The tertiary tilt: education and inequality in the developing world

THE TERTIARY TILT:
Education and Inequality in the Developing World

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July 2013

Forthcoming in *World Development*

Abstract

Education is widely perceived to be a tonic for the rising inequality that often accompanies development. But most developing-country governments tilt their education spending toward higher education, which disproportionately benefits elites. We find that in countries with high "tertiary tilts," rising primary enrollment is associated a decade later with far higher inequality—not the lower Gini coefficients many would expect. Since most developing countries tilt their spending toward higher education, our analysis suggests that efforts that concentrate only on expanding mass education, such as the UN's Millennium Campaign, could end up raising inequality in much of the developing world.

We are grateful to Timothy Besley, Brian Gaines, Miles Kahler, Thandika Mkandawire, Ofer Malamud, Lant Pritchett, Anouk Rigterink, Kenneth Shadlen, Piero Stanig, Borge Wietzke, seminar participants at the London School of Economics and at the Annual Meetings of the American Political Science Association in Washington, DC., and three anonymous reviewers for *World Development* for valuable comments and advice on earlier additions. Lloyd Gruber would also like to thank the STICERD/LSE Annual Fund New Researcher Award for providing generous financial support while this research was being carried out.

INTRODUCTION

Investments in education are widely perceived to be a tonic for inequality. Educate the poor and many will catch up to the elites; deny them education and they will fall further behind. This intuitively appealing logic has been one of the rationales behind a variety of policy interventions to spread primary education across the developing world, including, most prominently, the UN's Millennial Campaign for universal primary education.

But precisely because it seems obvious, the presumed link between primary education and inequality has been subjected to little serious scrutiny. Do higher primary enrollment rates really reduce economic inequality?

Our investigation of this question yields a surprising answer. Looking across the developing world, we find that higher primary enrollment rates are generally associated with somewhat *higher*, not lower, inequality in the future. We find that a one-standard-deviation increase in primary enrollment—about 19 percentage points—is associated, a decade later, with a Gini coefficient that, depending on the model specification and control variables, is between .02 and .04 points higher than it would otherwise have been.

We further demonstrate that this higher inequality is related to a common feature of education spending in many developing countries. Most education systems in the developing world exhibit what we term a "tertiary tilt": their educational resources are concentrated on students in higher education, not primary education. In developing countries without a tertiary tilt—those that concentrate their education resources on the primary level—our analysis confirms the commonly assumed positive relationship between primary enrollment and inequality: higher primary enrollment rates are associated with lower future inequality. But countries that focus on their primary schools are the exceptions. Most developing countries have high tertiary tilts in their spending, and in these countries increased primary enrollment is associated with substantially higher future inequality.

This association is cause for concern. While inequality may or may not slow growth directly[1], large distributional divides almost certainly exacerbate domestic conflict[2] as well as raising deeper moral

[1] Barro (2008) provides a recent update.

and philosophical concerns.[3] Our analysis reveals the tertiary tilt to be such a pervasive feature of developing country politics that, without a substantial adjustment in the developing world's current education spending priorities, a major boost in primary enrollment of the sort envisaged by proponents of the UN's second Millennium Development Goal (MDG) would likely be accompanied by substantially higher inequality in *most* developing countries.

This paper is in five sections. In the first we analyze the relationship between primary enrollment rates and future inequality, and find that they are positively associated in cross-national data. Section 2 introduces the "tertiary tilt," and section 3 estimates a model of inequality in which primary enrollment interacts with the government's tertiary tilt. Here we find that greater primary enrollment is associated with higher future inequality when spending is skewed toward students in higher education (as it is in most developing countries), but that it is associated with lower future inequality in countries exhibiting a primary tilt. The fourth section discusses these findings and the fifth section concludes.

1. PRIMARY ENROLLMENT AND INEQUALITY

In line with the 2nd MDG, the past four decades have seen primary enrollment rates skyrocket across much of the developing world. The 2010 United Nations *Human Development Report* noted: "[n]o country has seen declines in literacy or years of schooling since 1970…[S]ince 1960 the proportion of people who attended school has risen from 57 percent to 85 percent." (United Nations 2010, pp. 36-38). Primary completion rates have also been rising, as governments have made greater use of conditional cash transfer programs and other promising initiatives (Fiszbein & Schady, 2009).

This massive increase in primary enrollment rates might have been expected to reduce inequality in developing countries.[4] There is reason to think that higher primary enrollments would reduce the wage premia formerly enjoyed by a handful of workers—the educated elite—by allowing broader access to

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[2] McCarty, Poole, and Rosenthal (2006), L. Bartels (2008), Gruber (2013).

[3] Nussbaum and Sen (1993), Cohen (2008), Sen (2009). In theory, redistribution might help offset the resulting wage gap. But few developing countries possess the necessary tax bases to make this a realistic option.

[4] Psacharopoulos et al. (1997), Glomm and Ravikumar (1992), Ranis, Stewart, and Ramirez (2000), Checchi (2006).

skills valued in the labor market, lowering inequality as a consequence. In industrialized countries, there is a well-established negative association between educational attainment and earnings inequality.[5]

But have primary enrollments really been associated with lower inequality in developing countries? The presumed connection between primary enrollment and inequality has, until now, received surprisingly little empirical scrutiny. In studies of inequality, the common practice has been to account for the role of education by including a measure of secondary, not primary, education. For example, Higgins and Williamson (1999) include the secondary school enrollment ratio in their model of inequality "to capture the intuitive notion that broader access to education reduces inequality" (p. 20). Other studies, notably the seminal Li, Squire, and Zou (1998) paper that introduced the empirical model on which much of the later literature is based, also focus on secondary education. But even the relationship between secondary education and inequality is not completely clear. While several papers do find an inverse relationship between secondary enrollments and inequality (e.g., Perotti, 1996; Higgins & Williamson, 1999; De Gregorio & Lee, 2002), the coefficient on the secondary enrollment rate is often only barely significant. And Li et al. (1998) find a country's initial level of secondary education to be associated with significantly *higher* future inequality.[6]

We thus know relatively little about the relationship between primary enrollment and inequality. To that end, we begin our analysis by estimating a version of the standard Li et al. (1998) model that includes the primary enrollment rate as an explanatory variable. In the Li et al. model, inequality (measured by the Gini coefficient) is determined by two factors: the poor's access to financial markets and constraints on the ability of elites to expropriate wealth from others. We proxy these factors with three variables:

- the ratio of M2 to GDP (*M2*);
- the country's level of democracy (*Democracy*); and
- the availability of land, measured as hectares of arable land per capita (*Land*).[7]

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[5] See Katz and Murphy (1992), Becker (1994), Ashenfelter and Rouse (2000), and Bowles, Gintes, and Groves (2005). For an alternate perspective on the data, see Martins and Pereira (2004).

[6] Sylwester (2002) also finds that total education spending reduces inequality.

[7] The poor's access to financial markets is proxied in the Li et al. (1998)'s model with land inequality and the ratio between M2 and GDP, and restraints on expropriation are proxied by the population's level of secondary

In addition, we include two measures of economic development—GDP per capita and growth in GDP per capita—to account for the Kuznets hypothesis that development has a U-shaped relationship with inequality:

- per-capita GDP (*GDPpc*); and
- growth in per-capita GDP (*Growth*).

Finally, we control for overall education spending as a percentage of GDP (*TotEduExp*), lagged by 10 years, to account for Sylwester's (2002) finding that countries that spent more on education in the past had lower inequality in the future.

Our variable of primary interest is the primary gross enrollment ratio, *PrimEnroll,* which is ratio of the total number of primary students to the number of children of primary school age in the population.[8] Since we would not expect educational attainment levels to affect inequality immediately, we lag both *TotEduExp* and *PrimEnroll*. We use a lag of 10 years, on the rationale that many students begin primary school at age 5 or 6 and are likely to begin work at age 15 or 16.

In our specification, then, *Inequality* depends upon: education spending lagged 10 years ($TotEduExp_{t-10}$); the primary enrollment ratio lagged 10 years ($PrimEnroll_{t-10}$); a vector of the five control variables noted above that previous studies have shown to be important determinants of inequality ($\mathbf{z'}$), fixed country effects (η), and an error term ε where each variable is indexed by country *(i)*:

$$Inequality_{i,t} = \beta_0 + \beta_1 PrimEnroll_{i,t-10} + \beta_2 TotEduExp_{i,t-10} + \beta_3 \mathbf{z}' + \eta_i + \varepsilon_{i,t} \quad (1)$$

Because our focus is on the developing world, we exclude all OECD countries from the sample except Mexico and South Korea, both of which were still "developing" during much of the period we are investigating. Our data are from the World Bank's *World Development Indicators* database, with the exception of *Democracy*, which we proxy with the commonly-used Polity IV measure (Marshall &

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schooling in 1960 as well as the Freedom House measure of civil liberties. The authors find that a model with these four variables explains between 62 and 77 percent of the between-country variation in inequality. For other empirical studies of the determinants of inequality, see Higgins and Williamson (1999), Chong and Calderon (2000), and Milanovic (2005).

[8] We use the gross enrollment ratio rather than the net because the net enrollment ratio includes only the proportion of appropriately aged students who are enrolled rather than all primary students. In using the net ratio we would thus risk missing a substantial number of primary students, particularly in developing countries where the quality of schooling is poor and students often take additional years to complete their primary education. As a robustness check, we re-ran our main specifications using net enrollment rates instead of gross enrollment rates. This substitution did not alter our main findings (results available from the authors).

Jaggers, 2000). Cross-national time series data are notoriously incomplete, and this is particularly true of cross-national data on inequality. The two inequality indicators we use as our dependent variables were both constructed with data taken from household income surveys; only some countries undertake such surveys, and those that do collect these data rarely do so on a regular basis. The *World Development Indicators* database provides Gini coefficients and decile income shares for 142 countries since 1980, for instance, but 47 of these have only one observation through 2008, and only 46 have more than four observations.

