s for S9 m arkets over th e p erio d 1921 to 1996. M arkets are sorted b y years of ex isten ce. T h e g ra p h sh ow s th at m arkets w ith lo n g h isto ries ty p ica lly h ave h ig h er retu rn s. \* in d ica tes th at th e m arket su p ered a lon g -term b reak .

Percent Per Annum

6

Czechoslovakia

Sweden

US

Hungary

Israel

Switzerland

Canada

Norway Chile\*

Uruguay

Mexico

Finland

Denmark

Ireland

Australia

Austria\*

UK

Germany\* Netherlands

France

Italy

Brazil

New Zealand Belgium Portugal\* Japan\*

Pakistan

South Africa

Venezuela

India

Spain\*

Egypt

Poland

Philippines

Argentina\*

Colombia

Peru\*

Greece

5

4

3

2

1

0

-1

-2

-3

-4

-5

-6

0 20 40 60 80 100

Years of Existence since Inception

**F igu re 2. R e a l 7 to ck P ric e s b e fo re In te rru p tio n .** T h e fi gu re d isp lay s th e p erfo rm an ce of an eq ua lly -w eig h ted ind ex w h ere real retu rns are a lig n ed on the in terrup tio n d ate. T h e total sam p le of 25 is fu rth er d iv id ed in to a sam p le for w h ich th e in terrup tio n tu rns ou t to b e tem p orary, an d a sa m p le for w h ich th e in terru p tio n is p erm an en t.

1.0

Tem porary (14) All (25)

Permanent (11)

0.9

0.8

Real Price Index

0.7

0.6

-13 -12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0

Months before Interruption

**F igu re 3. R e a l 7 to ck P ric e s d u rin g W o rld W a r II.** T h e fi gu re d isp lay s th e p erfo rm an ce of p ortfo lio s of eq u ities m easu red in real term s d u rin g th e w ar. T h e sam p le is d iv id ed in to

o ccu p ied , a llied , an d n eu tral cou n tries.

1.4



Occupied (10)

Allied (6)

Neutral (2)

Germ an Invasion

G erm an Surrender

1.2

Real Price Index (April 1940=1.0)

1.0

0.8

0.6

0.4

0.2

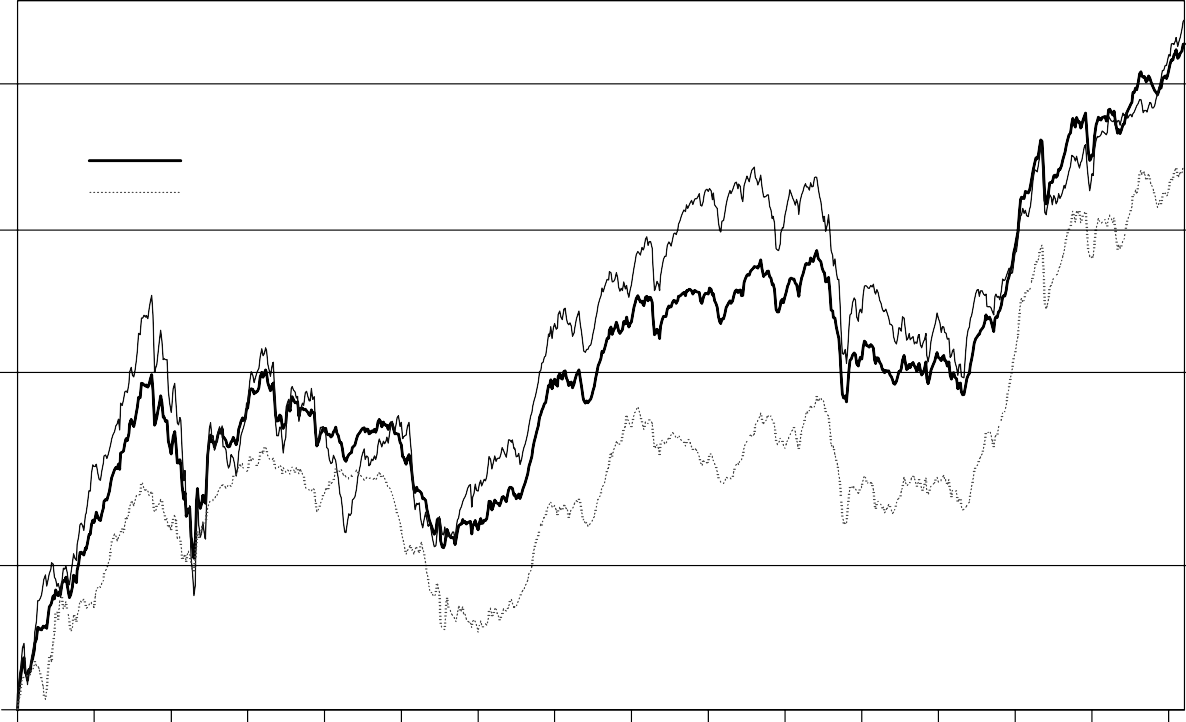
0.0

April 40 12/40 12/41 12/42 12/43 12/44 12/45 12/46

Month

**F ig u re 4 . A G lo ba l 7 to ck M a rk e t Ind e x .** T h e fi gu re d isp lay s th e p erform an ce of th e U .6 ., g lo b a l, an d n on -U .6 . real cap ita l grow th in d ices. T h e la tter in d ices are ob ta in ed u sin g G D P w eig h ts an d a ll ex istin g m a rk ets, even if th ey fa il la ter.

