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INSTITUTIONS AND GROWTH VOLATILITY

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June 2005

Abstract: Apart from the human suffering it causes, growth volatility is a major factor that retards growth. Recently several studies provided empirical evidence that democratic political institutions generate less volatile growth. In the economics literature fluctuations in major macroeconomic processes, like aggregate investment, are considered fundamental factors influencing growth volatility. However, the studies on democracy and growth volatility do not provide any link between democracy and investment volatility. Here, instead of democracy, we consider another institutional variable in explaining growth volatility: we focus on the specific channel that links individualistic societies and low growth volatility. In our theoretical model, it turns out that in a collectivistic society agents choose to invest together or choose not to invest together. In an individualistic society, on the other hand, there are also some parameter values at which the agents with more wealth choose to invest while the agents with less wealth do not find it worth investing. Hence, investment volatility and consequently growth volatility are lower in an individualistic society than in a collectivistic society. This is because in an individualistic society, agents are able to reap the entire benefits of their individual investments themselves and make their investment decisions regardless of the other agent's investment decision. Whereas in a collectivistic society, individuals are not able to reap the entire benefits of their individual investments themselves and cannot make their investment decisions regardless of the other agent's investment decision. We test the theoretical model's prediction by constructing a two-equation system of investment and income growth volatility, allowing various measures of individualism to influence growth volatility both directly and indirectly. Using standard controls, we importantly control for the development of democratic institutions. Based on a battery of sensitivity tests, we find individualism significantly directly and indirectly influences growth volatility negatively. We also find that, unlike individualism, democracy's influence on investment depends on the measure of democracy and econometric specification used.

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I. Introduction

There are extreme differences in per capita incomes and large differences in growth rates across countries'.¹ There are also large differences in countries' abilities to avoid major crises.² Apart from the human suffering it causes, growth volatility is a major factor that retards growth (see, most importantly, Ramey and Ramey, 1995, for strong empirical support).³ Therefore, it is not sporadic growth but sustained growth which is most sought after by societies which try to avoid episodes similar to the recent crises in Latin America and Asia.

Given that growth volatility retards growth and thus prosperity, the relevant question is 'what reduces growth volatility.' Recently several studies provided empirical evidence that democratic political institutions generate less volatile growth (Rodrik, 2000, Quinn and Woolley, 2001, Mobarak, 2005). Rodrik argues that democracies exhibit higher levels of social cooperation in the face of exogenous shocks which allows them to navigate and alleviate the potentially harmful effects of these shocks. Quinn and Woolley (2001) argue that because of the mechanism of democratic competition as well as the preferences of voters, democracies select away from high volatility.

The bulk of the economics literature, however, provides theoretical explanation and empirical evidence that the fluctuations of major macroeconomics processes are fundamental sources of aggregate growth volatility. The popularly held Keynesian view traditionally maintains that shocks that are specific to aggregate investment, and to government deficit-spending, lead to rapid changes in growth and therefore to growth volatility. Monetarists, on the other hand, argue that shocks to the money supply can augment or hamper aggregate investment, thereby adding to the volatility of investment and therefore income and consumption growth volatility. Real business cycle theory, however, has been used to argue that fluctuations in productivity contribute to major aggregate swings and therefore to investment and growth

¹ The per capita incomes of countries range from slightly more than \$100 to about \$35,000. While some countries in crisis experience decreases in their per capita income as much as -10 or more some countries with booms experience increases in their per capita income almost 10 percent. Typically neither growth rate is sustained over time. However, even one percent difference in long-term growth can cause large differences in per capita income: Controlling for the population growth, for instance, a country that grows 1 percent per year will double its per capita income in 72 years while a country that grows 2 per cent per year will double its income in 36 years.

² Growth volatility is a major source of uncertainty for a society. North (1993) states that the pervasive human attempt to reduce such uncertainty is the key to the understanding the way belief systems and institutions evolve.

³ Argentina's jobless rate, for instance, went over 20 percent in the most recent crisis; in addition, the crisis pushed half of the country's 36 million population under the poverty line. A World Bank document states that "over the long-term, declining health and malnutrition will affect worker productivity, reducing future growth, and delaying the recovery" (World Bank, 2005).

volatility.

Thus, and not surprisingly, the determinants and sources of aggregate macroeconomic fluctuations are of fundamental interest, and in ongoing research have been argued to include, in general, the level of aggregate economic, financial, demographic and political development, and in particular, the level per capita income. For example, the annual volatility of aggregate savings and investment has been strenuously argued to be a fundamental precursor to growth volatility, and the primary factors that explain investment volatility - and consequently growth volatility - are human capital, the extent of financial markets, capital market imperfections (including unequal access to such markets) and trade openness.

Levine (1997, 1998), King and Levine (1993a, 1993b), and Denizer, Iyigun, and Owen (2002) demonstrate that economies with greater financial development (banking, credit, liquidity, regulation) generate less macroeconomic volatility. Easterly, Islam and Stiglitz (2000) provide empirical evidence that the extent of the financial markets can reduce volatility while employment fluctuations can increase it. Razin, Sadka and Coury (2002) use a theoretical analysis to argue that trade openness increases investment volatility. Easterly and Kraay (2000) provide empirical evidence that trade openness can cause volatility especially for small countries. Aghion, Bachetta, and Banerjee (2000) demonstrate that volatility is more likely for open economies and intermediate levels of financial development. Aghion, Banerjee and Piketty (1999) consider a theoretical model in which capital market imperfections and unequal access to investment opportunities are responsible for generating endogenous fluctuations in aggregate income, investment and interest rates. Acemoglu and Zilibotti (1997) highlight the role of per capita income in reducing volatility.

Apart from Rodrik (2000), Quinn and Woolley (2001), and Mobarak (2005), other papers study the effects of political and other institutional factors on growth volatility. Henisz (2000) presents evidence that the number of politicians with veto power over policy changes (i.e. suggestive of a greater degree of democracy) is negatively associated with policy shifts that influence investment. Nooruddin (2003) argues that political constraints on politicians are negatively associated with growth volatility. Acemoglu, Johnson, Robinson and Taicharoen (2003) study the effects of a set of other institutional variables on growth volatility as well as those of distortionary macro economic policies.

In the political-economy literature, democracy has been frequently identified as the most prominent political institutional factor considered in explaining growth volatility. As will be reported in detail below, we find substantive

empirical evidence supporting the finding that democracy negatively influences growth volatility. The above mentioned papers that provide link between democracy and growth volatility, however, do not provide a link between democracy and investment volatility, the latter a fundamental source of fluctuations in aggregate growth.

Here, we consider a “slower-moving” institutional variable than democracy⁴ that reduces growth volatility both directly and - via reducing investment volatility - indirectly. The institutional variable that we consider here, individualism/collectivism, was also considered by Greif (1994), who examined contrasting individualistic and collectivistic backgrounds of Genoese and Maghribi traders that led these two pre-modern societies in the late medieval Mediterranean trade to evolve along distinct paths. By building on this tradition that highlights the fundamental role played by the “slow-moving” institutional and cultural differences of societies on these societies’ different political and economic outcomes, our paper focuses on the specific channel that links individualistic societies and their low growth volatility.

In terms of our empirical analysis, our starting point is Hofstede’s (1980a,b) analysis and data set on different cultural dimensions. Hofstede conducted questionnaires in 1968 and 1972 among 117,000 IBM employees; the initial 40-country sample was subsequently expanded to a total of 47 countries. It is still considered the most comprehensive comparative study especially in terms of the number of respondents involved. Hofstede based his analysis on four dimensions: ‘*individualism*’, ‘*power distance*’, ‘*masculinity*’, and ‘*uncertainty avoidance*’.⁵ In subsequent research, the individualism/collectivism dimension far exceeded the other dimensions in popularity. According to Hofstede, “individualism stands for a society in which ... everyone is expected to look after himself or herself and his or her immediate family only,” and “collectivism stands for a society in which people from birth onwards are integrated into strong, cohesive in-groups, which throughout people’s lifetime continue to protect them in exchange for unquestioning loyalty.”

⁴ Roland (2004) distinguishes between slow-moving and fast-moving institutions: “What is often called ‘culture’, including values, beliefs, and social norms, can be classified as a slow-moving institution. ... Political institutions can be classified as a fast-moving institution.”

⁵ “Power distance indicates the extent to which a society accepts the fact that power in institutions and organisations is distributed unequally.” “Masculinity” points to the extent that the dominant values in society are assertiveness, the acquisition of money and things, and *not* caring for others, the quality of life, or people. “Uncertainty Avoidance, indicates the extent to which a society feels threatened by uncertain and ambiguous situations and tries to avoid these situations by greater career stability, establishing more formal rules, not tolerating deviant ideas and behaviors, believing in absolute truths and the attainment of expertise.”

Not surprisingly, Hofstede's work has had its share of critics too.⁶ To show that our main empirical result which relates individualism to growth volatility through investment volatility does not hinge upon the idiosyncrasy of the IBM employees' cultural values in the 1960s and 1970s, we will use the "in-group collectivism" index of the GLOBE Project (see House et al., 2004), which also exhibits strong negative correlation with Hofstede's individualism (-.71, p-val = .001).^{7,8} The data on in-group collectivism were collected in 1994. Thus, arguably the other researchers' more recent indices' strong (negative) correlations with individualism indicate the slow-moving nature of cultural institutions.⁹ Figure 1 demonstrates the comparatively strong match between Hofstede's measure and those of GLOBE and Schwartz.

[Insert Figure 1 about here]

Note that, the U.S. (91), Australia (90), Great Britain (89), Canada (80), and Netherlands (80) constitute the top five societies according to Hofstede's individualism index; their index values are stated in the parentheses. Although Switzerland has a higher per capita income than the U.S., the latter's individualism index value exceeds that of the former by more than 30%: see Figure 2. While Japan's per capita income is 40% higher than that of Netherlands, the latter's individualism index value is almost 80% higher than that of the former. The comparison between Hong Kong and

⁶ Many of Hofstede's critics suggested various refinements of his dimensions. Triandis (1995), for instance, argues that several additional culture-specific attributes define different kinds of collectivism or individualism. For example, although both the kibbutz and most East Asian cultures are collectivist, there are profound differences among the specific kinds of collectivism of these cultures. That is, they constitute different species of collectivism. While Schwartz (1994) provides finer gradations of cultural differences, his embeddedness/autonomy index is relatively strongly negatively correlated (-.57, p-val = .008) with the individualism/collectivism index of Hofstede. Schwartz's index, however, spans a much smaller set of countries. Schwartz (2005) himself, however, contends that his embeddedness/autonomy dimension is not comparable to Hofstede's individualism.

⁷ Correlations are Pearson correlation coefficients; p-values are based on the Fisher correction, derived from a *t*-distribution.