Any large-*N* empirical investigation of inequality must therefore proceed with a good deal of caution. To smooth year-to-year variation, inequality data are usually divided into 5- or 10-year intervals. But the particular periodization can also bias estimates. On the assumption that no year- or period-average perfectly reflects the underlying parameters, we estimate our models using three different ways of slicing the data. The first two take averages of the data over 5-year periods, one beginning in 1967 and extending to 2007 and another starting in 1965 and running to 2005. The third cut is yearly data. Our primary estimation technique is Feasible Generalized Least Squares (FGLS), a procedure that allows us to control for autocorrelation, a particular concern with inequality because it is highly persistent over time.[9]

Table 1 displays our estimates of equation (1) for our three samples. The dependent variable we are modeling in these specifications is the Gini coefficient, the traditional measure used in inequality research, as compiled by the World Bank. As an extra robustness check, we also run all our estimations with inequality operationalized as *P90Share*, the percentage of a country's total income or consumption accruing to the richest 10-percent of households for a given year, also as reported by the World Bank. The estimates we obtain with this second operationalization are nearly identical to those with the Gini coefficient. Further investigation using a third operationalization—inequality measured as the ratio of the

[9] Both of our period samples incorporate data from over 71 developing countries, and our yearly sample includes data from as many as 79. Unfortunately, though, missing observations shrink these samples to a maximum of 240 observations for our period data and 875 for the yearly data. We dealt with some of the gaps in our sample's inequality and per-student spending time series by linearly interpolating the missing annual data for each country. (As a robustness check, we re-ran all specifications with non-interpolated data; none of the results are substantially different.) Table A6 in the Appendix has summary statistics for the dataset of periods beginning in 1967. Datasets and Stata code are available from the authors.

90th to the 10th percentile of each a country's income distribution—yielded similar results as well (see Tables A4 and A5 in the Appendix).[10]

We begin, in columns 1-3, with estimates using data averaged into 5-year periods beginning in 1967. Column 1 shows estimates from a specification that includes only our vector of control variables **z'**. Reassuringly, GDP per capita (*GDPpc*) is associated with higher inequality—consistent with the Kuznets hypothesis—as is the availability of arable land relative to the population (*Land*), while economic *Growth* is associated with lower inequality. *M2*, on the other hand, is strongly associated with higher inequality. This result goes against the intuition and findings in Li et al. (1998), though other papers question the significance of liquidity to inequality; see, e.g., Higgins and Williamson (1999). Also somewhat surprising is the absence of any consistent, statistically significant relationship between *Democracy* and inequality.

Columns 2-3 introduce our two lagged education variables of primary interest: $TotEduExp_{t-10}$ and $PrimEnroll_{t-10}$. Intuitively, and consistent with Sylwester (2002), we find that more education spending is associated with lower future inequality. But higher primary enrollment is significantly associated with *higher* inequality. The results are much the same using 5-year periods starting in 1960 (column 4) and yearly data (column 5). The magnitude is relatively small: a one-percentage point increase in the primary enrollment ratio is associated with a Gini coefficient that is between .02 and .04 points higher a decade later. That is, if we were to take our regression estimates literally, they imply that it would take between a 25 and a 50 percentage-point increase in the primary enrollment ratio to raise the Gini coefficient by just one point. Yet while small in magnitude, the positive association between primary enrollment and inequality is highly significant in statistical terms.

Why should higher enrollments, which seem to be associated with lower inequality in developed countries, be associated with higher inequality in developing countries? In the remainder of this paper we offer an answer: this puzzling finding is associated with a particular bias in the way most developing countries allocate their educational spending, a bias we term the "tertiary tilt."

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[10] In addition to inequality, we would have liked to explore the impact of enrollment rates on income *polarization*, a distinct concept with potentially greater relevance to the politics of education—and to politics more generally (e.g., Esteban & Ray, 1994; Keefer & Knack, 2001; McCarty, et al., 2006). Data limitations prevent us from taking this approach in a large-N study, but future work might use detailed case studies to examine whether patterns of income polarization fit the big picture patterns we develop here.

[Table 1 about here]

2. THE TERTIARY TILT

Even as primary enrollment rates have risen sharply across much of the developing world, education spending has remained highly concentrated on students at the upper levels. In Table 2 we present a regional breakdown of enrollment and spending figures for the 1990s. The 1990s were a decade of widespread agreement on the need for developing countries to focus more of their educational resources on primary students.[11] The striking feature of the table is how at odds it is with this consensus: far from focusing on primary students, poorer regions were notable for tilting their educational investments toward the relatively small numbers of students in higher education.

[Table 2 about here]

Most regions spend a similar proportion of their education budgets on tertiary education, about 25 percent on average. Yet while wealthier regions enroll a large number of students at that level, poorer regions enroll hardly any. In the 1990s most students in South Asia were primary students, but primary per-student spending was just 10 percent of GDP per capita. Yet while gross tertiary enrollment was just 5 percent, average spending on these students was 10 times the amount spent on primary students. Sub-Saharan Africa's tertiary per-student spending was more than 4 times its average GDP per capita: the average education system in sub-Saharan Africa lavished an average of $2,158 (1995 dollars) on the 3 percent of the tertiary-aged population who were enrolled, not much less than the $2,564 that the average system in East Asia spent—even though the average East Asian country was more than six times wealthier. Not that East Asia's spending was not tilted: per-student spending on tertiary students there was more than 10 times the spending on primary students. Indeed, only one developing region—Eastern Europe and Central Asia—did not exhibit a clear tertiary tilt; its spending profile was closer to the OECD's.

[11] The specific point of agreement was that investments in primary education were even more important for poor countries than they were for wealthier ones (see Psacharopoulos, 1973, 1981, 1994; Altbach, Hopper, Psacharopoulos, Bloom, & Rosovsky, 2004). In recent years, some scholars—notably in the World Bank, for decades one of the strongest proponents of a focus on primary education—began emphasizing the potential benefits of higher education (World Bank, 2002). Nancy Birdsall (1996), for example, argues persuasively that all countries should invest something in higher education, if only so they could support the research to apply technologies discovered elsewhere to their particular context.

We label this spending bias the "tertiary tilt." The bias itself is relatively well-documented (Psacharopoulos, 1977, 1994; Bardhan, 1996; Addison & Rahman, 2001; Rozada & Menéndez, 2002; Bourguignon, Ferreira, & Menéndez, 2003; Stasavage, 2005). Occasionally it is taken as a natural reflection of the greater cost of educating at higher levels (Judson, 1998).[12] But the fact that a university costs more to operate than a primary school does not mean that the tilt is inevitable: the governments that tilt their spending toward universities are still making a choice to devote a large share of their limited educational resources to provide higher education to a relative handful of students, money that could be used to provide high quality primary education to a vastly larger number of students.[13]

In poor countries, a tertiary tilt is very likely to benefit wealthier citizens. Wealthy families generally have the financial resources to pay for quality primary schooling out of their own pockets, whereas the full price of higher education is likely to strain the finances of most elite families. The interests of poor families are just the opposite. They cannot afford primary education without help: for a poor family, all education is costly, and they are unlikely to be able to borrow to meet those costs. Unless the government provides subsidies sufficient to ensure that poor families have access to high quality primary education,[14] poor families are unlikely to benefit from any government spending on higher education, simply because their children are unlikely to be equipped to compete for limited admissions

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[12] If there are economies of scale to higher education, some poor countries are spending a great deal on a few students in higher education because they have to; it is the only way to build the system. But this interpretation does not get us very far. Across the world, average spending on tertiary education declines with tertiary enrollment, but the drop-off is typically at very low levels of enrollment—below about 7 percent (calculations available from the authors). That is, there seem to be economies of scale as a country moves from educating almost no students to educating some, but not when it moves from educating some to educating many. There are also limits to the economies of scale in tertiary education—at least insofar as the quality of that education is concerned. The University of California enrolled more than 200,000 students in 2010, but still spent an average of nearly $16,000 on each one (University of California, 2010).

[13] While one might hope that public funds would be ample enough to allow governments to commit to all three educational levels, in practice educational budgets are limited—especially in developing countries. In practice, then, a choice to improve tertiary education is to a large degree a choice to take resources away from other educational levels.

[14] Although there is some debate about the connection between resources and school quality, and while there are undoubtedly diminishing returns to resources, there is little doubt that scarce resources make quality education difficult. In cross-country regressions of upper-middle and high income countries, higher per-student spending explains about half the variance in test scores (OECD, 2003), and there is considerable evidence for a link between educational resources and wages (for a discussion, see Card & Krueger, 1996a, 1996b). Without resources it is far harder to hire good teachers and consistently provide textbooks and supplies like paper and chalk, let alone construct high-quality school buildings—buildings that, for instance, can be used in the rain (World Bank, 2004; UNESCO, 2005).

with elite children, whose parents can afford primary education that better prepares students for entrance exams.[15]

To be clear, we do not want to discount the important economic, political, and cultural roles that public universities play in many developing countries. Large public universities provide the advanced managerial, scientific, and technical training necessary to managing and guiding a modern state and economy; they can also contribute to a robust civil society and serve as breeding grounds for future leaders and new social movements (Birdsall, 1996; Glaeser, Ponzetto, & Shleifer, 2007). But our focus here is inequality: inequality between the resources allotted to tertiary relative to primary education, and the wedge that tertiary-skewed spending may be driving between a society's haves and have-nots.

It would be difficult to overstate this funding disparity—either its magnitude, or the extent to which, as we saw in Table 2, high tertiary tilts pervade the developing world. The cases of Brazil and Ghana illustrate some of these effects , both the tilt's impact on disparities in the education system and its impact on underprivileged students' access to it.[16] In a 1979 report on Brazil, the World Bank noted that "while most rural primary schools must do without piped water and basic sanitation facilities, almost all public universities in Brazil have swimming pools, sports facilities, pleasant cafeterias, and other social amenities" (World Bank 1979, pg. 3). Only 10 percent of admissions to these universities went to students whose fathers were "working class"—unskilled or skilled workers or supervisors of manual workers (World Bank, 1979). In the early 1980s, 60 percent of rural primary teachers working in northeast Brazil classrooms had not themselves finished primary school, and only a third of first graders in these rural schools made it to second grade (World Bank, 1979; R. W. Harbison & Hanushek, 1992).

Ghana presents a similar picture. During the 1970s, per-student spending on Ghana's university students was between 131 and 171 *times* per-student spending on primary students (Kosack, 2012). In 1988, less than half of Ghanaian schools could use their classrooms in the rain, less than 80 percent had

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[15] In theory, a perfect credit market could reduce the high costs of a university education, particularly as higher education prepares students for well-remunerated employment and so, in most cases, has very high returns in the labor market (Mincer, 1974). In practice, however, it is hard for families to borrow against these future earnings to purchase quality education for their children. A university education, while valuable in the sense of allowing a student to earn higher wages in the future, cannot easily serve as that collateral—if the student later defaults, a bank cannot take her education. Repayment of educational loans thus depends to an unusual degree on the borrower's goodwill, making them risky for banks. Even in wealthy countries, private banks will rarely offer them without a subsidy or government guarantee (Friedman, 1962; Wiseman, 1987; Ljungqvist, 1993).