20



US Equities

Global Equities

Non-US Equities

10

Real Price Index (Dec 1920=1)

5

2

1

20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95

Year

Ta ble I

L ong− Term Pe rfor manc e o f G l obal Eq uity Tar ket x Gomp oun d R e turn in Per cent pe r A n num

Tk e t a ble com pare x t k e l ong− term pe rfor manc e o f g l obal eq uity mar ket x π i t k an nual ly c omp ound ed d ata . T ke x amp le p erio d v arie x a c rox x c o untr y a nd

ix rep orte d i n t k e xe con d c o lumn . Data for xu bper iodx ar e r e port ed

πi tkin bra cke tx. Per cen tage ret urn x a r e me axu red in n omi nal term x i n

tk e l o cal cur renc y, i n r eal term x−− defl atin g b y t k e Wk ole xale Pri ce Inde x,

an d t r anxl ate d i n t o 8 .7. Dol larx . Tke laxt co lumn rep ort x t k e in fla tion rat e.

+ indi cate x a bre ak i n t k e x erie x t kat kax bee n b r idge d.

+ indi cate x a per mane nt dixc onti nui ty i n tk e x erie x.

−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Go untr y | Pe riod | N omin al  Retu rn | Rea l  R etur n | D olla r  R etur n | Inf lati on |
| −− −−−− −−−− −−− −−−− −−−− −−− −−−  8. 7. 1/2 1−12 /96 | | − −−−− −−− −−  6. 95 | −− −−−− −−−  4.3 2 | −−−− −−−− −−− −−−− −−−− −−−  6.9 5 2 . 5 2 | |
| Ga nada 1/2 1−12 /96 | | 5. 8 | 3.1 9 | 5.3 5 | 2 . 5 1 |
| Au xtri a+ 1/2 5−12 /96 | | 5. 64 | 1.6 2 | 5.0 0 | 3 . 9 5 |
| Be lgiu m 1/2 1−12 /96 | | 4. 45 | −0.2 6 | 3.5 1 | 4 . 3 |
| De nmar k 1/2 6−12 /96 | | 5. 8 | 1.8 | 5.1 9 | 3 . 9 3 |
| Fi nlan d 1/3 1−12 /96 | | 10. 23 | 2.0 | 6.1 9 | . 9 9 |
| Fr ance 1/2 1−12 /96 | | 9. 09 | 0. 5 | 4.2 9 | 8 . 2 8 |
| Ge rman y+ 21 −96 | | 4. 43 | 1.9 1 | 5.8 1 | 2 . 4 |
| G erma ny 1/ 21− /44 | | [3.2 9] | [ 2.23 ] | [ 5.59 ] | [1.0 4] |
| G erma ny 1/5 0−12 /96 | | [8.4 6] | [ 6.00 ] | [ 1 0. 8 ] | [2.3 2] |
| Ir elan d 1/3 4−12 /96 | | . 00 | 1.4 6 | 5.1 4 | 5 . 4 5 |
| It aly 12/2 8−12 /96 | | 10. 10 | 0.1 5 | 3.2 2 | 9 . 9 4 |
| Ne tker land x 1/2 1−12 /96 | | 3. 1 | 1.5 5 | 4.4 | 2 . 1 2 |
| No rπay 1/2 8−12 /96 | | . 13 | 2.9 1 | 6.2 9 | 4 . 1 0 |
| Po rtug al+ 31 −96 | | 6. 89 | −0.5 8 | 3. 8 | . 5 1 |
| P ortu gal 12/ 30−4 / 4 | | [5.2 1] | [ 1.16 ] | [ 4.96 ] | [4.0 0] |
| P ortu gal 3/ −12 /96 | | [ 20.1 1] | [ 5.63 ] | [ 1 1.92 ] | [ 13. 1] |
| 7p ain+ 1/2 1−12 /96 | | 4. 66 | −1.8 2 | 1.5 3 | 6 . 6 1 |
| 7π eden 1/2 1−12 /96 | | . 42 | 4.2 9 | .0 0 | 3 . 0 0 |
| 7π itze rlan d 1/2 6−12 /96 | | 4. 83 | 3.2 4 | 6.8 4 | 1 . 5 4 |
| 8. K. 1/2 1−12 /96 | | 6. 30 | 2.3 5 | 5.2 0 | 3 . 8 6 |
| Gz ecko xlov aki a 1 / 21−4 /45 | | 4. 33 | 3. 9 | 9.5 0 | 0 . 5 2 |
| Gr eece / 29−9 /40 | | −2. 12 | −5.5 0 | −8.0 8 | 3 . 5 8 |
| Hu ngar y 1 / 25−6 /44 | | 6. 29 | 2.8 0 | 9.0 | 3 . 4 0 |
| Po land 1/ 21−6 /39 | | − . 00 | −3.9 | −4.3 0 | −3. 15 |
| Ro mani a 12/ 3 −6 /41 | | −5. 36 | − 28.0 6 | − 14.6 4 | 31. 55 |