⁸ The statements below constitute a very typical sample used by Hofstede to construct his individualism/collectivism index values. They are "how important is it to you to ..." questions, of which answers have the range "of utmost importance," "very important," "of moderate importance," "of little importance," "of very little or no importance." A7: Have an opportunity for high earnings. A8: Work with people who cooperate well with each other. A13: Have considerable freedom to adapt your own approach to the job. A15: Have an opportunity for advancement to higher-level jobs. C3: Have a job which allows you to make a real contribution to the success of your company. C4: Work in a company which is regarded in your country as successful. C6: Work in a congenial and friendly atmosphere. Similarly, the statement(s) "employees (individuals) should feel great loyalty to their organization (to their family)" to generate the in-group collectivism index by the GLOBE project. They are "do you agree or disagree" questions, of which answers have the "I strongly agree" to "I strongly disagree" spectrum. There are also "in this organization the pay and bonus system should be designed to maximize ..." and "the economic system in the society should be designed to maximize ..." statements with the ending spectrum ranging from "1.individual interests" to "7.collective interests."

⁹ In another way, "correlations between these measures and Hofstede's indicate that although these new measures may have some advantages, Hofstede's data is more dependable than many had thought" (Peterson, 2005).

Australia is not less stark than the ones above, where the latter's individualism index value is more than 3.5 times that of Hong Kong. More interestingly, for each of the country pairs mentioned above, the growth volatility is less in the more individualistic country.

[Insert Figure 2 about here]

Consider, for example, Hofstede's measure of individualism (*indiv*: 1972), the standard deviation of U.S. aggregate investment share¹⁰ (*investment volatility*: 1972-2000) and the standard deviation of U.S. aggregate GDP-per-capita growth (*growth volatility*: 1972-2000). The bivariate plots of Figure 2 provide a simple story. Hofstede's individualism measure in 1972 is moderately negatively correlated with investment volatility over the proceeding three decades (-.40, p-val = .008)¹¹; investment volatility is more pronouncedly positively correlated with growth volatility (.62, p-val = .000); and individualism itself is relatively strongly negatively correlated with growth volatility (-.55, p-val = .000).

In our theoretical model, we consider two agents (i.e., individuals, households, or firms) with different asset (wealth) levels. These agents' payoffs are determined within the cooperative bargaining framework of Nash (1950). Agents can enhance their assets by investing in them at a cost. This cost and thus the rate of return to their investments can fluctuate. We consider two types of societies. In the first type of society, individualistic agents adopt the Nash solution (Nash, 1950, 1953) which yields a payoff ratio identical to the asset ratio of the agents such that the payoff of an agent will increase when his assets increase, but will not change when the other agent's assets increase. In the second type of society, collectivistic agents adopt the Egalitarian solution which always yields the same payoffs independent of the asset ratio, such that the payoff of an agent will increase whenever any of the agents' assets increase.¹²

It turns out that in a collectivistic society either both agents choose to invest together or choose not to invest together. In an individualistic society, on the other hand, although there are some parameter levels at which both agents choose to invest together or choose not to invest together, there are also some parameter values at which the agent with more wealth chooses to invest while the agent with less wealth does not find it worth investing. Hence, investment volatility and consequently growth volatility are low in an individualistic society than in a collectivistic society. The

¹⁰ Consult Section IV and Appendix 1 for data sources and variable explanations.

¹¹ By comparison, GLOBE's in-group-collectivism has correlations of .25 (p-val = .09) and .42 (p-val = .005) respectively with investment volatility and income growth volatility.

¹² These solution concepts have also been advocated as social division rules; for instance, the Nash solution by

intuition is that in an individualistic society, agents are able to reap the entire benefits of their individual investments themselves and make their investment decisions regardless of the other agent's investment decision. Whereas in a collectivistic society, individuals are not able to reap the entire benefits of their individual investments themselves and cannot make their investment decisions regardless of the other agent's investment decision.

A simple bivariate, triangular simultaneous equation analysis treating investment volatility and growth volatility as endogenous detects a strong negative indirect influence from individualism to growth volatility through investment, as predicted. We then introduce demographic, macroeconomic, financial and political controls that have broad support in the empirical literature. We find that both Hofstede's and the Globe Project's measures of individualism/(in-group)collectivism imply a more pronounced degree of individualism provides a significant indirect and direct impact on growth volatility. This result remains robust to a battery of alternative model specifications based on political and financial controls.

Moreover, our model allows a direct test of whether democracy negatively influences growth volatility. Here, we control for multiple measures of macroeconomic fluctuations, of democracy and of individualism. As mentioned before, we find substantive empirical evidence supporting the important finding that democracy negatively influences growth volatility. However, unlike individualism, democracy's influence on investment depends on the measure of democracy and econometric specification used. This suggests that the link between democracy and growth volatility deserves further investigation, and the final answer concerning the mechanism by which democracy influences growth and growth volatility and the direct and indirect roles democracy plays has yet to be formed.

II. Institutions, Individualism/Collectivism and Political-Economic Outcomes

North (1994), in his Nobel speech, uses the term "institutions" to mean "shared behavioral regularities or shared routines within a population" which "define the incentive structure of societies and specifically economies." North highlights the key role played by culture in this context by stating that "it is culture that provides the key to path dependence."¹³ While

Binmore (1994) and the Egalitarian solution by Rawls (1972).

¹³ Roland (2004) distinguishes between slow-moving and fast-moving institutions: "What is often called 'culture', including values, beliefs, and social norms, can be classified as a slow-moving institution. ... Political institutions can be classified as a fast-moving institution."

the Western Europe's remarkable development "from relative backwardness in the 10th century to world economic hegemony by the 18th century is a story of a gradually evolving belief system ... producing economic institutions and political structure that produced modern economic growth," many other societies got stuck in institutions "that did not evolve into the impersonal exchange essential to capturing the productivity gains that came from the specialization and division of labor that have produced the Wealth of Nations.... and even within Western Europe there were successes (the Netherlands and England) and failures (Spain and Portugal) reflecting diverse external environmental experiences."¹⁴

In line with the above insights is Greif's (1994) examination of the Genoese and Maghribis, the two late medieval Mediterranean traders. Trade was central to Genoa's economy as well as to Maghribi traders. They both used comparable naval technology and traded in similar goods. The two trader groups had contrasting cultural backgrounds, however: "Collectivist cultural beliefs were a focal point among Maghribis and individualist cultural beliefs were a focal point among the Genoese." (Greif, 1994).

The Maghribis maintained transactional assurance by organizing agency relations¹⁵ within an informal economic institution. Greif (1997) refers to this institution as a "coalition." The coalition members hired agents only from within the coalition and paid their agents higher wages than the ones received by nonmembers.¹⁶ Based on the "gossip" information network among its members, coalition never employed agents who had previously cheated against any coalition members. Cheaters could be cheated by other coalition members with impunity. The coalition even held

¹⁴ Schwartz (1995) states that: "When values are used to characterize cultures, what is sought are the socially shared, abstract ideas about what is good, right, and desirable in a society or other bounded cultural group (Williams, 1970). These cultural values provide the bases for the shared norms that prescribe the behavior that is appropriate in various situations. Cultural value priorities are inherent in the organization of societal institutions." Schwartz (2003) continues: "Cultural value emphases shape and justify individual and group beliefs, actions, and goals. Institutional arrangements and policies, norms, and everyday practices express underlying cultural value emphases in societies. ... Of course, cultures are not fully coherent. In addition to a dominant culture, subgroups within societies espouse conflicting value emphases. The dominant cultural orientation changes in response to shifting power relations among these subgroups. ... Yet, cultural value orientations do change gradually. Societal adaptation to epidemics, technological advances, increasing wealth, contact with other cultures, and other exogenous factors leads to changes in cultural value emphases."

¹⁵ "Agents provided merchants with many trade-related services, including loading and unloading the ship, paying the customs, bribes and transportation fees; storing the goods; transferring the goods to the market; and deciding when how, and to whom to sell the goods and at what price and at which credit terms" (Greif, 1993).

¹⁶ Nagaishi (2004) provides evidence that, similar to the in-group trust of Maghribis, Japanese multinationals have a significant tendency to send more directors (both the top of the board of directors and directors as a whole) from the headquarters to their foreign affiliates than their American counterparts do.

relatives responsible for members' debts, which prevented older agents from cheating.¹⁷

The Genoese, on the other hand, evolved bilateral enforcement mechanisms which entailed the creation of formal legal and political organizations for monitoring and enforcing agreements, an institutional framework that lent itself to further evolution of increasingly complex trade. Greif (1994) states that: "During the twelfth century the Genoese ceased to use the ancient custom of entering contracts by a handshake and developed an extensive court system for registration and enforcement of contracts. Furthermore, the customary contract law that governed the relations between Genoese traders was codified as permanent courts were established. In contrast, ... Maghribis entered an informal code of conduct, and attempted to resolve disputes informally." Consequently, the Genoese went on to evolve more productive markets while the Maghribis eventually disappeared in the face of increasing competition.

The degree of individualism varies among species as well as among human societies. Some animals such as tigers are solitary while others such as wolves are gregarious. Humans are clearly on the gregarious side of the spectrum but different societies show differing degrees of gregariousness. While some hunting-gathering tribes tend to live in nuclear families some other tribes prefer to live in clans. Hofstede's definition of individualism/collectivism dimension has strong links to family structure. However, there are substantial differences even in the origins of family structures of the highly individualistic European and North American countries. Shorter (1975, p. 30), comparing old family statistics, found that around as early as 1700 the nuclear family was already a norm in Britain and North American colonies (and to a lesser degree in Netherlands) while the extended family dominated in the rest of Europe (there was no data available for Australia and New Zealand). This is crucial in understanding the degree individualism/collectivism of societies. Next, we

¹⁷ Even some contemporary societies exhibit some characteristics Maghribi type coalition arrangements. As McMillan and Woodruff (1999) describe, in Vietnam, business people can easily cheat each other since courts are of no use to them in resolving disputes. Entrepreneurs rely on reputation and gossip to select partners. They try to avoid disputes by checking their customers' financial backgrounds and personalities with others who have done business with them. The entrepreneur's incentive not to cheat a contract partner is not that the partners will sue but that they will stop dealing altogether. Certain milder aspects of this, such as credit bureaus, are relevant even in highly individualistic societies with very effective legal systems since legal conflict can be costly. Similar to Vietnamese businessmen swapping information, a debt collection agency for fish wholesalers in Portland, Maine, recently began using the Internet to sell wholesalers credit information about deadbeat buyers. Another example is a New York cable television company, Paragon Cable, which rather than terminating the cable service, chooses to run C-Span's monotonous political hearings on all of its 77 channels until the subscribers pay their bills. (See Stanford Graduate School of Business (2000) for the last two examples.)

will elaborate on what gives rise to such distinctive family structures.