[16] See also the discussions in Psacharopoulos (1977), King, (1997), and Schultz (2004).

blackboards, and two-thirds reported shortages of chalk. Only 13 percent of English students and 21 percent of math students had a textbook (World Bank, 2004). By contrast, all Ghanaian university students received a government scholarship that covered not only tuition, but room and board, books, clothing, travel, examination fees, activities' fees, and even provided extra money for the student to use as they wished (Ghana, 1971).

3. THE TERTIARY TILT AND INEQUALITY

How might these spending patterns influence the relationship between enrollment and inequality? To begin our empirical inquiry, we need a measure of the education spending tilt—of how much developing country governments value upper level students, particularly those attending university, relative to students at the primary level.

(a) Measuring bias in educational spending

Measuring this relative valuation is straightforward: we can capture it directly, as tertiary per-student spending as a proportion of spending on students in primary education.

$$\frac{TertSpendPerStud_{i,t}}{PrimSpendPerStud_{i,t}}$$

where $TertSpendPerStud_{i,t}$ is per-student spending on tertiary education in country i at time t.[17] We minimize the impact of countries with very high tilts by taking the natural log of this ratio:

$$TerTilt_{i,t} = ln\left(\frac{TertSpendPerStud_{i,t}}{PrimSpendPerStud_{i,t}}\right)$$

[17] To facilitate cross-national comparisons, each country's per-student spending figures are taken as a percentage of its GDP per capita, as in Table 2. Our data are again drawn from *World Development Indicators*. Tables A6 and A7 in the Appendix shows values of $TerTilt$ for all country-years for which we have reliable data. Readers may note that our measure of $TerTilt$ does not include secondary education. This is because the nature of secondary education is highly variable across developing countries: in many, secondary school resembles higher education—highly subsidized and restricted—but in others it is more like primary education, in being accessible and poorly funded. While we do not include secondary education in $TerTilt$, as a robustness check,we re-ran all our $TerTilt$ specifications substituting $TerSecoTilt$, a measure of education spending bias that puts both tertiary and secondary per-student spending in the numerator, dividing this sum by per-student spending on primary pupils. The results (available upon request) are closely in line with those generated by the $TerTilt$ specifications reported here.

TerTilt is highly negatively correlated with tertiary enrollment ($r = -0.70$ with five-year periods beginning in 1967), which supports our earlier contention that highly tilted education systems have upper levels that are both highly resourced and highly restrictive.

We can investigate the role of the tertiary tilt in mediating the relationship between primary enrollment and inequality by interacting the government's commitment to primary students with the population's access to primary education. To measure this access, we generate a metric of the relative accessibility of a country's primary schools to students from poor families—that is, to students whose parents cannot afford to buy quality primary education on their own and are therefore reliant on state-funded schools. The higher the primary enrollment ratio, the higher, generally, is the relative proportion of students from poor families (Psacharopoulos, 1977; Addison & Rahman, 2001; Rozada & Menéndez, 2002). What is a "high" enrollment ratio? We are agnostic about the threshold.[18] Instead of fixing one, we standardize the ratio across all countries for which we have primary enrollment data, so that a ratio is high or low relative to the world average, and an increase of 1 unit represents an increase of one standard deviation in the world's distribution of primary enrollment ratios.[19] A high value for this variable, which we call *PrimEnrollStd*, indicates a primary system that is comparatively open to poor students, and vice versa. Interacting *PrimEnrollStd* with a government's education spending tilt thus allows us to see the effect on inequality of increasing enrollment at various levels of government commitment to primary students.

$$PrimEnrollStd_{i,t} = STD(\text{Primary Enrollment Ratio}_{i,t})$$

[18] An alternative would be to define an "optimal" enrollment ratio. One effort to do this is Judson (1998), who calculates whether, given current per-student spending levels, enrollments are at their optimal levels. But because Judson's calculation requires an assumption that spending per-student equals, or at least is close to, the true cost of educating each student, hers is not a useful method for our purposes. The common approach is simply to assume that the optimal ratio is 100 percent. The result of the plethora of rate-of-return studies is that the highest economic returns in the poorest countries are to primary education (Psacharopoulos, 1973, 1981, 1994), but the implication of this is simply that enrollment should be expanded, not what the target level should be.

[19] Looking across all the countries for which the World Bank provides data, the mean primary enrollment ratio was 96 percent, with a standard deviation of 22 percent. (A country can have a ratio of greater than 100 percent if its system enrolls students who are older or younger than the typical school ages. Brazil's ratio is very high because it has a high repetition rate, so that primary school students are often much older than they should be (R. W. Harbison & Hanushek, 1992). In fact, Brazil's enrollment rate reached 165 percent in 1999, the highest rate in our sample. To put this in perspective, the lowest rate—that of Oman in 1970—was just 3 percent.

The simple hypothesis that orients our analysis can now be stated in terms of the following interaction: Where governments have skewed their education spending toward their primary sectors (i.e., where $TerTilt_{i,,t-10}$ is low), high primary enrollments ($PrimEnrollStd_{i,t-10}$) will be associated with lower Gini coefficients ($Inequality_{i,t}$) 10 years later, consistent with the intuition behind international efforts to boost primary enrollments in the developing world. But where governments tilt their education spending toward tertiary students ($TertTilt_{i\,t-10}$ is high), we expect high primary enrollments ($PrimEnrollStd_{i\,t-10}$) to be associated with *higher* Gini coefficients ($Inequality_{i,t}$) a decade on. As we discuss below, both propositions find considerable support across a range of datasets and estimation techniques.

To test this hypothesis, we re-estimate equation (1), our model of inequality, adding *TerTilt* and an interaction of *TerTilt* and *PrimEnrollStd*. As in equation (1), the vector $\mathbf{z'}$ contains five variables that may affect *Inequality*: M2 as a percentage of GDP (*M2*); the level of democracy (*Democracy*); per-capita GDP (*GDPpc*); growth in per-capita GDP (*Growth*); and the availability of land, measured as hectares of arable land per capita (*Land*).

$$Inequality_{i,t} = \beta_0 + \beta_1 PrimEnrollStd_{i,t-10} + \beta_2 TerTilt_{i,t-10} + \beta_3 (PrimEnrollStd \times TerTilt)_{i,t-10} + \beta_4 TotEduExp_{i,t-10} + \beta_5 \mathbf{z'} + \eta_i + \varepsilon_{i,t} \quad (2)$$

As with equation (1), we estimate equation (2) using three ways of slicing the data: yearly, 5-year averages for the period beginning in 1967 and extending to 2007, and 5-year averages for the period 1965 to 2005. We further check the robustness of our findings by using two estimation techniques. As in section 1, our primary technique is Feasible GLS with fixed effects, an appropriate procedure given the risk of autocorrelation in panel regressions of inequality. But we also present results using FGLS random-effects estimation with robust standard errors. In using these alternative estimation techniques, we are guided by the assumption that any strong pattern in our data, if it truly exists, will show up irrespective of the particularities that inhere in each estimation procedure or way of slicing the data. This empirical strategy biases us toward failure, and the fact that, despite this bias, we do find a strong pattern in the data should help to convince readers who share our hesitancy about running regressions on unbalanced cross-national time series panel datasets that the statistical relationships we find are real.

While random-effects estimation of pooled time series cross-sectional (TSCS) models is nothing new, our particular approach differs somewhat from the more familiar models in the empirical literature. A major concern when estimating any TSCS model is unobserved heterogeneity in clustered data.[20] Each of the country-clusters in our dataset may have a different intercept, raising the possibility that our model's between-country variation will be correlated in some fashion with the within-country (year-to-year or period-to-period) variation in which we are primarily interested. Our FGLS technique addresses this problem by incorporating cluster-specific dummies: country fixed effects. But including country fixed effects absorbs precious degrees of freedom. Thus for our second set of estimates we use a relatively new technique from Bafumi and Gelman (2006) and B. Bartels (2008), which allows us to tease out our causal variables' distinct between- and within-country effects by including each variable's country-specific mean as a separate regressor. These additional variables capture our model's between-country effects more parsimoniously than the dozens of country dummies we include on the right-hand side of our FGLS equations. Having separated out the country means for each variable, we then subtract these means from our time-varying regressors, thus obtaining a clean operationalization of each regressor's within-country effects. After performing these simple transformations, we estimate the full specification using a FGLS random-effects model with robust standard errors. The model takes the form of Equation 3 below, where the within-country coefficients are denoted by the superscript w and μ_i and $\varepsilon_{i,t}$ are respectively the between- and within-country components of the error term:

[20] The analysis of TSCS data has been the source of productive debate within both economics and political science (Beck, 2001; Zorn, 2001; Wawro, 2002; Hsiao, 2003; Baltagi, 2005).

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\begin{aligned}
Inequality_{i,t} = {} & \beta_0 + \beta_1 PrimEnrollStd_{i,t-10} + \beta_2 TerTilt_{i,t-10} \\
& + \beta_3 (PrimEnrollStd \times TerTilt)_{i,t-10} + \beta_4 TotEduExp_{i,t-10} + \beta_5 \mathbf{z}' \\
& + \gamma_1 \overline{PrimEnrollStd}_i^w + \gamma_2 \overline{TerTilt}_i^w + \gamma_3 \overline{(PrimEnrollStd \times TerTilt)}_i^w \\
& + \gamma_4 \overline{TotEduExp}_i^w + \gamma_5 \bar{\mathbf{z}}'^w + \mu_i + \varepsilon_{i,t} \qquad (3)
\end{aligned}
$$

One common concern in cross-national regressions like ours is endogeneity. As a general matter, the relationship between inequality and education spending could run both ways: education spending may affect inequality, as we theorize, but that inequality could in turn influence education spending, e.g., if those who benefited become commensurately more politically powerful (as in the "political economy" pathway discussed in Li et al. 1998). Endogeneity is far less of a concern with our particular model, however, as our dependent variable is *future* inequality: it is unlikely that inequality today caused education spending a decade ago.[21]

As noted earlier, while our dataset has excellent coverage across space and time, we do have a large number of missing observations. Some of our estimates are based on fewer observations than others, depending on the particular technique and/or periodization we are using. The paucity of observations in some of our regressions—our smallest sample sizes are those using 5-year averages for the period 1965 to 2005—is yet another reason we have chosen to present our results using a variety of techniques and samples, to allay any concern that our main findings may be dependent on a handful of observations or a particular sample.