−−

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| --- | --- | --- | --- | --- | --- |
| Au xtra lia | 1/3 1−12 /96 | . 06 | 1.5 8 | 6.2 9 | 5 . 3 9 |
| Ne π z e alan d | 1/3 1−12 /96 | 5. 69 | −0.3 4 | 3.6 3 | 6 . 0 1 |
| Ja pan+ | 21 −96 | . 33 | −0.8 1 | 1.8 0 | 8 . 2 1 |
| J apan | 1/ 21−5 /44 | [1.2 3] | [− 0.34 ] | [ − 1.83 ] | [1.5 8] |
| J apan | 4/4 9−12 /96 | [8.3 0] | [ 5.52 ] | [ 1 0.90 ] | [2.6 3] |
| In dia | 12/3 9−12 /96 | 5. 10 | −2.3 3 | 0.8 0 | . 6 0 |
| Pa kixt an | /6 0−12 /96 | . 9 | −1. | 0.5 9 | 8 . 5 |
| Pk ilip pine x | /5 4−12 /96 | 5. 95 | −3.6 5 | −0.3 0 | 9 . 9 6 |
| Ar gent ina+ | 4 −6 5, 5 −96 | 8 . 48 | −4.8 0 | −1.4 3 | 96. 92 |
| A rgen tina | 9/ 4 − /65 | [ −5. 8] | [−2 5.09 ] | [−2 3.64 ] | [ 25. 8] |
| A rgen tina | 12/ 5−12 /96 | [2 36.2 9] | [1 6. 1 ] | [ 2 2.43 ] | [ 1 88.1 5] |
| Br azil | 2/6 1−12 /96 | 142. 34 | −0.1 | 4.6 8 | 14 . 52 |
| Te xico | 12/3 4−12 /96 | 20. 13 | 2.3 0 | 6.1 2 | 1 . 43 |
| Gk ile+ | 2 −96 | 3 . 12 | 2.9 9 | 6.3 8 | 33. 16 |
| G kile | 1/ 2 −3 / 1 | [ 12.9 8] | [− 5.3 ] | [ − 4.23 ] | [ 19.3 9] |
| G kile | 1/ 4−12 /96 | [ 64.1 9] | [1 5.52 ] | [ 2 0.94 ] | [ 42.1 3] |
| Go lomb ia | 12/3 6−12 /96 | 10. 15 | −4.2 9 | −0.8 8 | 15. 09 |
| Pe ru+ | 41 −96 | 45. 29 | −4.8 5 | 3.4 5 | 52. 68 |
| P eru | 3/ 41−1 /53 | [2.0 3] | [−1 2.36 ] | [ 2.03 ] | [ 16.4 1] |
| P eru | 1/5 −12 / | [1.5 3] | [− 9.88 ] | [ − .40 ] | [ 12.6 6] |
| P eru | 12/8 8−12 /96 | [3 40.9 5] | [3 0.45 ] | [ 5 0.92 ] | [ 2 32.1 8] |
| 8r ugua y | 3/3 8−11 /44 | 6. 0 | 2.4 2 | 10.0 1 | 4 . 1 9 |
| ve nezu ela | 12/3 −12 /96 | 9. 6 | −2.0 4 | 0. 8 | 11. 95 |
| Eg ypt | / 50−9 /62 | −1. 46 | −2.8 4 | −1.6 3 | 1 . 4 2 |
| Ix rael | 1/5 −12 /96 | 3 . 05 | 3.0 3 | .2 1 | 33. 02 |
| 7o utk Afri ca | 1/4 −12 /96 | 6. 13 | −1. 6 | 1.4 8 | 8 . 0 3 |

Al l 3 9 cou ntr iex

T ean −0.4 3.1 1

T edia n 0. 5 4.6 8

11 cou ntri ex πitk con tin uoux kix tor iex into tk e 1 9 20x

T ean 1.8 8 5.0 9

T edia n 2.3 5 5.2 0

−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−

Ta ble II

Ret urn and Rix k o f G l obal Equ ity Tar ketx Ar itkm eti c R e turn in Per cent pe r A n num

Tk e t a ble com pare x a v era ge x tock re turn x a n d t keir xta nda rd d evia tio n ( 7 .D.) . Pe rcen tage re turn x a r e m eaxu red in nomi nal ter mx i n tk e l ocal cur ren cy,

in rea l t e rmx , d e flat ing by tke Wko lexa le P ric e I n dex, an d t r anxl ate d i n t o 8 .7.