As Acemoglu et al (2004) and Engerman and Sokoloff (2002) explain, due to very low population density and lack of easily exploitable resources, during colonial period in the North America, the British state had to grant access to land and to accept the formation of representative democratic institutions. In Spanish America, colonial powers faced a large indigenous population and rich resources to exploit. Consequently, in North America land ownership ranged between 75 and 90 percent of the population, whereas in most Latin American countries it was as low as 2.5 percent of the population. Thus, the crucial fact is that small, family farms were the norm in many colonies of the North American mainland, where climate and soil conditions were conducive to growing grains and livestock which exhibited limited economies of scale. These circumstances fostered relatively homogenous individualistic populations with relatively equal distributions of human capital, wealth as well as political power (the latter giving rise to representative democratic institutions). The Caribbean and Brazil enjoyed climate and soil conditions very conducive to growing cash crops that were most efficiently produced on large slave plantations. These countries took an un-individualistic clientelist path and generated very unequal distributions of human capital, wealth and political power.

Thus, initial climate and soil conditions, land policy and representative democratic institutions in the North America led to the individualistic structure which allowed the U.S. and Canada to establish institutions to provide the masses the chance to enhance their physical and human capital investment opportunities, while the non-individualistic clientelist structures of the rest of Americas led to the opposite path.^{18 19}

The role of education is crucial in this respect. Many New World societies had material means to establish

¹⁸ The roots of individualistic structure in North America are identified by Engerman and Sokoloff (2002) as initial climate and soil conditions, land policy and representative democratic institutions. Recall Shorter's finding that as early as 1700 the nuclear family was already a norm in Britain and to a lesser degree in Netherlands too while the extended family dominated in the rest of Europe. One may suspect that the relatively more urbanized way of living in those two countries - compared to the rest of Europe - perhaps has something to do with that finding, since nuclear family structure suits the mobility of urban life better. Another explanation is provided by Greif and Laitin (2004) who point out that decline of political authority can make clans and extended families the prominent unit of social organization since such corporate or consortial family form is more suited than the nuclear household to defend its wealth and status. It could very well be the case that the relatively strong political authority in Britain and Netherlands also contributed to the declining need for clans and extended families.

¹⁹ Clientelism (patronage) in a sense is a manifestation of collectivism and in-group collectivism. It entails loyalty for kick-backs - and thereby creates solidarities - among individuals in networks of reciprocal processes; these networks may be based on ethnic ties as well as on other factors such as occupational status, lineage, etc. Clientelism can thus involve personalized reciprocal links between socially similar or discrete entities.

widespread network of primary schools. Virtually from the time of settlement, however, only the U.S. and Canada invested in primary education that was more geared toward the children of the common people. Individualistic and non-individualistic patterns of land ownership had implications on banking and capital formation too in North and Latin America. In the former, “loans among farmers and planters in commercial agriculture were commonplace in the early eighteenth century. . . . The outcome, circa 1910 could not have been more different: the United States had roughly 25,000 banks and a highly competitive market structure; Mexico has 42 banks, two of which controlled 60 percent of total banking assets, and virtually none of which actually competed with another bank” (Acemoglu, Robinson and Johnson, 2005).

III. Theoretical Model

We consider two agents where one agent has the normalized asset (wealth) level, 1, and the other one has the normalized asset (wealth) level, $a > 1$. The assets could be human capital as well as physical capital. In short, we will refer to these agents as L (agent with low wealth) and H (agent with high wealth). We will consider a Nash bargaining setup.²⁰ In particular, the disagreement point will be normalized to (0,0), and for simplicity we will use the segment $[(1,0),(0,a)]$ as the Pareto frontier in the first period. That is, each party’s ideal payoff will be equal to the level of their asset ownership (or wealth).²¹

Agents can invest in their assets which will entail time and effort cost. In particular, given a level of ideal payoff b_i , each Agent i ($i = L,H$) can enhance their b_i to kb_i at a cost $c > 0$ where $2 > k > 1$. At the initial period, agents carry out their bargaining with their initial asset levels, 1 and a , and they will make their investment decisions individually considering their second period potential payoffs. Each agent will decide whether or not such an initial-period investment is worth taking.

In the individualistic society, the agents use the Nash bargaining solution. Given any ideal payoffs b_L and b_H , its

²⁰ As Ken Binmore (1994, p. 21) rightfully contends, “much negotiation [and exchange] in real life” entail relationships which “create a surplus that would otherwise be unavailable” to the parties (e.g., the potential buyer and the seller of a house, employer-employee, landowner-tenant): “if you have a fancy house to sell that is worth \$ t to you and \$3m to me, then ... a surplus of \$1m is available for us to split.”

²¹ By definition, the ideal payoff of an agent is the maximum that agent could achieve if it captured the entire surplus. With a given surplus, an agent with more assets (e.g., with more human and/or physical capital) can achieve a higher

outcome, $N(b_L, b_H)$ is such $N_L(b_L, b_H) = b_L/2$ and $N_H(b_L, b_H) = b_H/2$. Thus, initially, with $b_L = 1$ and $b_H = a$, we have $N_L(1, a) = 1/2$ and $N_H(1, a) = a/2$. Note that each $N_i(b_L, b_H)$ depends on b_i only, $i = L, H$. Observe that this is also the outcome when neither agent chooses to invest (in which case the growth rate is zero).

In the collectivistic society, the agents use the Egalitarian bargaining solution. Given any ideal payoffs b_L and b_H , its outcome, $E(b_L, b_H)$ is such $E_L(b_L, b_H) = b_L b_H / (b_L + b_H) = E_H(b_L, b_H)$.²² Thus, at the initial period, with $b_L = 1$ and $b_H = a$, we have $E_L(1, a) = a/(1+a) = E_H(1, a)$. Note that each $E_i(b_L, b_H)$ depends on b_i as well as on b_j , $i, j = L, H$ and $i \neq j$. Observe that this is also the outcome when neither agent chooses to invest.

Suppose both agents invest. Then we will have $b_1 = k$ and $b_2 = ka$. Hence, we will have $N_L(k, ka) = k/2$ and $N_H(k, ka) = ka/2$ as well as $E_L(k, ka) = ka/(1+a)$ and $E_H(k, ka) = ka/(1+a)$. Thus, in this case, the growth rate is $k-1$ in either society.

Next, with N , we will show that when H does not invest, neither will L and that when L does not invest, H might invest. Let c_H^N denote the highest cost at which H would invest. Assume that any agent invests even when he is indifferent between investing and not investing. As noted above, regardless of b_L , we will have $N_H(b_L, ka) = ka/2$. Thus, c_H^N will turn out to be $ka/2 - a/2 = (k-1)a/2$; that is $c_H^N = N_H(b_L, ka) - N_H(1, a)$. Likewise, regardless of b_H , we will have $N_L(k, b_H) = k/2$. Thus, c_L^N will turn out to be $k/2 - 1/2 = (k-1)/2$; that is $c_L^N = N_L(k, b_H) - N_L(1, a)$. Note that $c_H^N > c_L^N$. Therefore, when the cost of investing, c , is greater than c_H^N (such that H will choose not to invest), then c will also be greater than c_L^N (thus L will choose not to invest as well). Likewise, when the cost of investing, c , is less than c_L^N (such that L will choose to invest), then c will also be less than c_H^N (thus H will choose to invest as well). But since $c_H^N > c_L^N$, at any c such that $c_H^N \geq c > c_L^N$, H will invest but L will not invest. Let $a = 2$ and $k = 1.5$. Then observe that $N_L(1, 2) = .5$, $N_H(1, 2) = 1$, $N_L(1.5, 3) = .75$, and $N_H(1.5, 3) = 1.5$. Thus, $c_H^N = .5$ and $c_L^N = .25$.

Next, with E , we will show that if one agent does not invest, neither will the other one. Let c_H^{E*} denote the highest cost at which H would invest if L also invests, and c_L^{E*} the highest cost at which L would invest if H also invests.

maximum than another agent with less assets.

²² The Egalitarian solution is a member of the general class of Proportional solutions (Kalai (1977), Roth (1979)). A proportional solution yields a payoff ratio of \tilde{P} in $(0, \infty)$. In the case of the Egalitarian solution, $P = 1$. All proportional solutions exhibit the same collectivistic feature as the Egalitarian solution. In a hierarchical collectivistic society $P > 1$ represents the patron-client relationships more appropriately. In this paper, however, we use $P = 1$ for its focal nature and, more importantly, for its simplicity

Thus, $c_H^{E^*}$ and $c_L^{E^*}$ will turn out to be $ka/(1+a)-a/(1+a) = (k-1)a/(1+a)$; that is, $c_H^{E^*} = E_H(k,ka)-E_H(1,a)$ and $c_L^{E^*} = E_L(k,ka)-E_L(1,a)$. Let c_H^E denote the highest cost at which H would invest even if L does not invest, and c_L^E the highest cost at which L would invest even if H does not invest. Observe that $E_H(1,ka) = ka/(1+ka)$ and $E_L(k,a) = ka/(k+a)$. Thus, c_H^E will turn out to be $ka/(1+ka)-a/(1+a)$, and c_L^E will turn out to be $ka/(k+a) - a/(1+a)$. Note that $c_H^E < c_H^{E^*}$ and $c_L^E < c_L^{E^*}$. Thus, when the cost of investing, c , is less than or equal to $c_H^{E^*} = c_L^{E^*}$ both will invest and when c is greater than $c_H^{E^*} = c_L^{E^*}$ neither will invest. In other words, there is no c at which one of the agents invests and the other one does not invest. Again, let $a = 2$ and $k = 1.5$. Then observe that $E_L(1,2) = .66$, $E_H(1,2) = .66$, $E_L(1.5,3) = 1$, and $E_H(1.5,3) = 1$. Thus, $c_H^{E^*} = c_L^{E^*} = .33$.

Let c is uniformly distributed over any spectrum that contains $[0,ka]$.²³ Thus, there could be very high levels of c , at which no agent would be able to invest either with N or with E. At some low levels of c , however, both agents will be able to invest regardless N or E. As we will see, there will be a mid range of c in which the high type will be able to invest with N but no agent will be able to invest with E.

With both bargaining solution outcomes, when both agents invest, the growth rate is $k-1$, and when no agent invests, the growth rate is zero. Thus, the division rule that has a larger range of only one type investing will have less growth volatility. For E, the range in which only one type invests is $c_H^{E^*} - c_L^{E^*} = 0$, and for N, that range is $c_H^N - c_L^N = (k-1)(a-1)/2$. Thus, with E there is no chance for c to be at a level where one agent invests and the other one does not invest, but since with N there is some chance for c to be at a level where one agent invests and the other one does not invest, the growth volatility is less with N than with E.