(b) Results

Our results are in Tables 3 and 4. (Re-estimations with our alternative *P90Share* and *P90:P10* measures of inequality are in Table A5.) We begin with Table 3, which shows the estimates we obtained using FGLS with fixed effects. Column 6 displays the estimates from a specification that omits our variables of interest and contains only the vector of control variables **z'**. The significant variables are *TotEduExp*, *M2*, *GDPpc*, and *Land*. Consistent with the Kuznets hypothesis, higher GDP per capita is

[21] While future inequality is unlikely to cause current education spending, this does not entirely eliminate concerns about endogeneity; it remains possible that a third factor explains both current education spending and future inequality. The common method for dealing with this concern is the Arellano-Bond GMM method, which accounts for endogeneity in the absence of a suitable instrument by using the sample moments of each variable as instruments (Arellano & Bond, 1991). The downside of this method is that it requires a tremendous amount of data, and in our case left us with results based on only 18 observations across 14 countries—far too few to provide anything other than the most speculative of results.

associated in developing countries with higher inequality. The supply of money and the abundance of arable land are also associated with higher inequality, while lagged education expenditures are associated with lower inequality, as in Sylwester (2002). In column 7, we introduce our lagged education variables: *PrimEnrollStd* and *TerTilt*. The coefficient on *PrimEnrollStd* is positive and significant, while *TerTilt* is insignificant.

In column 8 we introduce the interaction term we discussed in the previous subsection. As expected, its coefficient is positive and highly significant, and remains so in all six of the regressions in which we have included it on the right-hand side (columns 8 – 13).

These results strongly suggest that if a country tilts its education spending toward primary students (i.e., *TerTilt* is relatively low), higher primary enrollment is associated with lower inequality in the future, consistent with the intuition behind international efforts to boost primary enrollments in the developing world. But where governments tilt their education spending away from primary students—where *TerTilt* is high—higher primary enrollment is associated with higher future inequality. Put another way, the general pattern we found earlier reappears: the higher is a developing country's primary enrollment today, the higher is its inequality 10 years later. But countries with low *TerTilt*s—countries that concentrate their educational resources on primary students, not upper level students—are exceptions: the higher their primary enrollment today, the lower their inequality 10 years later.

[Tables 3 and 4 about here]

The magnitudes here are substantial. Figure 1 plots the marginal effect of primary enrollment on inequality at different levels of $TerTilt_{t-10}$. In our main dataset—5-year periods starting in 1967—the highest tilt toward upper-level students was in Kenya from 1992-1996; the lowest was in South Korea from 1997-2001. If we take literally the coefficients in column 8, they imply that in South Korea, where spending was highly tilted toward primary students, an increase in primary enrollment of one standard deviation—19.3 percentage points—would be associated a decade later with inequality that was .063 points lower on a 0 – 1 Gini index. But in mid-1990s Kenya, where spending was highly tilted toward university students and away from primary students, a one-standard-deviation increase in primary

enrollment would be associated 10 years later with a Gini .129 points *higher* than it would otherwise have been.[22]

[Figure 1 about here]

These magnitudes change somewhat depending on the sample and the estimator—the results reported in column 10 imply, for instance, that a one-standard-deviation increase in Kenya's primary enrollment rate during the mid-1990s would generate a Gini only .083 points higher, while the results in column 9 imply a Gini .163 points higher But these relatively small differences do not alter the basic result: higher primary enrollment lowers inequality when countries tilt their spending toward primary students, but substantially raises inequality in countries when the spending tilt is toward upper-level students. Furthermore, in only two of the six regressions—the results using FGLS with random effects and 5-year periods (columns 11 and 12)—does the significance of the interaction terms fall below the one-percent level.[23]

In sum, higher primary enrollment is associated with lower future inequality only in countries that concentrate their education resources on the primary level. But these countries are the exceptions. In countries with high tertiary tilts—that is, in most developing countries—higher primary enrollment is associated with far higher future inequality.

4. DISCUSSION

These empirical associations naturally raise a number of questions. Are the results plausible—is it reasonable to think that higher primary enrollment would be associated with greater inequality where the tertiary tilt is high? And why do so many developing country governments choose to have high tertiary tilts? Our purpose in this paper is to document a surprising empirical reality rather than fully test the mechanism behind it. Nonetheless these questions are worth discussion, both to defend the

[22] The threshold level of the tertiary tilt at which enrollment's association with future inequality becomes negative is 1.215.

[23] As many of the countries with high tertiary tilts are in sub-Saharan Africa, readers may wonder whether our results are driven disproportionately by African countries. We conducted two robustness checks to explore this possibility. First, we re-ran our main specification with a sub-Saharan Africa dummy; our results did not change, and in fact the dummy was insignificant. Second, we ran our main specification on a sample restricted to countries outside of sub-Saharan Africa. (We thank an anonymous reviewer for this suggestion.) Our results also held in this smaller sample, implying that the association between higher enrollment higher future inequality in high-tertiary-tilt countries applies more broadly across the developing world than in sub-Saharan Africa alone.

credibility of the findings as well as lay the groundwork for future theoretical and empirical work to explain them.

First, why do the leaders of so many developing countries systematically tilt educational resources toward the upper levels even as they increase primary enrollment? We suggest that the pervasiveness of the tertiary tilt results from the political constraints under which the leaders of developing countries are operating. However sympathetic political leaders may personally be to the idea of quality primary education,[24] their main priority as political leaders must be to stay in power, and they can only achieve this objective by privileging the demands of societal groups that can threaten their power.[25] The poor are rarely organized and influential enough to be credible bases of support for or threats to governments; instead, leaders in developing countries typically rely for their support on relatively small groups of elites, whose organizational and resource advantages put them in a far better position to be supportive of a government that serves them and threatening to a government that does not (Lipton, 1977; Bates, 1981; Bueno de Mesquita, Smith, Siverson, & Morrow, 2003). To politically constrained policymakers, then, a widely heralded goal like providing every child with a high-quality primary education may be politically difficult. As argued earlier, elites benefit more when the government concentrates its limited education resources on restrictive upper levels of education, whose enrollment is likely to be drawn disproportionately from wealthy families—whose political support the leaders need to stay in power. In other words, the simplest reason for the tertiary tilt may be that powerful constituencies in most developing countries want it, and so will reward political leaders who provide it.[26]

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[24] If their signatures are at all meaningful, it is likely that many political leaders do have a personal preference for improving primary education: delegates from 155 countries signed the 1990 World Declaration on Education For All.

[25] Downs (1957), Haggard and Kauffman (1995).

[26] In a supplementary analyses available from the authors, we consider, first, whether the tertiary tilt can be explained by level of development or level of democracy (influential empirical work in political science has associated more democratic governments with higher spending on primary education; seeBrown & Hunter, 1999; Stasavage, 2005). We find that while both are statistically significant predictors of the tertiary tilt, the magnitude of their association is surprisingly small: a shift from full autocracy to full democracy, for example, lowers the expected tertiary tilt by less than the difference between the most and second-most tilted countries in our data. Second, we consider whether the tertiary tilt is a temporary problem—the result of spending's taking time to adjust to increased enrollment. We find, however, that while there is some small tendency for governments to spend more on primary students as their numbers increase, that tendency is far too small to alleviate the tertiary tilt's overall effect on inequality.

In countries with high tertiary tilts, is it plausible for increases in primary enrollment to be associated with higher, not lower, future inequality? There is good reason to think so. A rise in the enrollment rate may have some positive effect on the incomes of new students. But it is unlikely to reduce the incomes of a society's top earners since, without a commensurate increase in secondary and tertiary enrollment, new primary graduates would have little chance of continuing on to the higher levels of education that are a prerequisite for entry into the most lucrative occupations. And as for those who would have graduated from primary school anyway, any increase in the total number of primary students would be likely to reduce their future earnings power, both relatively speaking and in absolute terms, for at least two reasons.[27] The first is the difficulty, where resources are scarce, of expanding education while maintaining quality for existing students. The second reason has to do with the demand for primary-educated workers in capital-poor developing countries, and in those characterized by high tertiary tilts in particular. These add up to an environment in which it is highly plausible that higher inequality would follow an increase in primary enrollment.[28]

First, enrollment growth on its own may reduce the quality of education available to existing primary students, particularly in countries with high tertiary tilts. This is because the children who are the likely targets of efforts to increase enrollment—those who are not in primary school or who are dropping out before graduating—are likely to be harder to teach, on average, than the students who are currently in school. They are more likely to come to school hungry or unhealthy and may lack home environments conducive to acquiring formal education.[29] They may be disproportionately girls or minorities, who were traditionally excluded from the education system and require additional support to thrive in an unfamiliar environment in which they may feel unwelcome. These are often the very populations at which the

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[27] At least in the short run. In the long run, of course, increases in average productivity across the economy brought by widespread basic education may offset these short-run loses.

[28] A third possibility is that a broadly educated population disproportionately raises the productivity—and thus the earnings—of an economy's best-educated workers. The analogy is to the well-known phenomenon in industrialized countries of rising CEO pay while the pay of average workers, who are increasingly educated, has stagnated. This mechanism is related to but somewhat distinct from the second mechanism we discuss: the increasing abundance of primary-educated workers that puts downward pressure on their wages. It may also be the case that, in addition to allowing those at the top to capture productivity gains that come from better educated workers being more widely available, the greater abundance of primary-educated workers independently increases the productivity of those at the top of the income scale, further boosting their earnings. We thank an anonymous reviewer for suggesting this possibility.

[29] Gomes-Neto et al. (1997), Alderman et al. (1997), Case, Fertig, and Paxson (2005), Eide, Showalter, and Goldhaber (2010).

international community's emphasis on expanding primary enrollment is specifically being targeted. Yet adding these children to the education system in a country with a high tertiary tilt—where educational resources are focused on students in higher education, not primary education—is likely to strain the system, forcing it to adjust in ways both obvious (more students sharing desks and textbooks) and subtle (teachers spending less time with each student). Recognition of this very problem is at the root of a growing chorus of international advocates now clamoring for an increase in educational quality commensurate with the international community's push for increasing enrollment.[30]

As for the students who would not normally be attending school, one might think that they, at least, would benefit from the time they would now be spending in their country's primary system, however reluctant their parents may initially have been to enroll them. But even this is unclear. Schooling is a costly investment, after all, even for students who receive it for free. In addition to schooling's direct costs—books, uniforms, transportation—students bear substantial opportunity costs: in particular, they have less time to spend learning the traditional skills that sustained their ancestors and may be just as important to success in the agricultural or informal sectors in which most of them will end up earning their livings.[31]

The second reason that enrollment growth is likely to reduce the incomes of existing primary students has less to do with the tertiary tilt itself than with the labor market characteristics of developing countries. In poor countries with small formal sectors and limited capital, the supply of primary-educated workers can easily outstrip demand, leading to low rates of return on primary education. Although most studies report a positive effect of lower-level schooling on productivity, most concentrate on formal-sector workers[32], and studies that examine agriculture and the informal sectors productivity improvements from lower-level education generally attribute these improvements to the adoption of

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[30] The same UN Human Development Report, cited above, that reports the tremendous worldwide progress in expanding primary education also notes that "many developing countries have proven more capable of putting children in school than of giving them a high quality education" (United Nations, 2010, p. 36); see also Filmer, Hasan, and Pritchett (2006). A related literature in industrialized countries explores the effects of eliminating tracking on the academic performance of students who would normally have been placed in the accelerated tracks (e.g., Hanushek & Wössmann, 2006; Brunello & Checchi, 2007; Malamud & Pop-Eleches, 2011).