Do llar x. Tke ari tkme tic ave rage re turn ix obt aine d f r o m tke mont kly ave rage

mu ltip lied by tπe lve; x. d. i x an nua lize d b y m u ltip lyin g t ke m ontk ly vola tili ty by xqu are roo t o f tπe lve . F or x eri ex π itk bre akx (1), (2 ), ( 3 ) r efe r t o

di ffer ent xub peri odx.

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| --- | --- | --- | --- | --- | --- | --- | --- |
| −− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− − | | | | | | | |
| Go untr y | P erio d | | N omin al Retu rn Rea l R e tur n  A v erag e (7.D .) Ave rage (7 .D. ) | | | | Doll ar Ret urn  A vera ge (7. D.) |
| −− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− − | | | | | | | |
| 8. 7. | 1/ 21−1 2/9 6 | | 8.0 9++ (16. 20) | | 5.48 ++(1 5.8 4) | | 8. 09+ +(16 .20) |
| Ga nada |  | 1/ 21−1 2/9 6 | .0 6++ (16. 81) | | 4.54 + | ( 1 6.6 5) | 6. 88+ +(18 .1 ) |
| Au xtri a |  | 1 / 25−1 2/9 6 | 6. ++ (18. 92) | | 2.32 | (1 9.4 9) | . 22+ +(21 .49) |
| Be lgiu m |  | 1 / 21−1 2/9 6 | 6.2 5++ (1 . 92) | | 1.49 | (1 8.9 ) | 5. + +(21 .80) |
| De nmar k |  | 1 / 26−1 2/9 6 | 6.4 3++ (12. 04) | | 2.65 | (1 2.6 9) | 6. 10+ +(14 .36) |
| Fi nlan d |  | 1 / 31−1 2/9 6 | 10. 4++ (16. 56) | | 3.50 | (1 .0 ) | 8. 18+ +(20 .49) |
| Fr ance |  | 1/ 21−1 2/9 6 | 11.1 9++ (21. 5 ) | | 3.16 | (2 1.2 5) | . 6+ +(25 .50) |
| Ge rman y | ( 1 ) | 1 /21− /4 4 | 10.2 2 (40. 24) | | .62 | (3 4.2 6) | 12. 54 (40 .49) |
| G erma ny | ( 2 ) | 1 / 50−1 2/9 6 | 9.3 5++ (15. 50) | | .06 ++(1 5.6 0) | | 11. 5+ +(1 .19) |
| Ir elan d | | 1 / 34−1 2/9 6 | .8 8++ (14. 85) | | 2.59 | (1 5.0 2) | 6. 43+ +(16 . 3) |
| It aly | | 12/ 28−1 2/9 6 | 12.6 2++ (26. 01) | | 3.15 | (2 5.6 6) | 3. 15 (25 .66) |
| Ne tker land x | | 1 / 21−1 2/9 6 | 4. 8++ (15. 12) | | 2. 8 + | ( 1 4.8 0) | 5. 85+ +(16 .50) |
| No rπay | | 1/ 28−1 2/9 6 | 8.4 9++ (1 . 90) | | 4.4 + | ( 1 .9 0) | . 9 + +(19 .33) |
| Po rtug al ( 1 ) | | 1 2 /30− 4/ 4 | 6.5 0++ (15. 15) | | 2.34 | (1 4.6 9) | . 40+ +(15 .03) |
| P ortu gal (2) | | 3/ −1 2/9 6 | 2 .0 8++ (46. 38) | | 1 4.69 | (4 .6 8) | 20. 42 (4 .11) |
| 7p ain | | 1/ 21−1 2/9 6 | 6. ++ (18. 92) | | − 0.51 | (1 6.0 0) | 2. 44 (28 .89) |
| 7π eden | 1/ 21−1 2/9 6 | | 8.5 6++ (16. 61) | | 5.60 ++(1 6.6 5) | | 8. 38+ +(1 .69) |
| 7π itze rlan d | | 1 / 26−1 2/9 6 | 5.8 3++ (14. 9) | | 4.28 + | ( 1 4. 3) | . 91+ +(15 .9 ) |
| 8. K. | | 1/ 21−1 2/9 6 | .2 5++ (15. 43) | | 3.60 + | ( 1 5.6 8) | 6. 66+ +(1 .5 ) |
| Gz ecko xlov aki a | | 1 /21− 4/4 5 | 5.0 4+ | (12. 53) | 4.56 | (1 2.8 4) | 10. 50+ +(1 .12) |
| Gr eece | | /29− 9/4 0 | −0.0 9 | (21. ) | − 3.44 | (2 1.6 1) | −5. 31 (25 .50) |
| Hu ngar y | | 1 /25− 6/4 4 | 9.3 4 | (25. 84) | 6.20 | (2 6.5 8) | 11. 99+ (26 .02) |
| Po land | | 1 /21− 6/3 9 | 13.6 0 | ( 1. 20) | 1 4.40 | (6 5.6 9) | 16. 69 ( 1 .54) |
| Ro mani a | | 1 2 /3 − 6/4 1 | 0.1 4 | (33. 31) | −2 .30 | (3 1.3 8) | −9. 45 (35 .06) |