Theorem 1: *Investment volatility and consequently growth volatility is less with N than with E.*

The intuition is that with E there will either be very high or very low investment and growth but with N there can be very high, very low or at some medium levels of investment too. This is because with N agents are able to reap the entire benefits of their individual investments themselves and make their investment decisions regardless of the other agent's

²³Since no agent can receive a payoff of ka under any circumstance with N or E, c will be less than ka .

investment decision. Whereas with E, individuals are not able to reap the entire benefits of their individual investments themselves and cannot make their investment decisions regardless of the other agent's investment decision.

IV. Empirical Analysis

The fundamental empirical prediction of our formal model is that individualism reduces investment volatility which in turn reduces growth volatility. Thus, our empirical analysis considers the impact individualism has on growth volatility, indirectly through its impact on annual investment volatility, in a triangular simultaneous system of equations.

In the economics literature, key links to stable investment and growth are popularly argued to be investment level, per capita income, the extent of financial development, the level and volatility of government spending, private sector finance, including access to credit supplied from banks, the amount of credit supplied to the private sector (as well as the regulation of such a markets), the development of industry and services, human capital, access to education and training, and health care, the population growth rate, and so on. Recently, democracy, political stability, participation, and competitiveness have been linked to a reduction growth volatility that retards growth. More discussion on these variables will be provided whenever necessary.

IV.A. Data Sources

We consider five major categories of control variables, based on the above brief discussion: macroeconomic, financial/credit, demographic, political, and cultural. We discuss below, in order, the set of control variables employed in this study. The most prominent issue to bear in mind is the constraint on sample size. We base our fundamental measure of individualism on Hofstede's (1982) research, which is based on 47 countries fixed at the year 1972. Thus, a panel of a reasonably large country list over multiple periods is not an option. We focus by necessity on Hofstede's country list (see Table 1 in Appendix 1), and consider variables based on initial values in 1973, or means and standard deviations over the period 1973-2000.

We use the Globe Project's *in-group-collectivism* as an alternative measure of individualism in order to provide a robustness of check against use of Hofstede's data: see Section IV.C. Because Hofstede's and Globe Project's country lists are not identical, we defer to the 38 countries common to the two studies: this way, our robustness check will not be subject to sample selection bias associated with the different criteria by which the countries were selected. After missing

observations are removed, the sample size is 36 countries.²⁴ Within the shared sub-set of countries, the two cultural measures have a correlation $-.695$ ($p\text{-val} < .01$).

Because of the limited sample of countries available, and the broad literature defense of an extensive list of reasonable control variables, we must balance logic with availability and space considerations. We therefore use a reasonably inclusive list of control variables, and provide robustness regressions where multiple variables might logically be included simultaneously (as regression complements), but must be included separately (as regression substitutes) due to our challenge with degrees of freedom.²⁵ See Table 2 for a complete list of variables, descriptions, and sources.

IV.A.1. Control Variables

Macroeconomic variables are collected from the World Bank Group and Penn World Tables. The primary variables include the *log of per capita GDP* (initial, mean²⁶); growth of *per capita GDP* (initial, mean, standard deviation); the *private investment share of GDP* (initial, mean, standard deviation); the *inflation rate* derived from the GDP deflator (mean); and the annual *percent change of the local currency* measured in U.S. dollars (mean). We also include a measure of *trade openness* defined as imports plus exports as a share of GDP (mean). In order to control for government involvement in the local economy, we use *government expenditure* as a share of GDP (mean and standard deviation).

In order to control for the degree of financial development, we use *domestic credit provided to by banking sector*

²⁴ We comment below on results of the fundamental tests when performed on Hofstede's complete list of 47 countries. When observations with missing variables are removed, the sample size is 45. In general, with respect to tests considering the indirect impact individualism has income growth volatility, there is little difference between the fundamental outcomes when Hofstede's 45 (effective) country set, or the subset of 36 (effective) common to Hofstede and Globe, is used. There are, however, some differences with respect to tests of how democracy indirectly influences income growth volatility, which we discuss in Section IV.C.

²⁵ Similarly, we omit lags and "changes" in macroeconomic and political control variables, as well as nonlinear terms (e.g. Quinn and Woolley, 2001) and instruments for democracy (e.g. Mobarak, 2005): the degrees of freedom issue severely binds our hands with respect to such extensions; there does not exist a consensus either in macroeconomic theory or empirics on choice of nonlinear functional form (aside for the use of logs); and we opt to use widely accepted direct measures of democracy and political participation. Indeed, in regressions not reported here, we never find quadratic terms in macroeconomic, political or cultural control variables to be significant. It should be pointed out, moreover, that the sole index of democracy (cf. Freedom House: see Table 2, below) used in Quinn and Woolley (2001) is fixed at the initial period 1972-1973 in that study, and typically only it, and not the change in democracy measured over 1974-1989 (which is small for most countries, with a low cross-country dispersion), is significant. In this paper, we use the mean of several measures of democracy and political participation, and find robustly significant coefficients and fundamental test results: see below. In regressions not reported here, we never find the change in popularly used measures of democracy to be significant.

²⁶ The initial period is 1973; the mean and standard deviation are taken over the period 1973-2000.

as percent of GDP (“*bank*”: mean), as well as *domestic credit to the private sector as percent of GDP* (“*privy*”: mean) - source: the World Bank Group. *Bank* measures the relative importance of banks to the financial sector, and *privy* measures the extent to which the financial sector interacts with the private sector. Other measures are discussed in King and Levine (1993a,b), and include the ratio of M2 to GDP and the ratio of claims on the non-financial sector to total domestic credit. Denizer et al (2002), in particular, find that *bank* is robustly negatively associated with growth volatility and investment volatility.

Demographic variables used to control for human capital, health care and population dynamics include the *log of population size*; the *population growth rate*; the *mortality rate of children under the age of five*; the *fertility rate*; and the percent of the population with a *secondary education* (all variables in means).

Political control variables were obtained from the Gastil-Freedom House archive and the Polity IV Project. Variables include Freedom House’s *democracy*,²⁷ measured as an average of civil liberties and political rights (mean): small values denote a greater degree of democracy; Polity IV’s *openness of executive recruitment* (mean), measuring the degree to which political offices are open to members of a society; Polity IV’s *competitiveness of political participation* (mean); and Polity IV’s measure of the difference between democracy and autocracy (mean: “*pol*”): large positive values represent a greater degree of democracy, and large negative values denote a greater degree of autocracy.

IV.A.2. Collinearity

In order to reduce the redundancy of some explanatory variables and correct the potential hazards associated with multicollinearity,²⁸ we only include *mean income per capita* (and not initial income), only *mean and standard deviation of*

²⁷ Freedom House’s measure of *democracy* is more appropriately described as a measure of *autocracy*: large values are associated with diminished degrees of democracy: see Table 2. We use the term “democracy” in keeping with the Freedom House data archive, and an established convention in the literature.

²⁸ There is an extensive degree to which many control variables in our sample are correlated. Of particular note is the extraordinary degree to which the initial values of investment, income and income growth are correlated with the mean values. Income per capita in 1973 and the mean income over 1973-2000 have a correlation of .96; initial and mean investment have a correlation of .81; initial and mean government expenditure as share of GDP have a correlation of .86. Similarly, individualism is highly related to many control variables employed in our models: individualism and mean democracy (-.73), and mean fertility (-.63), and mean population growth rate (-.71), and initial income (.69), and mean income (.66). Initial and mean income in particular are essentially controlling for the same macroeconomic information. Moreover, credit supplied by banks and credit supplied to the private sector have a correlation of .94; and Freedom House’s measure of *democracy* and Polity IV’s measure of the *democracy-autocracy* spread are strongly negatively related (-.93).

income growth (and not initial income growth), and only *mean and standard deviation of investment* (and not initial). Because of the strong positive correlation between credit supplied by banks and credit supplied to the private sector, we use only one credit variable at a time. Similarly, due to the strong correlation between alternative controls for extent of democracy we include only one in any model specification. In regressions not reported in this paper, we find little difference between use of initial or mean values.

IV.B. Econometric Specifications

We treat *investment volatility* (inv_v) and *growth volatility* (y_g_v) as triangularly endogenous, where investment volatility is not a function of growth volatility, and individualism only enters the investment equation. This is the simplest specification available that directly represents the theoretical model, allowing for the indirect causal path $indiv \rightarrow inv_v \rightarrow y_g_v$, without feedback from growth volatility to investment volatility.²⁹ **Model 1** omits all controls variables and is treated as a simple benchmark model, modeling only the indirect correlative channel from individualism to investment volatility to income growth volatility. **Model 2** allows controls for both investment and income, allows individualism to affect growth volatility both indirectly through investment volatility and directly in the growth volatility equation, and strongly ties our theoretical premise to the full macroeconomics and political-economics literatures.

IV.B.1. Framework, Estimation Methodology

The general econometric framework is

$$(1.1) \quad inv_v_i = \alpha_1 + \alpha_2 indiv_i + \alpha_3' X_{1i} + u_{1i}$$

$$(1.2) \quad y_g_v_i = \beta_1 + \beta_2 inv_v_i + \beta_3 indiv_i + \beta_4' X_{2i} + u_{2i}$$

$$(2) \quad u_{j,i} \sim N(0, \sigma_{j,i}^2), \quad j=1,2 \quad i=1 \dots n$$

$$corr(u_{1i}, u_{2i}) = \rho$$

where X_{1i} and X_{2i} denote the equation specific control variables. For Model 1, note that $\alpha_3 = \beta_3 = \beta_4 = 0$ such that individualism only enters the investment equation, and all control variables are omitted.

²⁹ In separate research, we consider models that treat income and investment volatility as simultaneously endogenous and both as regressors, as well as models which consider the endogeneity of democracy (e.g. Mobarak, 2005). We focus on the minimal, most concise requirements of our formal model in the present paper in order not to introduce extraneous structure not predicated by our theoretical structure.

We allow for the country-specific errors terms u_{ji} to be heteroscedastic for each equation, and the equation-specific errors to be correlated across equations. Shocks to investment volatility will be spread to income growth volatility through (1.2). However, and more importantly, it is certainly the case that shocks to growth volatility will be related to, and incorporated into, shocks to investment volatility. Thus, it is important to allow the equation-specific errors terms to be correlated. This implies we expect that investment volatility will be correlated with the income growth volatility error term. Also, evidence not reported here shows highly significant patterns of heteroscedasticity in the unobservable country characteristics.³⁰

In order to control for both cross-equation error correlation and therefore the non-orthogonality between investment volatility and the growth volatility error, and country-specific heterogeneity, we use heteroscedasticity-corrected Three-Stage Least Squares.³¹ In all cases tests (not reported here) of the hypothesis that the equation specific errors are uncorrelated, after controlling for the included regressors, are strongly rejected in favor of cross-equation correlation. Moreover, and not surprisingly, the equation specific shocks are significantly positively correlated supporting our intuition that they have common components due to shared macroeconomic processes.