[31] On the importance of on-the-job training, and learning-by-doing more generally, see Foster and Rosenzweig (1995) and Johanson and Adams (2004).

[32] Owens and Wood (1997), Feenstra and Hanson (2003).

productivity-enhancing technologies by better-educated workers.[33] By contrast, studies that rely on nationally representative household surveys—not simply workers in the formal sector—generally find much lower rates of return to primary education in poor countries: for example, Schultz (2004) surveys recent comparable returns to primary education in six countries in Africa, where tertiary tilts tend to be high, and finds very low returns of between 2 and 7 percent—partly the result, he concludes, of a vast expansion of primary education, coupled with a highly restricted higher education sector, in the context of weak economic growth and thus limited or lagging demand for primary-educated workers.[34] There are even poor countries where primary-educated workers are so abundant that the return on primary education has fallen effectively to zero. One such country is Ghana, ironically one of 10 countries the UN cites as success stories in expanding basic education[35]: in Ghana, a recent study found no statistically significant return to the first nine years of schooling (World Bank, 2004).[36] Countries with high tertiary tilts are not the only ones to experience low returns, of course. But the tilt, where it exists, almost certainly exacerbates the problem, as resource-strapped primary systems have an especially hard time teaching productivity-enhancing skills that could make basic education a useful investment in countries with limited capital.

For all these reasons, we question the presumption that primary enrollment-boosting initiatives are a major step along the path to lower inequality. Instead, our theoretical expectation is that inequality will depend on primary education's economic rewards for both new and existing students. To clarify the underlying logic, Figure 2 presents four hypothetical scenarios for the inequality effects of increasing the primary enrollment ratio from 50 to 90 percent in a stylized society with 10 people. In the status quo,

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[33] See Welch (1970), Foster and Rosenzweig (1995), Behrman, Rosenzweig, and Vashishtha (1995), Birdsall (1993), and Jamison and Moock (1984). On the questionable cross-national connection between educational attainment and output per worker, see Pritchett (2001).

[34] Schultz's recent findings are notable for sharply contrasting with earlier cross-national surveys such as Psacharopoulos (1981, 1994), which reported an average worldwide return to primary education of 18 percent. In countries with such low rates of return to primary education it is questionable that primary schooling on its own—that is, when the student has little possibility of advancing to higher education—is a good investment for poor families, even when it is free.

[35] United Nations (2008). The others are Burundi, the Democratic Republic of the Congo, Ethiopia, Ghana, Haiti, Kenya, Malawi, Mozambique, Tanzania, and Uganda.

[36] A 1999 survey of homeless youths in the Ghanaian capital—youngsters found "living, working, and sleeping on the streets of Accra"—found that only seven percent had never attended school, while 40 percent had graduated from junior secondary school (Amankrah, Wadieh, Amuzu, & Kristensen, 1999). Unsurprisingly many poorer Ghanaian families in the late 1990s harbored deep reservations about the value of primary education (Addae-Mensah, 2000).

enrollment is 50 percent: five people did not attend primary school and went on to earn $2 per day; another five did attend primary school, and of these: three entered the workforce after graduation and earned $20 per day, and two—members of the society's elite—went on to secondary school and university and ended up earning $60 per day. The Gini coefficient for this income distribution is .57 on a 0 – 1 scale.

In the first two scenarios, inequality falls following an increase in primary enrollment. In the first scenario, increasing enrollment to 90 percent raises the incomes of new primary graduates from $2 to $3. Competition from the increasing number of educated workers lowers the wages of the two university graduates, from $60 to $45, as well as of the three current primary graduates who would have graduated from primary school without the increase in enrollment; their wages fall from $20 to $10. In this scenario, the increase in enrollment lowers inequality from a Gini of .57 to .56. In the second scenario, increasing the enrollment rate to 90 percent raises the incomes of new primary graduates from $2 per day to $3 per day but does not affect the incomes either of university graduates or of current primary graduates—those who would have graduated from primary school without the increase in enrollment. In this scenario inequality drops by more than in scenario 1, from .57 to .55.

But neither of these two scenarios is realistic. The new primary graduates are unlikely to be able to compete for the jobs held by the university graduates. They will, however, compete with existing primary graduates for jobs and the use of scarce capital. In addition, adding these new students to the education system without investing commensurate new resources is likely to lower the quality of the primary education available to current graduates. Both effects will tend to reduce the wages of existing graduates. We capture this in the third scenario. Here, the expansion of primary education still raises the earnings of the very poorest—those who were previously out of school—by the same amount, from $2 to $3. The expansion also does nothing to erode the wage premia enjoyed by elite tertiary graduates. But existing students' future incomes are reduced from $20 to $10 per day, reflecting the rise in the competition they face for formal sector jobs requiring a primary education as well as the reduction in primary education's overall quality as the system takes on new students. In this scenario, inequality rises, from a Gini of .57 to .60. Notably, this is the case even though in the scenario the incomes of existing

primary graduates remain substantially higher than the new entrants: $10 compared to $3 for new entrants.

It is also possible that primary education has a negative return for new entrants—perhaps because, while attending school, they forego the opportunity to acquire traditional skills. We capture this possibility in the fourth scenario, in which new primary graduates earn $1 per day, half what they would have earned as adults if they had not gone to school. Inequality here rises to a Gini of .66. Although theoretically possible, however, scenario 4—like scenarios 1 and 2—is less realistic, since returns to primary education in the developing world are typically positive, if only modestly so (Schultz, 2004).

[Figure 2 about here]

In sum, while it is theoretically possible for inequality to fall after an increase in the primary enrollment rate, our most realistic scenario, scenario 3, has inequality rising substantially. Why is this realistic? Because the politically constrained policymakers who govern developing countries have a strong interest in protecting the earnings of elite university graduates, the vast majority of whom come from wealthy families whose political support these leaders need to stay in power. Education budgets are likely to remain heavily biased toward universities, then, even when primary enrollments rise. And because the underfunded primary schools one finds in "tilted" political economies are too poorly staffed—and too poorly equipped generally—to accommodate an influx of new students, the push to raise these countries' primary enrollment rates could end up lifting, rather than lowering, their long-run rates of inequality.

5. CONCLUSION

We began this paper with a puzzle. We showed empirically that higher primary enrollment is associated in developing countries with higher, not lower, future inequality. This association runs contrary to much of the conventional wisdom, which sees primary education enabling the poor to catch up to the rich. We further showed that this relationship depends on the educational spending patterns prevalent in developing countries. In developing countries that focus their educational resources on primary students rather than students in their secondary schools and universities, increases in primary enrollment are associated with significantly lower inequality a decade later. But these governments are the exceptions: most of the time, and across most of the developing world, governments concentrate their

education spending on students in the upper levels. And in these countries, higher primary enrollment today is strongly associated with much higher future inequality.

We laid out some of the factors that may lie behind these associations. The tertiary tilt may be a political necessity for the leaders of many developing countries. And where educational resources are concentrated on students in higher education instead of primary students, it may be difficult to expand primary enrollment while maintaining quality for existing primary students. Exacerbating the problem are the limited returns to primary-educated workers in capital-poor developing countries where primary education is already abundant. We leave a more thorough examination of these and other explanations for future research. Here our purpose is rather to document a robust association between current primary enrollment and future inequality in countries with high tertiary tilts—an association that has important implications for the international community's current campaign to promote basic education. Developing countries have made tremendous progress in raising primary enrollment rates. But it is not enough to enroll primary students. They must also be educated—and a high-quality education costs money.

Eliciting that money for the sake of equality (or out of regard for education's contribution to societal well-being more broadly) may require an equally vigorous new campaign, this one aimed at "re-tilting" the political priorities of developing country governments.[37] Many of these governments have been receptive to the idea of expanding primary enrollments. Perhaps they should now be encouraged to devote greater attention—and funding—to primary education as a whole, even if that means diverting resources away from their countries' elite universities. Without that re-tilting, the international community's well-intentioned push for universal primary education could paradoxically end up increasing inequality throughout much of the developing world.

[37] Tertiary-tilted spending priorities may have other consequences as well, of course, beyond their impact on inequality. Our hope is that this analysis will stimulate a wider investigation of the tilt's causes and internal dynamics (which are what we began to address in Section 4) as well as its broader effects—e.g., for long-run economic growth. On the growth effects of primary versus tertiary education, see Denison (1962), Harbison and Myers (1964), Ahmed and Blaug (1973), Psacharopoulos (1973, 1981, 1994), and Schultz (2004).