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| Au xtra lia | 1/ 31−1 2/9 6 | . 8++ (13. 49) | | 2.5 | (1 3.9 4) | . 68+ +(18 .06) | |
| Ne π z e alan d | 1 / 31−1 2/9 6 | 6.2 0++ (12. 12) | | 0.55 | (1 2.5 0) | 4. 98+ +(15 .9 ) | |
| Ja pan (1) | 1 /21− 5/4 4 | 2. 2 (1 . 51) | | 0.89 | (1 5. 9) | −0. 35 (1 .40) | |
| J apan (2) | 4/ 49−1 2/9 6 | 9. 9++ (18. 8) | | .21 ++(1 8.9 0) | | 12. 61+ +(20 .9 ) | |
| In dia | 12/ 39−1 2/9 6 | 6.1 8++ (15. 53) | | − 1.0 | (1 6.1 3) | 2. 3 | (1 .46) |
| Pa kixt an | / 60−1 2/9 6 | .4 6++ (14. 3 ) | | − 0.64 | (1 5.2 3) | 2. 39 | (1 .50) |
| Pk ilip pine x | / 54−1 2/9 6 | 10.6 2 (3 . 35) | | 1.21 | (3 .2 1) | 5. 30 | (38 .91) |
| Ar gent ina (1) | 9 /4 − /6 5 | −1.1 3 | (31. 91) | −2 3.32 ++(3 2. 3) | | −18. 1 (40 .11) | |
| A rgen tina (2) | 12/ 5−1 2/9 6 | 1 9.3 4 | ( 133. 55) | 4 9.68 (8 .8 3) | | 5 . 85+ +(93 .68) | |
| Br azil | 2/ 61−1 2/9 6 | 1 10.6 9++ (68. 22) | | 1 2.92 | (5 1.9 3) | 18. 45+ (53 .44) | |
| Te xico | 12/ 34−1 2/9 6 | 21.9 ++ (26. 9) | | 5.3 | (2 4.4 5) | 10. 46+ +(29 .09) | |
| Gk ile (1) | 1 /2 − 3/ 1 | 14.5 1++ (22. 45) | | − 3.91 | (2 1.8 5) | −0. 12 (28 .64) | |
| G kile (2) | 12/ 3−1 2/9 6 | 5 .1 9++ (40. 34) | | 2 0.48 ++(3 6.2 5) | | 25. 94+ +(38 .59) | |
| Go lomb ia | 12/ 36−1 2/9 6 | 11.6 6++ (21. 56) | | − 2.32 (2 1. 8) | | 1. 6 (23 .39) | |
| Pe ru ( 1 ) | 3 /41− 1/5 3 | 3.0 2 (12. 90) | | −1 2.08 ++(1 4.1 5) | | 3. 39 (16 .58) | |
| P eru (2) | 1/ 5 −1 2/ | 1.8 9 (8. 62) | | − 9.94 ++ ( 9.0 8) | | −6. 61+ (13 .66) | |
| P eru (3) | 12/ 88−1 2/9 6 | 2 00.6 4++ (118 .38) | | 5 5.55 (8 .9 8) | | 1. 95+ (8 .18) | |
| 8r ugua y | 12/ 36−1 1/4 4 | 10.5 5 (28. 98) | | 6.6 (2 9.6 6) | | 13. 80 (29 .63) | |
| ve nezu ela | 12/ 3 −1 2/9 6 | 12.0 3++ (24. 65) | | 0.88 (2 4.8 4) | | 4. 85 (28 .08) | |
| Eg ypt | /50− 9/6 2 | −0.8 3 | (11. 50) | − 2.11 | (1 2.5 4) | −0. 19 | (1 .33) |
| Ix rael | 1/ 5 −1 2/9 6 | 35.1 8++ (26. 0 ) | | 5.68 | (2 2.9 6) | 10. 0 + | (24 .33) |
| 7o utk Afri ca | 1/ 4 −1 2/9 6 | .2 4++ (15. 5) | | − 0.46 | (1 5.8 9) | 3. 34 | (18 .8 ) |

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No te: +, + + i ndic atex xi gnif ican tly dif fere nt from zer o a t t k e 5% an d 1 % lev el, re xpec tive ly.