Finally, for each model we initially employ Hofstede's measure of *individualism*. For Model 2, as a bench-mark we employ Polity IV's measure of the spread between democracy and autocracy (*pol*), openness of executive recruitment (*openexr*) and competitiveness of political participation (*comppar*); and for financial development controls we use credit supplied by banks (*bank*). For robustness checks, we use Globe's *in-group-collectivism* (*ingrcol*), Freedom House's measure of *democracy*, and credit supplied to the private sector (*privy*): see Section IV.C.

IV.B.2. Test Logic

³⁰ *Individualism*, mean *investment*, mean *income*, mean *government spending*, mean *inflation*, mean *high school graduation rate* and mean *fertility* rate are all significantly negatively associated with the dispersion of investment volatility and income growth volatility; similarly, *government spending volatility*, mean *population growth*, and *credit* provided by banks all positively add to country-wide dispersion of investment and income growth volatility. Complete estimation and test results are available upon request.

³¹ Essentially the method is an efficient form of Seemingly-Unrelated-Regression (SUR) with IV for the right-hand-side endogenous variable: for the growth volatility equation, we instrument investment volatility by passing it through a linear filter involving all non-endogenous regressors (which is all remaining control variables). See, e.g., Schmidt (1977) and Bartels and Feiberg (1992). Although in every model and specification considered in this paper do we find highly significant evidence that the macroeconomic volatility errors are positively correlated, regressions using predicted values for the right-hand-side investment volatility (SUR+IV) or the original values (SUR) produces essentially identical results.

The fundamental test that individualism does not influence income growth volatility through investment volatility depends on whether we are testing for direct, indirect or net influence, and whether we use Model 1 or 2. For Model 1, we test $\alpha_2 \times \beta_2 = 0$ against $\alpha_2 \times \beta_2 < 0$. Evidence in support of $\alpha_2 \times \beta_2 < 0$ means evidence that individualism negatively influences growth volatility indirectly through investment volatility. For Model 2 there are two channels through which individualism may influence growth volatility giving indirect ($\alpha_2 \times \beta_2$), direct (β_3) and the net indirect-direct ($\alpha_2 \times \beta_2 + \beta_3$) effects. Evidence in favor of both $\alpha_2 \times \beta_2 < 0$ and $\alpha_2 \times \beta_2 + \beta_3 < 0$ provides support of our main theorem that individualism negatively influences growth volatility, after controlling for investment volatility, and controlling for the multifarious processes that simultaneously influence income and investment dynamics.

IV.B.3. Estimation Results

In the first specification, Model 1, we omit all exogenous controls and focus entirely on the correlative relationships between investment volatility and income growth volatility, through individualism.³² We obtain

$$(3) \quad \begin{array}{ll} \text{inv_}v_i = .434 & - .219 \times \text{indiv}_i \\ (9.28) & (3.55) \end{array}$$

$$\begin{array}{ll} y_g_v_i = .275 & + .631 \times \text{inv_}v_i \\ (31.1) & (5.53) \end{array}$$

where parenthetical values contain *t*-statistics. Consult column 1 of Table 3. A joint test that individualism does not impact investment and investment does not impact income is highly rejected.³³ Similarly, a one-sided test that *individualism* does not influence growth volatility through investment volatility is rejected at the 1%-level in favor of a negative indirect influence.³⁴

As alluded to above, a substantial literature suggests that growth volatility influenced by *volatility of investment share of GDP, access to credit, initial or per capita income, trade openness, government expenditure level and dynamics,*

³² Recall that we use the subset of 36 countries common to Hofstede's and Globe Project's independent studies.

³³ Test 1 (see Table 3) tests the hypothesis $\alpha_2 = \beta_2 = 0$: individualism and investment volatility jointly are non-influential.

³⁴ Test 2 (see Table 3) tests the hypothesis $\alpha_2 \times \beta_2 = 0$: individualism does not influence growth volatility through investment volatility. The alternative is one-sided, $\alpha_2 \times \beta_2 < 0$: individualism negatively influences growth volatility through investment volatility. The *p-value* in this case is .003. When the complete Hofstede country set is used, the one-sided test *p-value* is .001.

human capital inflation, exchange rate movements, population size and growth, as well as political stability. Moreover, the literature suggests investment volatility is significantly influenced by *initial or mean investment, initial or mean income, government expenditure level and dynamics, inflation, exchange rate fluctuations, human capital, access to credit, and political processes* (Denizer et al, 2002; Acemoglu et al, 2003, etc.). Control variables used in Model 2 are selected based on this literature, with the understood caveats of redundancy and limited sample size, cf. Section IV.A.1-IV.A.2.

Condensed results are reproduced below: consult column 2 of Table 3 for complete details. We obtain

$$(4) \quad \text{inv_}v_i = .953 \quad - .349 \times \text{indiv}_i + .329 \times \text{pol}_i + \dots$$

(1.50) (3.04) (3.81)

$$y_g_v_i = -1.21 \quad - .162 \times \text{indiv}_i \quad + .265 \times \text{inv_}v_i - .309 \times \text{pol}_i + \dots$$

(1.79) (2.51) (2.34) (3.05)

Prominently, controlling for the multiple social, political and economic processes that are expected to influence both investment and income growth volatility, individualism significantly negatively influences both investment and income growth volatility: each coefficient on individualism is negative and significant at the 5%-level. Moreover, the predicted values associated with Model 2 provide compelling evidence that the present model works quite well to explain the volatility processes³⁵: see Figure 3.

We strongly reject the fundamental hypothesis that individualism does not influence growth volatility in favor of a combined indirect and direct negative effect. However, a simple inspection of the regression results reveals that this is not due to a net negative impact per se (e.g. a small positive direct impact and a large negative indirect impact): individualism significantly negatively influences growth volatility directly,³⁶ indirectly³⁷ and significantly negatively influences growth volatility jointly indirectly and directly.³⁸ The net impact can be deduced from the above equations:

³⁵ Classical F-tests were performed on all models in this paper resulting in rejections of the null that all slopes are jointly zero at below the 1%-level: because of the uniformity of this outcome we do not mention such measures of goodness-of-fit again.

³⁶ The individualism coefficient in the income growth equation is -.162, significant at at the 5%-level.

³⁷ The Test 2 *t*-value is -2.78 and the *p*-value is .025. When Hofstede's complete country set is used, the *p*-value is .039 (not shown).

³⁸ Test 3 (see Table 3) tests the hypothesis $\alpha_2 \times \beta_2 + \beta_3 = 0$ (i.e. $\text{indiv}_1 \times \text{inv_}v_2 + \text{indiv}_2 = 0$): individualism does not influence growth volatility directly (i.e. β_3) and indirectly (i.e. $\alpha_2 \times \beta_2$) through investment volatility. The alternative is one-sided, $\alpha_2 \times \beta_2 + \beta_3 < 0$: individualism negatively influences growth volatility through net direct and indirect channels. For the present test, the Test 3 *t*-value is -2.41 and the *p*-value is .037. When Hofstede's complete country

$$\begin{aligned}
(5) \quad y_g_v_i &= -1.21 - .162 \times indiv_i - .309 \times pol_i \\
&\quad + .265 \times (.953 - .349 \times indiv_i + .329 \times pol_i) + \dots \\
&= -.957 - (.162 + .265 \times .349) \times indiv_i + (-.309 + .265 \times .329) \times pol_i + \dots \\
&= -.957 - .254 \times indiv_i - .223 \times pol_i + \dots
\end{aligned}$$

Other control variables generate coefficient signs roughly as expected. Credit supplied by banks negatively influences growth volatility both directly (insignificant) and indirectly (significant at the 10%-level): this provides direct support of evidence presented in Levine (1998), Easterly et al (2000) and Denizer et al (2005). This result remains robust to every alternative specification discussed in Section IV.C. Fluctuations in the annual *exchange rate* and the *secondary education* graduation rate negatively impact investment volatility, and positively impact growth volatility (both coefficients are significant), results that are again robust to every alternative specification.

IV.B.4. Democracy and Income Growth Volatility

Our Model 2 serves a dual purpose of providing empirical support of our maintained thesis, and of providing a robustness check against the findings of Quinn and Woolley (2001). Using a single equation model of growth volatility, control variables similar to those used in the present paper, and omitting investment volatility and cultural measures as causal effects on growth volatility, the authors find significant evidence that countries with more developed democracies are associated with lower growth volatility.

Even a cursory inspection of the regression results from our Model 2 shows a far richer potential dynamic at play when a multiple equation approach is employed: we control for the simultaneity of investment volatility and growth volatility, the significant role investment volatility has on growth volatility, the role of cultural values as represented by *individualism*, the dual role that the level of democracy plays on investment and income growth dynamics, for both the heteroscedastic nature of investment and growth volatilities, and the correlatedness between the unobservable characteristics (i.e. the errors/shocks) of our dual measures of macroeconomic volatility.

In this expanded context, we find that the *democracy-autocracy* spread (*pol*) significantly positively augments investment volatility, while significantly negatively influencing growth volatility, cf. Table 3. Thus, the simple question of whether democratic institutions are associated with macroeconomic volatility, and how, depends on which

set is used, the *t*-value is -2.28 with a *p*-value of .020.

macroeconomic event is in question, and how they are allowed sequentially to relate (and which country set is used: see Footnote 39). On the surface, because investment volatility significantly positively influences growth dynamic, we must test for a net impact of democracy on growth volatility. We find that the *democracy-autocracy* spread has a significant net negative influence on growth volatility channeled through investment volatility.³⁹ This result is robust to the use of alternative measures of individualism, credit and political control variable choice: see Section IV.C.3.

IV.C. Sensitivity Analysis

We now inspect the degree to which the above results are due to the specific financial, political and cultural variables employed, and country set. Due to space considerations, and degrees-of-freedom constraints, using Model 2 as the benchmark we consider only a few alternative specifications reported in Table 4, and comment on interesting results not otherwise reported.