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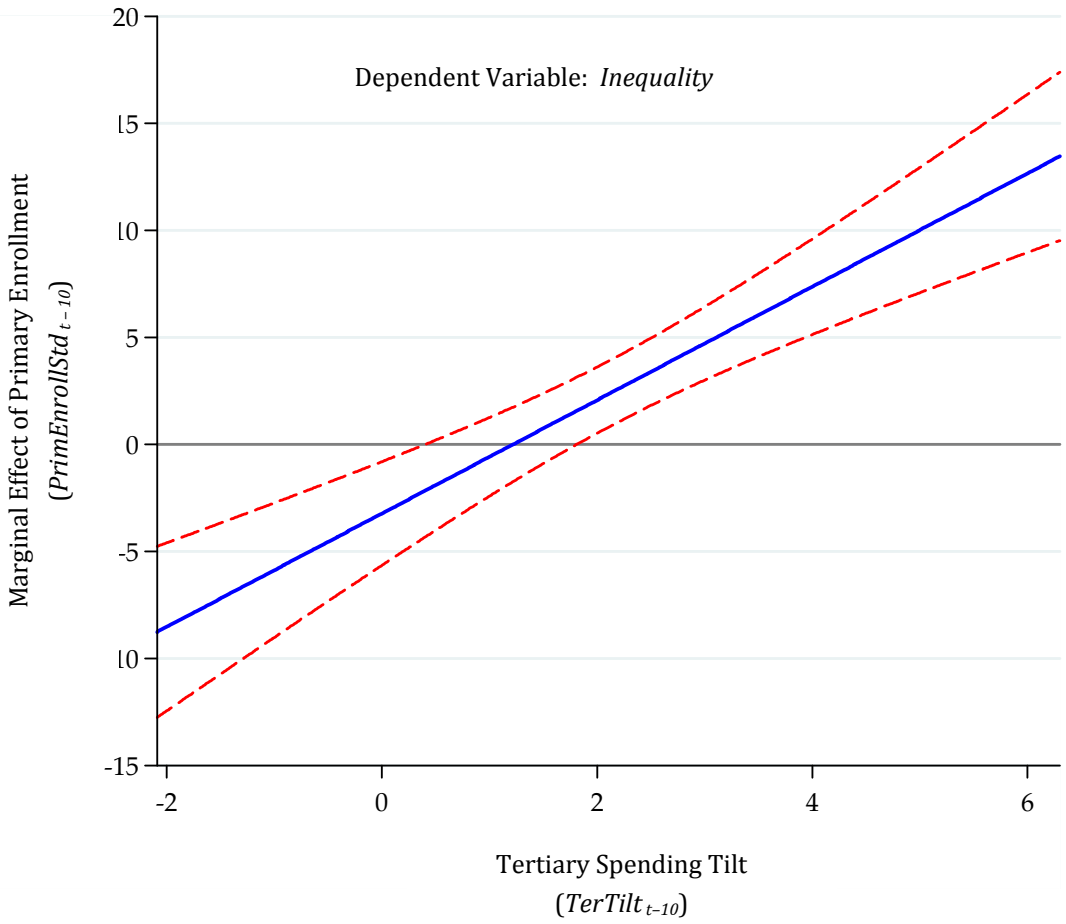

Figure 1 - Primary Enrollment's Marginal Effect on Inequality As Tilt Shifts from Primary to Tertiary

Note: Dashed lines represent the 95-percent confidence interval.

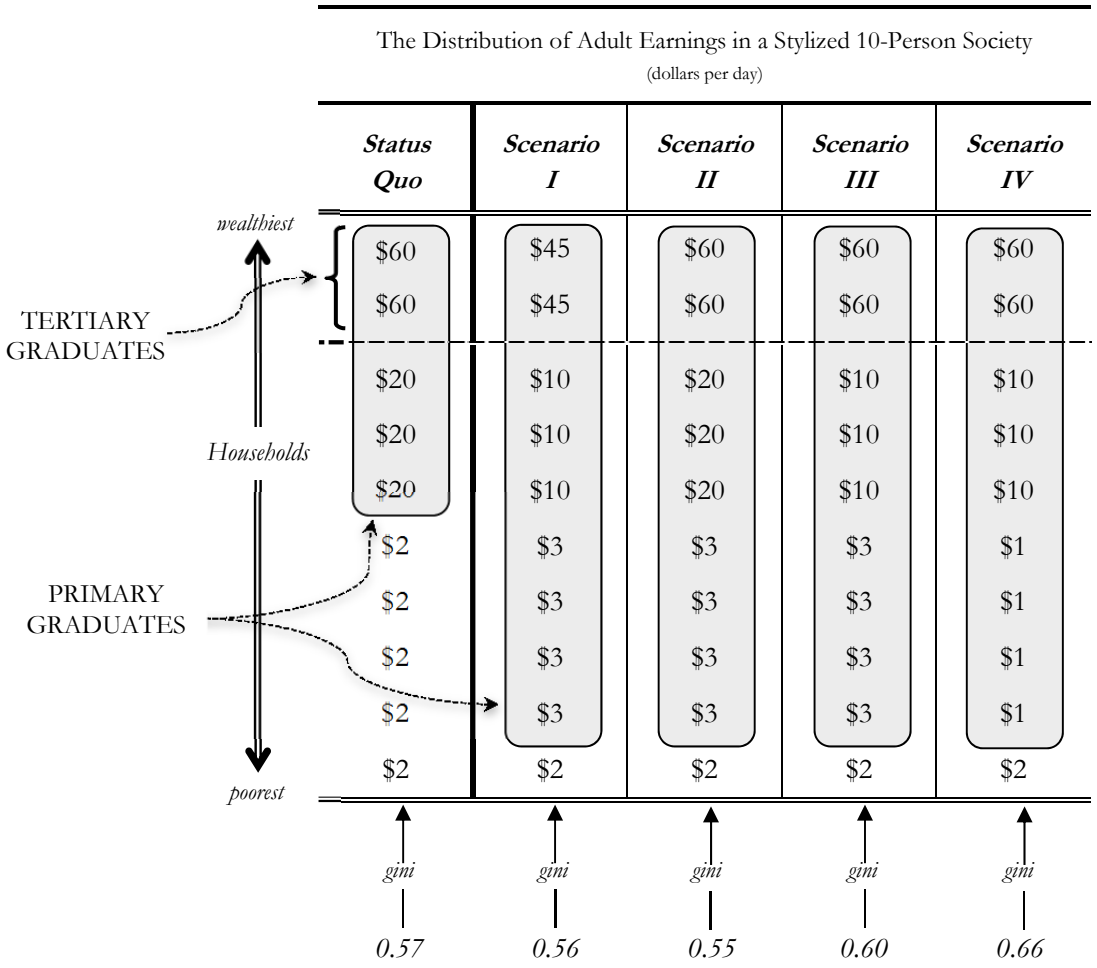

Figure 2 - Inequality after an expansion of primary enrollment in four alternative scenarios

Table 1 - The Impact of Lagged Primary Enrollment on Current Inequality

Sample:	*5-Year Averages from 1967 to 2007*			*5-Year Averages from 1965 to 2005*	*Annual Data*
	(1)	(2)	(3)	(4)	(5)
$PrimEnroll_{t-10}$			.041***	.020**	.021***
			(.011)	(.010)	(.008)
$TotEduExp_{t-10}$		-.220***	-.328***	-.589***	-.130***
		(.048)	(.075)	(.081)	(.032)
M2	.045***	.040***	.041***	.038***	.018***
	(.006)	(.006)	(.009)	(.007)	(.006)
Democracy	-.0012	-.004	-.019	-.030*	-.003
	(.0016)	(.007)	(.014)	(.018)	(.003)
GDPpc	.0016***	.0014***	.0019***	.0011***	.0007***
	(.0001)	(.0001)	(.0001)	(.0002)	(.0002)
Land	9.29***	12.48***	15.04***	15.73***	5.25**
	(2.98)	(2.53)	(2.74)	(2.60)	(2.23)
Growth	-.076***	-.021	-.039	.021	-.0028
	(.028)	(.029)	(.027)	(.050)	(.014)
Constant	23.16***	23.69***	19.12***	23.57***	25.14***
	(.89)	(.79)	(1.49)	(1.25)	(1.26)
Country Fixed Effects	✓	✓	✓	✓	✓
Country N	72	72	72	69	80
Total N	245	245	245	220	895

*** Significant at the 1 percent level ** Significant at the 5 percent level * Significant at the 10 percent level

Notes: The dependent variable is the Gini coefficient, as reported in the World Bank's *World Development Indicators* database. Estimation method is FGLS (robust standard errors are shown in parentheses). Results are displayed for three different samples: 5-year averages over the period stretching from 1967 to 2007, 5-year averages over the period from 1965 to 2005, and yearly data. *PrimEnroll* is the primary enrollment ratio. *TotEduExp* is education spending as a percentage of GDP.

Table 2 - Enrollments and Spending by Region, 1990s

A.		*Gross Enrollment Ratios*		
	GDP per capita	*Primary*	*Secondary*	*Tertiary*
South Asia	$528	101%	43%	5%
Sub-Saharan Africa	$879	80%	25%	3%
Eastern Europe and Central Asia	$2,640	97%	84%	27%
Latin American and Caribbean	$4,039	105%	58%	19%
East Asia and Pacific	$5,536	106%	56%	15%
Middle East and North Africa	$5,756	92%	64%	16%
OECD	$26,020	103%	109%	47%

B.		*Per student spending (% of GDP per capita)*		
	GDP per capita	*Primary*	*Secondary*	*Tertiary*
South Asia	$528	10%	13%	101%
Sub-Saharan Africa	$879	14%	41%	402%
Eastern Europe and Central Asia	$2,640	24%	21%	37%
Latin American and Caribbean	$4,039	8%	13%	42%
East Asia and Pacific	$5,536	9%	16%	96%
Middle East and North Africa	$5,756	16%	22%	71%
OECD	$26,020	19%	22%	36%

*C.**		*Proportion of the education budget devoted to:*		
	GDP per capita	*Primary*	*Secondary*	*Tertiary*
South Asia	$528	53%	27%	21%
Sub-Saharan Africa	$879	49%	29%	22%
Eastern Europe and Central Asia	$2,640	43%	38%	19%
Latin American and Caribbean	$4,039	46%	31%	23%
East Asia and Pacific	$5,536	45%	36%	19%
Middle East and North Africa	$5,756	39%	44%	16%
OECD	$26,020	30%	45%	25%

Source: World Development Indicators. GDP per capita is in constant 1995 US dollars.

* Figures in panel C are authors' calculations based on per-student spending, enrollment, and GDP figures from the World Bank's *World Development Indicators* database. They thus omit any education spending not targeted at a particular education level (such as central administration).

Table 3 - Results using FGLS Estimation with AR(1) Correction

Sample:	*5-Year Averages from 1967 to 2007*			*5-Year Averages from 1965 to 2005*	*Annual Data*
	(6)	(7)	(8)	(9)	(10)
$PrimEnrollStd_{t-10}$	.884*** (.229)	3.105*** (.431)	-3.218*** (1.235)	-4.713*** (1.142)	-1.123*** (.409)
$TerTilt_{t-10}$		.634 (.483)	.153 (.487)	.615 (.565)	1.011*** (.309)
$PrimEnrollStd_{t-10} \times TerTilt_{t-10}$			2.647*** (.444)	3.450*** (.431)	1.548*** (.138)
$TotEduExp_{t-10}$	-.328*** (.075)	.006 (.205)	-.295 (.263)	.132 (.405)	-.028 (.097)
M2	.041*** (.009)	-.052*** (.015)	-.047** (.018)	-.054* (.031)	-.012 (.011)
Democracy	-.019 (.014)	.089*** (.024)	-.135*** (.012)	-.190*** (.033)	.002 (.004)
GDPpc	.0019*** (.0001)	.0018*** (.0002)	.0018*** (.0004)	.0019*** (.0007)	.0010*** (.0002)
Land	15.04*** (2.74)	11.76** (5.06)	23.66*** (4.83)	2.55 (5.60)	8.21** (3.88)
Growth	-.039 (.027)	.042 (.029)	.0006 (.0652)	-.0036 (.0933)	-.053* (.031)
Constant	23.08*** (.83)	37.24*** 3.06	13.85*** (4.25)	37.63*** (5.39)	24.69*** (3.37)
Country Fixed Effects	✓	✓	✓	✓	✓
Country N	72	27	27	22	27
Total N	245	83	83	62	279

Notes: See Table 1. (*PrimEnrollStd* is the primary enrollment ratio normalized across all countries for which we have data.)