Ta ble III

Gomp ari xon of R eal Ret urnx πi tk a n d π itk out Divi den dx

Tk e t a ble com pare x x t ock ret urnx πi tk a n d π itk out divi den dx.

Re turn x a r e m eaxu red in real ter mx and are ann uall y c o mpo unde d. Tk e t o p pa rt repo rtx Tor gan 7tan ley Gap ital In tern atio nal

Pe rxpe ctiv e ( T7GI P) d ata ; t k e bo tto m p a r t p rex entx lon g−t erm data , ob tain ed f rom var ioux xo urce x.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| −− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−− | | | | |
| G omp ound  Re turn  πitk D ivi dend  G ount ry (% pa) | | Gom poun d  R etur n πi tkou t Div iden d ( % pa ) | D iff eren ce  due to D i vide nd | In flat ion  ( % pa) |
| −− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−−− −−− −−−− −−− | | | | |
| Ta rket x G o ver ed by | T7 GIP, | 19 0−1 995 |  |  |
| Au xtra lia | 3.65 | −0. 1 | 4 . 3 6 | 6 . 9 |
| Au xtri a | 4.89 | 2.0 | 2 . 8 2 | 2 . 5 |
| Be lgiu m | 1 2.9 | 4.0 5 | 8 . 9 2 | 2 . 4 6 |
| Ga nada | 4.34 | 0.6 5 | 3 . 6 9 | 5 . 8 |
| De nmar k | 6.54 | 2. 1 | 3 . 8 3 | 5 . 6 2 |
| Fr ance | 4.45 | −0.2 9 | 4 . 4 | . 4 0 |
| Ge rman y | 5.52 | 1.4 4 | 4 . 0 8 | 3 . 0 9 |
| It aly | − 0.26 | −2.9 5 | 2 . 6 9 | 9 . 8 |
| Ja pan | 8.59 | 6. 5 | 1 . 8 4 | 2 . 1 8 |
| Ne tker lan dx | 8.84 | 3.0 9 | 5 . 4 | 3 . 4 1 |
| No rπay | 6.03 | 2. 8 | 3 . 2 6 | 5 . 9 0 |
| 7p ain | 2.30 | −4.0 0 | 6 . 3 1 | 8 . 4 0 |
| 7π eden | 8. 9 | 5.0 3 | 3 . 6 | . 4 2 |
| 7π itze rla nd | 5. 2 | 3.0 6 | 2 . 6 6 | 2 . 5 4 |
| 8. K. | 6.39 | 1.2 3 | 5 . 1 6 | 8 . 3 5 |
| 8. 7. | 6.15 | 2.0 1 | 4 . 1 4 | 4 . 8 9 |
| Av erag e | 5.93 | 1.6 8 | 4 . 2 5 | 5 . 4 3 |
| Lo ng−T erm Tar ketx  D enma rk 192 3−95 | 4.88 | 0.6 4 | 4 . 2 4 | 3 . 2 |
| G erma ny 192 4−95 | 4.83 | 1.2 1 | 3 . 6 3 | 2 . 4 |
| 7 πede n 192 6−95 | .13 | 3.3 0 | 3 . 8 3 | 3 . 6 4 |
| 7 πitz erla nd 192 1−95 | 5.5 | 2.1 2 | 3 . 4 5 | 2 . 4 9 |
| 8 .K. 192 1−95 | 8.16 | 2.9 9 | 5 . 1 | 3 . 5 |
| 8 .7. 192 1−95 | 8.22 | 3.3 8 | 4 . 8 4 | 2 . 6 9 |
| 8 .7. 1 8 1− 1920 | 5.43 | 0.2 | 5 . 1 6 | 0 . 5 9 |
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T abl e I v

An alyx ix of 7 tock Pr icex aro und Bre akx

Tk e t a ble dex crib ex t k e beka vior of xto ck p ric ex m eaxu red in real te rmx ar ound maj or brea kx. It rep ortx tk e b r eak dat e, t k e r etu rn i n tk e y ear pr evio ux t o t k e b reak , t ke x erie x r exta rt d ate and xub xeq uent cka nge ,

πk en a vail abl e. Real re turn x a r e i n ex cexx of tke Wko lex ale Pric e I ndex fo r t k e co rre xpon ding co untr iex.

+ indi cate x t kat equi tie x π e r e e ffe ctiv ely xub ject to pri ce c ontr olx .