IV.C.1. Alternative Financial Development Variables

For the most part, use of either of financial development control, credit supplied by banks or credit supplied to the provide sector, generates the same substantive outcome as the original Model 2. The coefficient magnitudes and signs are essentially the same for either credit variable, and the fundamental test outcomes for individualism and democracy are robust.⁴⁰

IV.C.2. Alternative Democracy and Individualism Variables: Tests on “Individualism”

In Table 4 we present robustness checks by considering various combinations of political and individualism variables. We provide a robustness check of Model 2 using the Globe Project’s *in-group-collectivism*; we estimate Model 2 using only Polity IV’s measure of democracy as political control, removing *openness of executive recruitment* and *competitive participation*; and we substitute Freedom House’s measure of democracy for Polity IV’s related measure, estimating

³⁹ Test 4 (see Table 3) tests the hypothesis $\alpha_{12} \times \beta_2 + \beta_{16} = 0$ (i.e. $dem_1 \times inv_v_2 + dem_2 = 0$): democracy does not influence growth volatility directly (i.e. β_{16}) and indirectly (i.e. $\alpha_{12} \times \beta_2$) through investment volatility. The alternative is one-sided, $\alpha_{12} \times \beta_2 + \beta_{16} < 0$: democracy negatively influences income growth volatility through a net direct and direct channels. In the present case, the Test 4 *t*-value is -4.20 with a *p*-value of .007. When Hofstede’s complete country set is used, the *democracy-autocracy* spread coefficient is *negative* in both investment and income growth volatility equations, but only *significant in the growth volatility equation*. In this case, the *t*-value is -4.84 the *p*-value is .0002.

⁴⁰ The Test 3 (*indiv*) *t*-value is -2.67, and the *p*-value is .03; the Test 4 (*dem-aut*) *t*-value is -4.16, and the *p*-value is .0071. We do not present regression results for the alternative credit measures for the sake of brevity: results are available upon request.

Model 2 with and without the *openness of executive recruitment* and *competitive participation*.

Across specifications we obtain evidence ranging from mild to strongly significant that individualism indirectly (through investment volatility) and directly negatively influences growth volatility. Hofstede's *individualism* is used. Use of either democracy measure, or either democracy measure in tandem with measures of openness and competitiveness of the electoral processes, generates roughly similar results⁴¹.

Moreover, and most importantly, when we use Globe Project's measure of *in-group-collectivism* (the opposite, both conceptually and numerically, of Hofstede's *individualism*), we again obtain significant evidence of our maintained thesis: see columns 1 and 5 of Table 4⁴². Thus, our main theoretical result regarding the indirect link from individualistic behavior to macroeconomic growth volatility is robust to an alternative measure of *individualism/collectivism*, and is collectively robust to the use of alternative measures of credit and democracy.

IV.C.3. Alternative Democracy and Individualism Variables: Tests on "Democracy"

For each alternative specification, the coefficient estimates and the test concerning the net impact "democracy" has on income growth volatility depends on the political/democracy variable(s) and the measure of individualism being employed. The test results across political and individualism specifications are presented in the bottom row of Table 4.

If we use Quinn and Woolley's (2001) favored Gastil-Freedom House measure *democracy*, along with Hofstede's *individualism*, Polity IV's measures of political openness and competitiveness, and the country list common to

⁴¹ We reject in favor of individualism having a net negative impact on income growth volatility at the 13%-15%-level when Hofstede's *individualism* is used in tandem with either Freedom House's *democracy* or Polity IV's *democracy-autocracy* spread alone (without political participation or competitiveness): see columns 2 and 4 of Table 4. When Hofstede's complete country list is used, we reject in favor of a net negative impact at the 5%-10%-level. We reject in favor of a net negative impact at the 10% level if we use Globe's *in-group-collectivism* and Freedom House's *democracy*: see column 5 of Table 4.

⁴² Recall that *in-group-collectivism* measures the propensity to which members of a society behave collectively. Therefore, applying our theorem's main prediction, we expect collectivism to promote investment volatility, which will positively influence growth volatility: we predict a *positive* channel from *collectivism* to macroeconomic growth volatility. The estimated coefficient in the investment volatility equation is positive and significant at the roughly the 5%-level. The estimated coefficient in the growth volatility equation is *negative* and significant at the 10% level (column 1 of Table 4), or 1%-level (column 5 of Table 4). Jointly, the relative magnitudes imply a net positive link from *collectivism* to income growth volatility, with the positive indirect effect through investment volatility trumping the comparatively small negative direct effect. In column 1 of Table 4, the Test 3 (*indiv*) *t*-value is 1.74, with *p*-value of .078, when Polity IV's *democracy-autocracy* spread is used with political openness and competitiveness (column 1); and in column 5 the Test 3 *t*-value is 1.55, with *p*-value of .098 when Freedom House's *democracy* is used alone (column 5). Thus, while evidence suggests a negative direct impact is possible, *the net impact is significantly positive due to the indirect channel through investment volatility*, as predicted.

Hofstede and Globe, we find significant evidence that smaller values of *democracy* (i.e. a more established extent of democracy) leads to lower levels of investment volatility (i.e. the estimated coefficient is positive), whereas the direct effect on income growth volatility is highly insignificant: see column 3 of Table 4. Indeed, we reject the claim that “democracy” has a zero effect on income growth volatility in favor of an indirect negative effect.⁴³ The result is even stronger if we use Hofstede’s complete country list: in this case, the presence of democratic institutions significantly reduces volatility in *both* investment and income growth (not shown), and we profoundly reject the claim that democracy does not influence income growth volatility in favor of a negative role.⁴⁴

In every case we find either significant evidence that “democracy” is associated with a net negative impact on growth volatility: in every case save one,⁴⁵ the measured impact is positive in one equation (investment *or* income) and negative in the other equation (income *or* investment); and in every case the only significant coefficient occurs with the expected sign.⁴⁶

There are, however, notable differences in how Freedom House’s measure *democracy* and Polity IV’s measure of the *democracy-autocracy* spread influence volatility. Using the country set common to Hofstede and Globe, Polity IV’s measure significantly negatively impacts income growth volatility directly, and either does not play an indirect role, or indirectly *positively* augments growth volatility through investment volatility: see column 2 of Table 3. Freedom House’s *democracy*, the chosen measure of Quinn and Woolley (2001), by comparison, captures the obverse relationship in 2 out of 3 specifications (columns 3-4 in Table 4): more democracy leads to less investment volatility, *more growth volatility directly*, and *less income growth volatility indirectly* through investment.⁴⁷ Thus, our Model 2 suggests that the reason that

⁴³ See column 3 of Table 4. The Test 4 *t*-value is 1.92 with a *p*-value of .063. The positive value implies Freedom House’s *democracy* (which measures the extent of autocracy), has a positive indirect influence on income growth volatility: this implies the extent of democracy has a negative indirect influence.

⁴⁴ See column 3 of Table 4. In this case the coefficient on *democracy* is positive and significant at below the 1%-level in both equations (not shown), and the Test 4 *t*-value is 5.87 with a *p*-value of .00003.

⁴⁵ The exception is in column 5 of Table 4, in which *in-group-collectivism* is used with Freedom House’s *democracy*, and no other political controls. However, in this case the coefficients on *democracy* (measuring autocracy) are significantly positive in *both* volatility equations, as expected.

⁴⁶ For example, in column 3 we use Hofstede’s *individualism*, Freedom House’s *democracy* (which measures the extent of autocracy), along with Polity IV’s measures of political openness and competitiveness: the coefficient in the investment equation is positive and significant at the 1% level (more autocracy is associated with more volatility), and the coefficient in the income growth volatility equation is negative and insignificant.

⁴⁷ Note, however, that neither democracy coefficient in the respective growth volatility equations of columns 3 and 4 is

democracy lowers the potential for growth volatility may involve a macroeconomic investment dynamic.

If we expand the sample set to include all of Hofstede's countries, the fundamental test results remain intact. Using Polity IV's measure of democracy alone (without measures of political openness and competitiveness), democracy has a significant negative impact on *both* macroeconomics volatility variables. If political openness and competitiveness are included, democracy negatively influences both, but only growth volatility significantly. If Freedom House's "democracy" is used alone, we find democracy lowers both volatilities, but only investment volatility significantly. In tandem with both controls for political competitiveness and openness, democracy strongly significantly negatively influences *both* volatilities. Clearly, all of these results demand further investigation, a matter we leave for future endeavors.

V. Concluding Remarks

Clearly a simple theoretical model like ours cannot capture the entire complexity of individualistic and collectivistic societies in identifying all of the channels through which growth volatility can be influenced. Investment decision itself is a complicated one which at times can involve complex social interactions. As Triandis (1995) argues, in collectivistic cultures knowledge sharing is limited within the society at large (it takes places primarily among in-group members as Greif (1994) described about the Maghribis).⁴⁸ Furthermore, in these societies individuals tend to avoid deviations from the others and thus will tend to mimic each other's investment behavior. This reinforces co-movement of investment behavior among individuals in these societies. In contrast, individuals in individualistic cultures tend to share knowledge with relative ease even with the ones who are not necessarily members of their in-groups. Such an environment also allows a broader tolerance for different opinions and individual deviations in investment behavior. This will curb co-movement of investment behavior. We believe that this is a promising direction for future research.

Finally, it is interesting to point out that across all specifications treated in Tables 3-4 we find mean government expenditure positively influencing both macroeconomic volatilities, and, with the exception of the original specification of

significant: it is significant in column 5 of Table 4 with the expected sign.

⁴⁸Also, see Peltokorpi (2004) on the limited knowledge sharing with others in the Japanese society.

Model 2 in Table 3, the only significant coefficient occurs in the investment volatility equation. Thus, evidence suggests higher levels of government spending, measured as a percent share of GDP, significantly positively induces a greater dispersion of income growth. We suspect that that the reason behind that relationship is strong positive correlation between collectivism and high government expenditures. However, the specific channel between the latter two variables needs to be identified, which we leave for future research.