Table 4 - Results using FGLS Random-Effects Estimation with Robust Standard Errors

	Sample:	*5-Year Averages from 1967 to 2007*	*5-Year Averages from 1965 to 2005*	*Annual Data*
		(11)	(12)	(13)
Within-Country Effects	$PrimEnrollStd_{t-10}$	-3.19 (2.51)	-1.99 (2.43)	-4.00* (2.36)
	$TerTilt_{t-10}$	.50 (1.68)	.13 (.07)	.89 (1.37)
	$PrimEnrollStd_{t-10} \times TerTilt_{t-10}$	2.59** (1.03)	2.64** (1.11)	2.68*** (1.03)
	$TotEduExp_{t-10}$	.12 (.77)	-.89 (.93)	-.34 (.50)
	M2	-.05 (.04)	-.07 (.06)	-.03 (.04)
	Democracy	-.11*** (.03)	-.14* (.07)	-.02 (.01)
	GDPpc	.0013* (.0007)	.0006 (.0012)	.0003 (.0007)
	Land	19.24 (11.77)	10.51 (20.95)	4.84 (15.23)
	Growth	-.13 (.15)	-.02 (.23)	-.05 (.13)
Between-Country Effects	$PrimEnrollStd_{t-10}$	-2.24 (4.06)	-1.45 (3.67)	5.20 (4.20)
	$TerTilt_{t-10}$	2.79** (1.35)	3.77*** (1.36)	2.98*** (.95)
	$PrimEnrollStd_{t-10} \times TerTilt_{t-10}$	1.59 (1.69)	1.68 (1.21)	-1.29 (1.43)
	$TotEduExp_{t-10}$	-1.17 (.99)	-1.12 (.87)	-.44 (1.02)
	M2	-.01 (.07)	-.02 (.06)	-.007 (.052)
	Democracy	.34 (.28)	.08 (.23)	.35 (.23)
	GDPpc	-.0001 (.0004)	.0004 (.0005)	-.0002 (.0004)
	Land	-3.65 (7.28)	3.90 (7.67)	-4.47 (8.87)
	Growth	-.29 (1.00)	-.16 (.91)	.36 (.59)
	Constant	44.05*** (4.80)	39.48*** (6.12)	39.18*** (4.83)
	Country N	45	44	38
	Total N	101	84	290

Notes: See Table 1. (*PrimEnrollStd* is the primary enrollment ratio normalized across all countries for which we have data.)

APPENDIX

Table A1 - Summary Statistics for Sample Using 5-Year Averages Beginning in 1967

	N	*Mean*	*Standard Deviation*	*Minimum*	*Maximum*
Gini	159	43.5	9.2	23.3	60.7
P90Share	159	34.2	7.2	19.2	51.0
P90P10	159	22.6	20.4	4.6	168.5
PrimEnroll	159	98.1	19.3	32.3	146.7
PrimEnrollStd	159	0.09	0.90	-2.98	2.35
TerTilt	159	1.64	1.30	-1.17	6.09
TerSecoTilt	148	1.93	1.07	-0.43	6.11
TotEduExp	159	4.16	1.44	1.20	9.34
M2	159	34.8	20.8	7.07	125.03
Democracy	159	2.51	8.34	-52.4	10.0
Land	159	0.27	0.20	0.04	1.50
GDPpc	159	2,287	2,519	108	18,396
Growth	159	1.65	3.23	-16.59	9.22

Table A2 - Summary Statistics for Sample with Yearly Data

	N	*Mean*	*Standard. Deviation*	*Minimum*	*Maximum*
Gini	210	44.6	9.6	25.5	63.2
P90Share	210	34.9	7.6	20.2	51.0
P90P10	210	25.2	21.7	5.0	168.5
PrimEnroll	210	102.3	15.1	37.5	166.0
PrimEnrollStd	210	0.28	0.70	-2.74	3.24
TerTilt	210	1.39	1.21	-1.16	6.85
TerSecoTilt	210	1.77	1.05	-0.51	6.85
TotEduExp	210	4.25	1.41	1.15	10.30
M2	210	35.0	21.1	6.7	116.8
Democracy	210	4.22	8.62	-88.0	10.0
Land	210	0.28	0.22	0.04	1.53
GDPpc	210	2,664	2,326	116	18,674
Growth	210	2.06	3.39	-13.50	9.30

Table A3 - Verification of Table 1 Results Using the P90Share Measure of Inequality

Sample:	*5-Year Averages from 1967 to 2007*			*5-Year Averages from 1965 to 2005*	*Annual Data*
PrimEnroll $_{t-10}$			.042***	.028***	.010
			(.010)	(.007)	(.007)
TotEduExp $_{t-10}$		-.293***	-.384***	-.61***	-.09***
		(.049)	(.034)	(.07)	(.02)
M2	.0202***	.013	.013	.027***	.009**
	(.0067)	(.009)	(.010)	(.009)	(.005)
Democracy	-.0003	-.0005	.0036	-.024**	.003
	(.0098)	(.0096)	(.0119)	(.010)	(.003)
GDPpc	.00077***	.0011***	.0016***	.00054***	.0005***
	(.00017)	(.0002)	(.0001)	(.00017)	(.0001)
Land	-1.50	5.87***	6.83***	11.13***	1.72
	(1.49)	(1.94)	(1.28)	(2.87)	(1.84)
Growth	-.043*	-.028**	-.050	.064	-.029*
	(.023)	(.014)	(.011)	(.039)	(.016)
Constant	21.10***	21.15***	16.55***	18.61***	21.26***
	(.54)	(.74)	(1.32)	(1.34)	(1.00)
Country Fixed Effects	✓	✓	✓	✓	✓
Country N	82	72	72	69	80
Total N	286	245	245	220	895

*** Significant at the 1 percent level ** Significant at the 5 percent level * Significant at the 10 percent level

Notes: The dependent variable is percentage of a country's total income accruing to households in its highest income decile, as reported in the World Bank's *World Development Indicators* database. Estimation method is FGLS (robust standard errors are shown in parentheses). Results are displayed for three different samples: 5-year averages over the period stretching from 1967 to 2007, 5-year averages over the period from 1965 to 2005, and yearly data. ***PrimEnroll*** is the primary enrollment ratio. ***TotEduExp*** is education spending as a percentage of GDP.

Table A4 - Verification of Table 1 Results Using P90:P10 Ratio Instead of Gini Indicator of Inequality

Sample:	*5-Year Averages from 1967 to 2007*			*5-Year Averages from 1965 to 2005*	*Annual Data*
PrimEnroll $_{t-10}$			.050**	.023*	.020*
			(.022)	(.012)	(.011)
TotEduExp $_{t-10}$		.184	-.283**	-.396***	-.123***
		(.133)	(.119)	(.082)	(.046)
M2	.266***	.243***	.213***	.209***	.053***
	(.010)	(.020)	(.018)	(.021)	(.009)
Democracy	-.033***	-.044***	-.041***	-.154***	-.0000
	(.011)	(.006)	(.014)	(.020)	(.0029)
GDPpc	-.0014***	-.0011***	-.0006***	-.0016***	.0001
	(.0003)	(.0003)	(.0002)	(.0004)	(.0003)
Land	7.39**	17.47***	23.19***	21.04***	11.31***
	(2.99)	(4.53)	(5.09)	(4.38)	(2.87)
Growth	-.038	.212***	.213***	.024	.038
	(.023)	(.046)	(.053)	(.050)	(.028)
Constant	-9.05***	-12.25***	-15.15***	-7.25***	-.77
	(1.07)	(1.88)	(3.73)	(2.14)	(1.58)
Country Fixed Effects	✓	✓	✓	✓	✓
Country N	82	72	72	69	80
Total N	286	245	245	220	895

Notes: The dependent variable is the ratio of the 90th to the 10th percentile of a country's income distribution, as reported in the World Bank's *World Development Indicators* database. Estimation method is FGLS (robust standard errors are shown in parentheses). Results are displayed for three different samples: 5-year averages over the period stretching from 1967 to 2007, 5-year averages over the period from 1965 to 2005, and yearly data. *PrimEnroll* is the primary enrollment ratio. *TotEduExp* is education spending as a percentage of GDP.

Table A5 - Verification of Tables 3 and 4 Using the P90Share and P90:P10 Measures of Inequality

Dependent Variable:	*P90Share*		*P90:P10 Ratio*	
	FGLS with Fixed Effects	*FGLS with Random Effects*	*FGLS with Fixed Effects*	*FGLS with Random Effects*
PrimEnrollStd $_{t-10}$	-1.86* (.98)	-2.23 (2.06)	-7.33*** (2.11)	-5.88 (6.30)
TerTilt $_{t-10}$	-.07 (.37)	.37 (1.42)	.49 (1.20)	-1.39 (4.96)
PrimEnrollStd $_{t-10}$ X *TerTilt* $_{t-10}$	1.95*** (.30)	2.04*** (.71)	4.27*** (.42)	3.68*** (1.41)
TotEduExp $_{t-10}$	-.13 (.18)	.293 (.686)	.48** (.20)	.17 (1.30)
M2	-.06*** (.01)	-.06** (.03)	-.072*** (.030)	-.09 (.14)
Democracy	-.11*** (.01)	-.09*** (.03)	-.21** (.09)	-.24 (.17)
GDPpc	.0017*** (.0003)	.0015** (.0006)	.0012* (.0007)	.0002 (.0022)
Land	18.36*** (2.38)	14.11 (10.35)	-5.92 (14.19)	-1.01 (45.81)
Growth	-.03 (.05)	-.13 (.11)	-.30*** (.10)	-.28 (.49)
Constant	8.99** (3.52)	34.81*** (3.75)	47.29*** (7.51)	32.39*** (10.19)
Specification includes country fixed effects	✓		✓	
Specification parcels out between- & within-country effects as described in text		✓		✓
Country N	27	16	27	45
Total N	83	29	83	101

*** Significant at the 1 percent level ** Significant at the 5 percent level * Significant at the 10 percent level

Notes: See Tables 3 and 4. The dependent variables for this table are ***P90Share*** (the percentage of a country's total income accruing to households in its highest income decile) and ***P90:P10*** (the ratio of the 90th to the 10th percentile of a country's income distribution), both as reported in the World Bank's *World Development Indicators* database. Columns for random effects specifications display coefficients and standard errors for within-country regressors only. All samples are 5-year averages from 1967 to 2007.