+ indi cate x t kat tke xux eque nt c kan ge π a x o bta ined fro m a lter nati ve data xou rce x.

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Br eak Pre viou x 7 eri ex 7 ubxe que nt d ate yea r r e xta rt cka nge

Go untr y r etur n d a t e G o mmen t

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| Hu ngar y | /31 | − 0.22 2 | 9 / 3 2 | 0 . 125 | Fi nanc ial cri xix, co untr y i n | | | | | d e faul t | |
| Ge rman y | /31 | − 0.31 6 | 4 / 3 2 | −0. 232 | Gr edit cr ixix | | | | |  | |
| Gr eece | 10 /31 | − 0.09 9 | 12/ 32 | −0. 581 | Fi nanc ial cri xix, dr ougk t | | | | |  | |
| 7p ain | /36 | − 0.11 3 | 3 / 4 0 | −0. 14 | Gi vil War | | | | |  | |
| Au xtri a | 4 /38 | − 0.1 9 | 12/ 46 | 0. 941 | An nexa tio n b y Ger man y | | | | |  | |
| Gz ecko xlov aki a | 1 0 /38 | − 0.20 5 | 1 / 4 0 | 0 . 015 | 7e xxio n o f l a n d t o G erma ny | | | | |  | |
| Po land | /39 | 0.16 9 |  |  | I n vade d | b y | G e rman y | ( 7ep | 30) | | |
| Fi nlan d | 1 2 /39 | − 0.19 2 | 3 / 4 0 | −0. 101 | In vade d | b y | 7 o viet x | ( Nov | 30) | | |
| De nmar k | 4 /40 | − 0.32 8 | 6 / 4 0 | −0. 084 | In vade d | b y | G e rman y | ( Apr | 9) | | |
| No rπay | 4 /40 | − 0.2 4 | 6 / 4 0 | −0. 154 | In vade d | b y | G e rman y | ( Apr | 11) | | |
| Ne tker land x | 5 /40 | − 0.23 1 | 9 / 4 0 | 0 . 105 | In vade d | b y | G e rman y | ( Tay | 10) | | |
| Be lgiu m | 5 /40 | − 0.26 | 12/ 40 | 0. 850 | In vade d | b y | G e rman y | ( Tay | 10) | | |
| 7π itze rlan d | 5 /40 | − 0.19 3 | / 4 0 | −0. 20 | To bili zat ion | | |  |  | | |
| Fr ance | 6 /40 | − 0.12 2 | 4 / 4 1 | 0 . 824 | In vade d b y G e rman y | | | ( Jun | 14) | | |
| Gr eece | 10 /40 | − 0.24 9 | n o n e |  | I n vade d b y G e rman y | | | ( Oct | 28) | | |
| Ro mani a | /41 | − 0.39 6 | n o n e |  | E n terx πa r | | |  |  | | |
| Gz ecko xlov aki a+ | /43 | − 0.14 1 | n o n e |  | W a r | | |  |  | | |
| Ja pan+ | 6 /44 | − 0.21 1 | 4 / 4 9 | −0. 949 + | W a r | | |  |  | | |
| Hu ngar y+ | /44 | − 0.49 1 | n o n e |  | W a r | | |  |  | | |
| Be lgiu m+ | 8 /44 | 0.16 1 | 6 / 4 5 | −0. 145 | Wa r | | |  |  | | |
| Ge rman y+ | 8 /44 | − 0.01 3 | 1 / 5 0 | −0. 838 + | I n vade d b y A l lied | | | (7 ep 1 | 5 ) | | |
| Eg ypt | 10 /62 | − 0.12 6 | n o n e | A r a b x oci alix m | | | |  | | | |
| Ar gent ina | 8 /65 | − 0.69 2 | N / A | Wi dexp rea d u n rext , | | | | k yper infl ati on | | | |
| Gk ile  Po rtug al | 4 / 1  4 / 4 | − 0.54 3  − 0.11 2 | 1 / 4  3 / | 1 . 618 +  −0. 860 + | 7 t ate tak ex c ontr ol of e cono my (Apr Ju nta rev erxe x p o lic iex (7ep 11 , 3 )  T a keov er by l efti xt junt a ( A p r 2 ) | | | | | | 4) |

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Ta bl e v

Re la ti ve Im por ta nce o f Eco no mie x

Per ce nta ge W eig kt x B ax ed on 8 .7. D oll ar P ric ex

Tk e tab le d exc ri bex t k e p e r c ent ag e o f e a c k c o unt ry i n t k e t o t a l G r o x x Do me xti c P r odu ct (G DP ) i n 1 9 20, 1 950 , a n d 1 9 9 0 . T ke la xt co lu mn xk oπ x tk e per ce nt age π eig kt b axe d o n x t ock m a r ket c api ta li zat io n.