Appendix 1: Tables

Table 1: List of 47 Countries in Sample

Country	Hofstede ¹	Globe ²	Income Growth Vol. ³	Investment Vol. ⁴
Argentina	46	5.51	0.3593	0.2688
Australia	90	4.14	0.4720	0.1261
Austria	55	4.89	0.5042	0.1826
Belgium	75	.	0.4902	0.1859
Brazil	38	5.16	0.4260	0.2819
Canada	80	4.22	0.4688	0.1906
Chile	23	.	0.5750	0.3791
Costa Rica	15	5.26	0.3752	0.0929
Denmark	74	3.63	0.4710	0.1630
Ecuador	8	5.55	0.3400	0.1531
El Salvador	19	5.22	0.3242	0.1140
Finland	63	4.23	0.4903	0.1480
France	71	4.66	0.4739	0.1723
Germany	67	4.40	0.4959	0.1956
Greece	35	5.28	0.4211	0.1676
Guatemala	6	5.54	0.3567	0.1357
Hong Kong	25	5.33	0.7301	0.2232
India	48	5.81	0.5950	0.2349
Indonesia	14	5.50	0.7475	0.4183
Iran	41	.	0.2992	0.7002
Ireland	70	5.12	0.6471	0.1649
Israel	54	4.63	0.5224	0.1328
Italy	76	4.99	0.5226	0.1796
Jamaica	39	.	0.3626	0.2166
Japan	46	4.72	0.5470	0.2312
Malaysia	26	5.71	0.6552	0.1684
Mexico	30	5.47	0.4015	0.1107
Netherlands	80	5.62	0.4701	0.1691
New Zealand	79	3.79	0.4083	0.1466
Norway	69	3.58	0.5134	0.1202
Pakistan	14	.	0.5368	0.1825
Panama	11	.	0.4411	0.1091
Peru	16	.	0.2756	0.1554
Philippines	32	.	0.3804	0.1384
Portugal	27	6.14	0.5765	0.1624
Singapore	20	5.64	0.7527	0.1329
South Africa	65	5.66	0.3362	0.2648
South Korea	18	5.18	0.8306	0.1900
Spain	51	5.53	0.4869	0.2210
Sweden	71	3.46	0.4391	0.1689
Switzerland	68	4.04	0.4268	0.1762
Thailand	20	5.72	0.7216	0.0923
Turkey	37	5.79	0.5010	0.3151
UK	89	4.08	0.5073	0.1563
USA	91	4.22	0.4712	0.3162
Uruguay	36	.	0.5037	0.0523
Venezuela	12	5.41	0.3219	0.2630

Notes: 1. Hofstede's (1982) *individualism*;

2. The Globe project's *in-group-collectivism*;

3. The standard deviation of log-gdp per capita over the period 1973-2000;

4. The standard deviation of private investment share of gdp over 1973-2000.

Table 2: Variables – Descriptive Statistics and Sources

Name	Description	Mean ¹	SD ²	Source ³	Sign ⁴
<i>Macroeconomic Variables</i>					
<i>inv_sh</i>	Initial gross domestic investment share of GDP ⁵	22.90	9.275	PWT	-
<i>inv_sh_m</i>	Mean investment share of GDP	20.38	5.906	PWT	+
<i>inv_sh_v</i>	Standard deviation investment share of GDP	3.317	1.587	PWT	+
<i>y</i>	Initial log of GDP per capita	7.779	0.790	PWT	-
<i>y_m</i>	Mean Log of GDP per capita	8.757	0.758	PWT	-
<i>y_g</i>	Initial growth of GDP per capita	.1149	.0605	PWT	-
<i>y_g_m</i>	Mean growth of GDP per capita	0.066	0.015	PWT	-
<i>y_g_v</i>	Standard deviation growth of GDP per capita	0.048	0.020	PWT	
<i>tra</i>	Mean trade openness ⁶	0.534	0.429	WB	+
<i>gov_s_m</i>	Mean government expenditure share	16.23	6.713	WB	+
<i>gov_s_v</i>	Standard deviation government expenditure share	3.157	2.215	WB	-
<i>infl</i>	Mean inflation: GDP deflator	36.46	89.04	WB	?
<i>exch</i>	Mean exchange rate annual percent change	0.282	85.06	WB	?
<i>Credit Variables</i>					
<i>bank</i>	Mean domestic credit provided by banking sector (% GDP)	75.30	42.39	WB	-
<i>privy</i>	Mean domestic credit to private sector (% GDP)	59.89	37.17	WB	-
<i>Demographic Variables</i>					
<i>sec</i>	Mean percent of population with secondary education	15.47	3.024	WB	-
<i>pop</i>	Mean log population size	9.807	1.418	PWT	?
<i>pop_g</i>	Mean population growth rate	0.014	0.009	PWT	+
<i>mort</i>	Mean mortality rate of children under age of 5	40.02	37.83	PWT	+
<i>fert</i>	Mean fertility rate	2.874	1.249	PWT	+
<i>Political Variables</i>					
<i>dem</i>	Mean democracy ⁷	2.494	1.403	FH	-
<i>pol</i>	Democracy – Autocracy spread ⁸	2.750	7.916	POL	-
<i>openexr</i>	Mean openness of executive recruitment ⁹	3.786	.490	POL	-
<i>comppar</i>	Mean competitiveness of participation ¹⁰	3.924	1.113	POL	-
<i>Culture Variables</i>					
<i>indiv</i>	Individualism	45.53	25.61	HOF	-
<i>ingrcol</i>	In-group-collectivism	4.969	0.736	GLO	+

Notes: 1. The country mean over 1973-2000;

2. The country mean of the standard deviation over 1973-2000, except for *individualism* and *in-group-collectivism* which were measured for the sole years of 1972 and 1994 respectively;

3. Sources are PWT = Penn World Table (pwt.econ.upenn.edu/php_site/pwt_index.php), WB = World Bank Group data archive (www.worldbank.org/); FH = Freedom House (www.freedomhouse.org), POL = Polity-IV Project data archive (www.cidcm.umd.edu/inscr/polity/); HOF = Hofstede (1982); GLO – Globe Project, House *et al* (2004);

4. The expected net impact on income growth volatility (*y_g_v*).

5. Initial values are taken at 1973 when available; otherwise the year closest to 1973;

6. Trade openness = ratio of (imports + exports) to GDP;

7. *dem* = average of *civil liberties* and *political rights* as measured by the Gastil index at Freedom House: the range is 1...7, where 1 denotes the highest rating and 7 denotes the lowest;

8. *Pol* is the difference between the Polity IV's measures of *Democracy* (0...10) and *Autocracy* (0...10): the range is -10...10, where -10 denotes most autocratic and 10 denotes most democratic.

9. *Openness of executive recruitment* ranges from 1...4;

10. *Competitiveness of political participation* ranges from 1...4.

Table 3

	<u>Model 1</u> (base)		<u>Model 2</u> (base + controls + individualism in growth volatility equation)	
	Investment Volatility	Income Growth Volatility	Investment Volatility	Income Growth Volatility
Constant	.434 (9.28) ¹ ***	.275 (13.1)***	.953 (1.50)	-1.21 (1.79)
Individualism	-219 (3.55)***		-349 (3.04)**	-162 (2.51)**
Investment Volatility		.631 (5.53)***		.265 (2.34)*
Investment: <i>mean</i>			1.57 (3.23)**	
Income: <i>mean</i>			-.432 (.473)	.843 (1.37)
Income growth: <i>mean</i>			-.134 (.753)	.105 (.933)
Gov. expenditure: <i>mean</i>			.290 (1.53)	.927 (2.56)*
Gov. expend.: <i>volatility</i>			-.07 (1.87)*	-.243 (4.01)***
Inflation: <i>mean</i>			.010 (4.14)***	-.037 (2.56)**
Exch. rate fluct.: <i>mean</i>			-.052 (2.10)*	.089 (4.71)***
Credit by banks: <i>mean</i>			-.107 (1.85)*	-.049 (1.29)
Secondary education.: <i>mean</i>			-.688 (2.12)**	.956 (1.71)
Pop. size: <i>mean</i>				1.03 (.687)
Pop. growth rate: <i>mean</i>				-.596 (2.13)*
Fertility rate: <i>mean</i>				1.14 (3.16)**
Mortality rate: <i>mean</i>				-.067 (.739)
Dem. – Autoc.: <i>mean</i>			.329 (3.81)***	-.309 (3.05)**
Executive openness: <i>mean</i>			.360 (.264)	.597 (.691)
Competitive participation: <i>mean</i>			-1.651 (4.12)***	1.23 (2.56)**
Test 1. $indiv_1 = inv_v_2 = 0^2$	42.13 ³ (.000) ⁴		12.37 (.002)	
Test 2. $indiv_1 \times inv_v_2 = 0$	-2.98 (.003)		-2.78 (.025)	
Test 3. $indiv_1 \times inv_v_2 + indiv_2 = 0$			-2.41 (.037)	
Test 3. $indiv_1 \times inv_v_2 + indiv_2 = 0 (h)^5$			-2.28 (.020)	
Test 4. $dem_1 \times inv_v_2 + dem_2 = 0$			-4.20 (.007)	
Test 4. $dem_1 \times inv_v_2 + dem_2 = 0 (h)$			-4.84 (.000)	
Obs.	36		36	

Notes: 1. All regression results, and tests (unless otherwise noted) are based on the country set common to Hofstede and Globe. Absolute value of *t*-statistics are in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.
 2. Test 1 tests the *two-sided* hypothesis that individualism in the investment volatility equation and investment volatility in the income growth volatility equation are jointly insignificant; Test 2 tests the *one-sided* hypothesis that individualism negatively influences income growth volatility indirectly through investment volatility; Test 3 (4) tests the *one-sided* hypothesis that individualism (democracy) negatively influences income growth volatility indirectly through investment volatility and directly through the income growth volatility equation.
 3. Test 1 is an F-test with 2-degrees of freedom; Tests 2 - 4 are nonlinear one-sided *t*-tests.
 4. Parenthetical values are *p-values* based on F-distribution for Test 1, and the *t*-distribution for the one-sided Tests 2 - 4.
 5. Tests denoted “*h*” are based on estimates using the entire country set of Hofstede.