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| 8. 7. | 46 .1 % | 51. 52 % | 30. 59 % | 4 1 . 0 3 % |
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| Gr ee ce | 0 .33 % | 0 . 3 9 % | 0. 3 % | 0 .1 1% |
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Ta ble FI

P erfo rman ce o f G loba l S t ock Ind ex: 1921 −199 6 Real Ret urn s ( P erce nt P e r Rnnu m)

Tk e t a ble disp lay s t k e risk a n d retu rn o f re al retu rns on s tock ma rket in dice s, m easu red in exce ss o f t k e N kole sale Pr ice Inde x in flat ion .

Rr itkm etic ret urn is obta ined fr om t k e m ontk ly aver age mult ipli ed by

tv elve ; r is k is m ontk ly v olat ility m ulti plie d b y s q uare roo t o f t v elve ; Sk arpe rat io is t k e r atio of mon tkly ave rage to mon tkly vol atil ity ;

ge omet ric retu rn uses ann ual com poun ding . E ndi ng v ealt k r e port s t ke final valu e o f L 1 inv este d o n D e cemb er 1 920 at tke end of t k e s amp le.

”S urvi ved mark ets ” s e ries inc lud es o nly mark ets in our samp le in e xist ence in 199 6, t aken si nce tke last in terr upti on ( tem pora ry o r pe rman ent ).

”R ll m arke ts” ser ies acco unts fo r a ll ma rket s in t k e sa mple , im put ing a

5 lo s s in t k e m ontk tke ser ies per mane ntly di sapp ears , o r tke ac tual lo ss s prea d o v e r tke peri od o f t k e b reak .

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| In dex | Rr itkm etic  Re turn | Ri sk | To ntk ly Ge omet ric E ndin g  S kar pe Ret urn N ealt k | | |
| −− −−−− −−−− −−−− −−− −−−− −−−− −−−− −−− −−−− −−−−  U. S. Index 5. 48 15. 83 | | | −−−− −−− −−−− −−−−  0 .09 99 | −−−− −−−− −−−  4 .32 | −−−− −−  2 . 3 |
| Gl obal Ind ex:  − surv ived mar ket s | 4 . 9 8 | 12. 08 | 0 .11 90 | 4 .33 | 2 . 3 |
| − all mark ets | 4. 59 | 11. 05 | 0 .11 99 | 4 .04 | 21. 9 |
| No n−U. S. Index  − surv ived mar ket s | 4 . 5 2 | 10. 02 | 0 .13 01 | 4 .09 | 22. 2 |
| − all mark ets | 3. 84 | 9. 96 | 0 .11 14 | 3 .39 | 13. 1 |

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Ta ble FII

P erfo rman ce o f G loba l S t ock Ind ex: 1921 −199 6

No min al R etur ns in U .S. Doll ars (Pe rcen t P e r Rn num)

Tk e t a ble disp lay s t k e risk a n d retu rn o f do lla r r e turn s o n sto ck mark et in dice s, t rans lat ed into U.S. do llar s a t tke of fici al r ate.

Rr itkm etic ret urn is obta ined fr om t k e m ontk ly aver age mult ipli ed by

tv elve ; r is k is m ontk ly v olat ility m ulti plie d b y s q uare roo t o f t v elve ; Sk arpe rat io is t k e r atio of mon tkly ave rage to mon tkly vol atil ity ;

ge omet ric retu rn uses ann ual com poun ding . E ndi ng v ealt k r e port s t ke final valu e o f L 1 inv este d o n D e cemb er 1 920 at tke end of t k e s amp le.

”S urvi ved mark ets ” s e ries inc lud es o nly mark ets in our samp le in e xist ence in 199 6, t aken si nce tke last in terr upti on ( tem pora ry o r pe rman ent ).

”R ll m arke ts” ser ies acco unts fo r a ll ma rket s in t k e sa mple , im put ing a

5 lo s s in t k e m ontk tke ser ies per mane ntly di sapp ears , o r tke ac tual lo ss s prea d o v e r tke peri od o f t k e b reak .

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| −− −−−− −−−− −−−− −−− −−−− −−−− −−−− −−− −−−− −−−−  U. S. Index 8.04 16. 19 | | | −−−− −−− −−−− −−−−  0 .14 33 | −−−− −−−− −−− −−−− −−  6 .95 1 1. 2 | |
| Gl obal Ind ex:  − surv ived mar ket s | .98 | 13. 34 | 0 .1 28 | .32 | 222. 9 |
| − all mark ets | . 6 | 12. 14 | 0 .18 45 | .25 | 211. 2 |
| No n−U. S. Index  − surv ived mar ket s | .53 | 12. 1 | 0 .1 85 | .00 | 1 6. 5 |
| − all mark ets | .28 | 12. 08 | 0 .1 40 | 6 . 5 | 146. 2 |

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