Table 4: Robustness Checks

	<i>In-Group-Collectivism, Dem-Autoc., Exec. Open and Compet. Partic</i>		<i>Individualism and Dem-Autoc.</i>		<i>Individualism, and Democracy, Exec. Open, and Compet. Partic.</i>		<i>Individualism, and Democracy</i>		<i>In-Group-Collectivism and Democracy</i>	
	Invest. Volatility	Income Growth Volatility	Invest. Volatility	Income Growth Volatility	Invest. Volatility	Income Growth Volatility	Invest. Volatility	Income Growth Volatility	Invest. Volatility	Income Growth Volatility
Constant	.476 (.874)	.205 (.215)	0.796 (1.20)	.843 (.351)	-1.869 (2.32)*	.561 (.569)	-.151 (.218)	.751 (.622)	-.542 (.664)	1.740 (1.95)*
Individualism			-0.323 (2.47)**	-112 (.365)	-.111 (1.89)*	-.214 (1.83)*	-.071 (1.43)*	-.142 (.949)		
In-Group-Collect.	.920 (2.61)**	-.356 (2.07)*							.961 (2.23)**	-.121 (4.74)***
Investment Vol.		.391 (3.15)**		.434 (2.22)*		.267 (2.21)*		.465 (2.01)*		.146 (2.09)*
Investment: <i>mean</i>	2.49 (3.97)***		1.890 (4.49)***		1.920 (2.71)**		1.924 (4.72)***		2.575 (5.14)***	
Income: <i>mean</i>	-.350 (.443)	-.648 (.774)	-.725 (.88)	-.651 (.293)	.871 (1.01)	-.805 (.859)	.287 (.372)	-.722 (.622)	.243 (.316)	-1.150 (1.42)
Income growth: <i>mean</i>	-.336 (1.36)	.116 (.673)	-0.073 (.48)	.066 (.172)	-.153 (.504)	.004 (.026)	-.187 (1.22)	.049 (.244)	-.390 (-2.1)**	.184 (1.26)
Gov. expend.: <i>mean</i>	.947 (3.07)**	.240 (.532)	.753 (3.26)***	.438 (.372)	1.139 (4.17)***	.523 (1.09)	1.053 (4.17)***	.234 (.413)	1.208 (4.33)***	-1.152 (.464)
Gov. expend.: <i>volatility</i>	-.153 (1.79)	-.104 (1.36)	-.141 (1.97)*	-.139 (.644)	-.179 (2.14)*	-.166 (2.02)*	-.204 (3.05)***	-.091 (.857)	-.260 (2.52)**	.003 (.040)
Inflation: <i>mean</i>	.007 (.839)	-.028 (1.60)	.018 (2.23)**	-.025 (.553)	.023 (2.47)*	-.047 (1.71)	.007 (.983)	-.029 (1.29)	.004 (.522)	-.011 (.843)
Exch. rate fluct.: <i>mean</i>	-.054 (3.42)**	.097 (4.12)***	-.018 (1.02)	.075 (2.07)*	-.001 (.045)	.070 (2.69)**	-.036 (2.10)*	.085 (3.48)***	-.048 (2.30)**	.085 (5.80)***
Credit by banks: <i>mean</i>	-.085 (1.83)	.008 (.261)	-.098 (1.68)	-.020 (.192)	-.104 (1.76)	-.036 (.656)	-.135 (3.47)***	-.014 (.250)	-.141 (2.33)**	-.004 (.116)
Secondary education: <i>mean</i>	-1.80 (2.16)*	1.06 (2.08)*	-.660 (1.10)	.534 (.322)	-1.859 (3.32)***	.862 (1.11)	-1.364 (3.20)***	.459 (.574)	-1.621 (2.14)*	1.194 (3.30)***
Pop. size: <i>mean</i>		-.307 (.211)		.576 (.137)		.576 (.259)		1.12 (.428)		-2.583 (2.08)**
Pop. growth rate: <i>mean</i>		-.395 (.942)		-.084 (.085)		-.050 (.129)		.019 (.039)		.957 (2.09)**
Fertility rate: <i>mean</i>		.918 (1.76)		.342 (.292)		.339 (.736)		.483 (.777)		-0.883 (1.97)*
Mortality rate: <i>mean</i>		-.114 (1.13)		-.247 (.841)		-.124 (.833)		-.158 (.850)		-.034 (.255)
Democracy: mean					3.04 (3.64)***	-.362 (.431)	.861 (3.32)***	-.122 (.208)	.704 (2.38)**	.651 (2.14)**
Dem. – Autoc.: mean	.013 (.114)	-.267 (2.57)**	.069 (1.09)	-.070 (3.49)***						
Exec. open.: <i>mean</i>	.152 (.186)	.905 (.767)			-.512 (.74)	1.739 (1.64)				
Compet. partic.: <i>mean</i>	-.675 (-1.21)	.944 (1.56)			2.266 (2.29)**	-.457 (.569)				
Test 2: $indv_1 \times inv_v_2=0^1$	1.47 (.107)		-1.59 (.075)		-1.22 (.145)		-1.16 (.140)		2.89 (.010)	
Test 2: $indv_1 \times inv_v_2=0 (h)^2$	...		-1.67 (.057)		-1.25 (.117)		-1.14 (.144)		...	
Test 3: $indv_1 \times inv_v_2+indv_2=0$	1.74 (.078)		-1.23 (.128)		-1.96 (.061)		-1.13 (.149)		1.55 (.098)	
Test 3: $indv_1 \times inv_v_2+indv_2=0 (h)$	...		-1.30 (.105)		-1.97 (.060)		-2.16 (.023)		...	
Test 4: $dem_1 \times inv_v_2+dem_2=0$	-2.58 (.031)		-.408 (.347)		1.92 (.063)		1.86 (.05)		2.83 (.011)	
Test 4: $dem_1 \times inv_v_2+dem_2=0 (h)$	...		-2.51 (.011)		5.87 (.000)		2.01 (.030)		...	
Obs.	36		36		36		36		36	

Notes: 1. Model estimates and tests are generated from the country list common to Hofstede and Globe;
 2. Tests are performed on estimated coefficients based on Hofstede's country list: by construction, this is not valid for any model with Globbe's *in-group-collectivism*, denoted "...". Regression results in this case are not presented, but available upon request.

Figure 1
Hofstede's Individualism vs. GLOBE and Schwartz

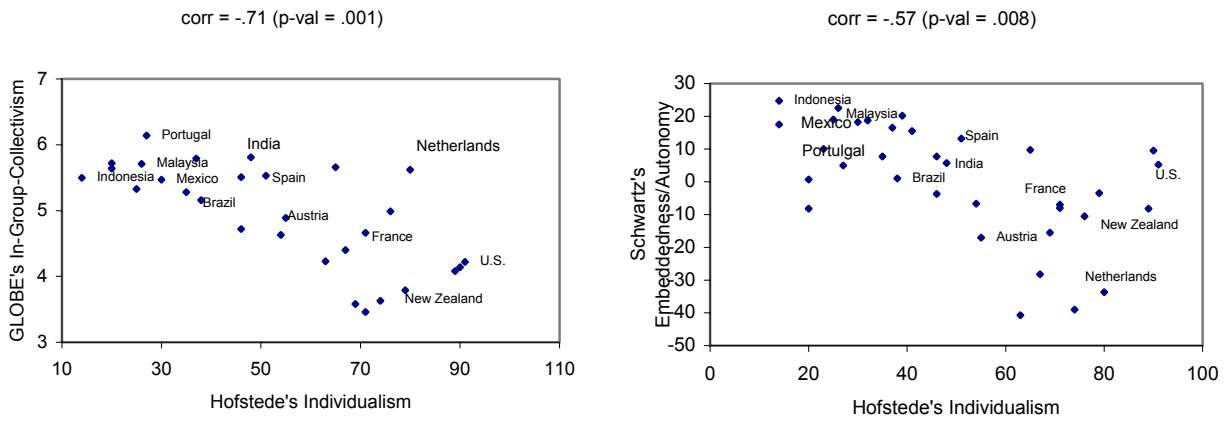


Figure 2
Individualism (1972), Investment and Income Growth Volatility (1973-2000)

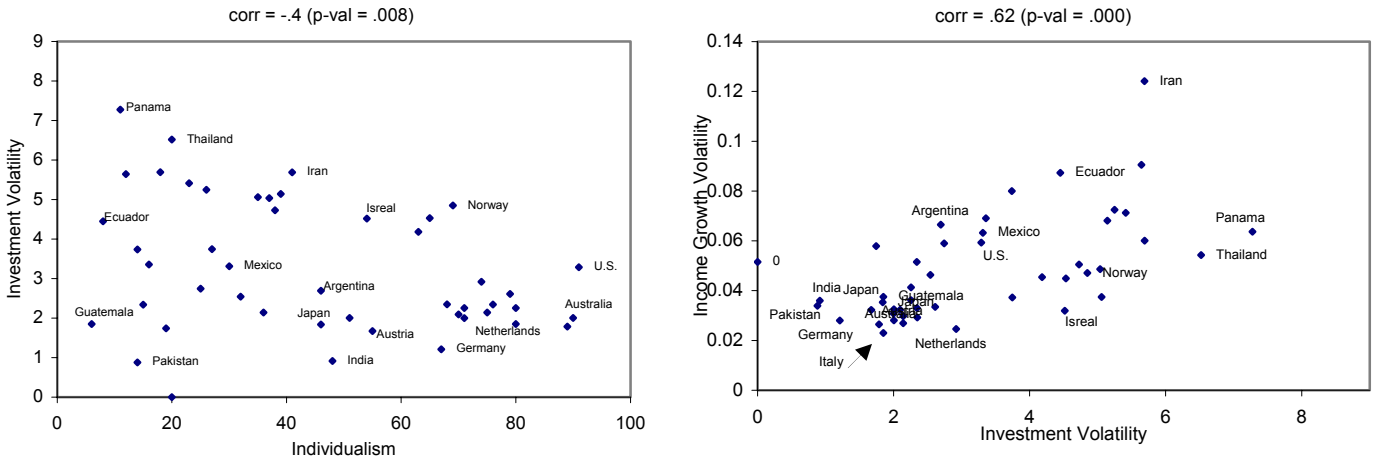
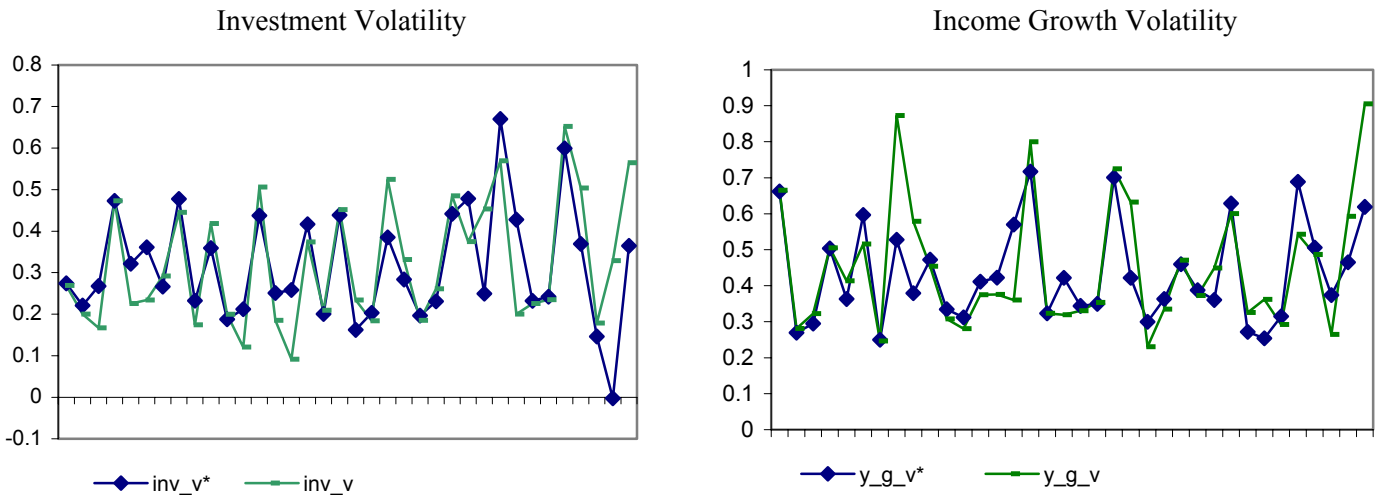


Figure 3
Investment and Income Growth Volatility Predicted Values ("*")
Model 2 with Initial Control Variables



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