Table A6 - TerTilt Values for Sample Using 5-Year Averages Beginning in 1967

Country	*5-Year*	*TerTilt*
Kenya	1992-1996	6.09
Malawi	1977-1981	5.39
Malawi	1982-1986	5.22
Malawi	1992-1996	5.21
Malawi	1972-1976	5.18
Ghana	1967-1971	5.09
Malawi	1987-1991	4.99
Ghana	1972-1976	4.86
Kenya	1987-1991	4.82
Nigeria	1967-1971	4.72
Lesotho	1977-1981	4.72
Kenya	1997-2001	4.64
Rwanda	1967-1971	4.63
Ghana	1977-1981	4.53
Togo	1982-1986	4.50
Rwanda	1992-1996	4.46
Rwanda	1997-2001	4.45
Rwanda	1987-1991	4.44
Rwanda	1982-1986	4.42
Burundi	1997-2001	4.41
Lesotho	1982-1986	4.36
Togo	1977-1981	4.36
Rwanda	1977-1981	4.31
Botswana	1972-1976	4.29
Congo Rep.	1977-1981	4.29
Togo	1987-1991	4.28
Zambia	1992-1996	4.22
Rwanda	1972-1976	4.21
Ghana	1982-1986	4.19
Botswana	1977-1981	4.19
Congo Rep.	1982-1986	4.14
Eritrea	2002-2006	4.13
Togo	1992-1996	4.13
Congo Rep.	1972-1976	4.13
China	1977-1981	4.09
Chad	2002-2006	4.03
Botswana	1982-1986	4.01
Congo Rep.	1987-1991	3.99
Guinea	1987-1991	3.97
Kenya	1982-1986	3.93

Country	*5-Year*	*TerTilt*
Rwanda	2002-2006	3.91
Lesotho	1987-1991	3.88
Ethiopia	2002-2006	3.87
Ghana	1987-1991	3.86
Congo Rep.	1992-1996	3.85
Chad	1997-2001	3.82
Cent. Afr. Rep.	2002-2006	3.71
Congo Rep.	1997-2001	3.70
Bhutan	1997-2001	3.69
Lesotho	2002-2006	3.68
Swaziland	1997-2001	3.67
Swaziland	1987-1991	3.64
Ethiopia	1997-2001	3.63
Chad	1992-1996	3.62
Lesotho	1992-1996	3.60
Swaziland	1992-1996	3.58
Lesotho	1997-2001	3.57
China	1982-1986	3.55
Ghana	1992-1996	3.53
Mozambique	2002-2006	3.46
Zambia	1997-2001	3.46
Togo	1997-2001	3.44
Congo Rep.	2002-2006	3.44
The Gambia	2002-2006	3.43
Botswana	1987-1991	3.39
Congo Rep.	1967-1971	3.39
Eritrea	1997-2001	3.36
Belize	2002-2006	3.34
Burundi	2002-2006	3.33
Botswana	2002-2006	3.30
Swaziland	1982-1986	3.28
Guyana	1982-1986	3.28
Swaziland	2002-2006	3.27
Mali	1992-1996	3.24
The Gambia	1997-2001	3.24
Ethiopia	1982-1986	3.23
India	1967-1971	3.23
Botswana	1997-2001	3.22
Ghana	1997-2001	3.19
Burkina Faso	1992-1996	3.19

Country	*5-Year*	*TerTilt*
Thailand	1967-1971	3.16
Mauritania	1987-1991	3.14
Botswana	1992-1996	3.14
China	1987-1991	3.12
India	1972-1976	3.11
Togo	1972-1976	3.10
Ethiopia	1992-1996	3.07
The Gambia	1992-1996	3.05
Madagascar	2002-2006	3.04
Benin	1992-1996	2.96
Senegal	1992-1996	2.96
Madagascar	1997-2001	2.96
Samoa	1997-2001	2.95
India	1977-1981	2.95
Vietnam	1992-1996	2.94
Senegal	1997-2001	2.93
Mali	1997-2001	2.91
Ethiopia	1987-1991	2.90
Mauritania	1992-1996	2.90
Lao PDR	1997-2001	2.89
Ghana	2002-2006	2.89
Zimbabwe	1992-1996	2.89
Senegal	1987-1991	2.89
Guyana	1987-1991	2.88
Zimbabwe	1972-1976	2.85
Senegal	1982-1986	2.84
Uganda	2002-2006	2.82
Mauritius	1987-1991	2.82
India	1982-1986	2.79
Zimbabwe	1977-1981	2.77
Zimbabwe	1997-2001	2.77
Mauritius	1982-1986	2.73
Vanuatu	1997-2001	2.70
Trinidad &	1987-1991	2.69
Jamaica	1977-1981	2.67
Senegal	2002-2006	2.65
Mauritius	1992-1996	2.64
Burkina Faso	1997-2001	2.64
India	1987-1991	2.62
Venezuela	1987-1991	2.62
Jamaica	1982-1986	2.61
China	1992-1996	2.57

Country	*5-Year*	*TerTilt*
Tonga	2002-2006	2.57
Nepal	1997-2001	2.56
Niger	2002-2006	2.56
Nepal	1992-1996	2.56
Trinidad &	1992-1996	2.56
Benin	1997-2001	2.53
Venezuela	1977-1981	2.51
Jamaica	1987-1991	2.51
Kuwait	1967-1971	2.50
Venezuela	1982-1986	2.46
Paraguay	1987-1991	2.46
India	1992-1996	2.46
Paraguay	1982-1986	2.45
Iran	1987-1991	2.45
Thailand	1972-1976	2.45
Kenya	2002-2006	2.43
China	1997-2001	2.41
Guatemala	1987-1991	2.39
Venezuela	1992-1996	2.39
Cote d'Ivoire	1997-2001	2.38
Chile	1977-1981	2.36
Benin	2002-2006	2.35
Myanmar	1997-2001	2.34
Comoros	1997-2001	2.32
Cambodia	1997-2001	2.31
Guyana	1992-1996	2.30
Guatemala	1982-1986	2.30
Iran	1982-1986	2.29
Mauritania	1997-2001	2.27
Armenia	1997-2001	2.27
Morocco	1972-1976	2.25
Trinidad &	1997-2001	2.24
Guatemala	1977-1981	2.21
Gabon	1997-2001	2.21
Cameroon	2002-2006	2.17
Togo	1967-1971	2.17
Lao PDR	1992-1996	2.17
Qatar	1972-1976	2.16
Morocco	1977-1981	2.15
Guatemala	1972-1976	2.12
Jamaica	1992-1996	2.10
Paraguay	1992-1996	2.10

Country	*5-Year*	*TerTilt*
Zimbabwe	1987-1991	2.09
Colombia	1977-1981	2.09
Kuwait	2002-2006	2.08
Cameroon	1997-2001	2.06
Guatemala	1967-1971	2.06
Cyprus	1972-1976	2.04
Cape Verde	2002-2006	2.03
Burkina Faso	2002-2006	2.02
Morocco	1982-1986	2.02
Mexico	1982-1986	2.01
India	1997-2001	2.00
Venezuela	1997-2001	2.00
Thailand	1977-1981	1.97
Malaysia	1997-2001	1.95
Malaysia	1992-1996	1.94
Mexico	1987-1991	1.94
Mauritius	1997-2001	1.92
Morocco	1987-1991	1.88
Colombia	1982-1986	1.88
Guatemala	1992-1996	1.88
Myanmar	1992-1996	1.87
India	2002-2006	1.86
Kuwait	1972-1976	1.83
Macao, China	1997-2001	1.83
Mexico	1977-1981	1.82
Nepal	2002-2006	1.81
Kuwait	1997-2001	1.81
Zimbabwe	1982-1986	1.78
Costa Rica	1987-1991	1.77
Namibia	1997-2001	1.77
Kuwait	1992-1996	1.74
Morocco	1992-1996	1.74
Guyana	1997-2001	1.73
Morocco	1997-2001	1.71
Namibia	2002-2006	1.70
Cuba	1992-1996	1.70
Bangladesh	1997-2001	1.70
Lao PDR	2002-2006	1.68
Kuwait	1987-1991	1.68
Jamaica	1997-2001	1.68
Bangladesh	2002-2006	1.68
Chile	1982-1986	1.67

Country	*5-Year*	*TerTilt*
Brazil	1997-2001	1.64
Paraguay	1997-2001	1.63
Mauritania	2002-2006	1.62
Malaysia	2002-2006	1.61
Tunisia	1997-2001	1.61
Venezuela	2002-2006	1.61
Bolivia	1992-1996	1.59
Mexico	1992-1996	1.58
U.A.E.	1997-2001	1.58
Colombia	1987-1991	1.58
Albania	2002-2006	1.55
Malta	1997-2001	1.54
Morocco	2002-2006	1.53
Thailand	1982-1986	1.53
Guatemala	1997-2001	1.53
Costa Rica	1992-1996	1.51
Israel	1977-1981	1.49
Dominican	1982-1986	1.48
Hong Kong	2002-2006	1.46
Iran	1992-1996	1.43
South Africa	1997-2001	1.39
Guatemala	2002-2006	1.39
Pap. N. Guinea	1997-2001	1.36
U.A.E.	2002-2006	1.35
Cyprus	1977-1981	1.35
Kuwait	1977-1981	1.34
Cuba	1997-2001	1.31
Mexico	1997-2001	1.30
Chile	1987-1991	1.29
Mauritius	2002-2006	1.29
Fiji	2002-2006	1.28
South Africa	2002-2006	1.28
Bolivia	1997-2001	1.28
Colombia	1992-1996	1.28
Jamaica	2002-2006	1.27
Macedonia,	1992-1996	1.26
Israel	1982-1986	1.26
Costa Rica	1997-2001	1.24
Tunisia	2002-2006	1.23
Brazil	2002-2006	1.22
Macao, China	2002-2006	1.17
Guyana	2002-2006	1.15

Country	*5-Year*	*TerTilt*
Marshall Islands	2002-2006	1.14
Peru	1997-2001	1.11
Uruguay	1977-1981	1.11
Barbados	1997-2001	1.10
Ukraine	1997-2001	1.09
Mexico	2002-2006	1.08
Uruguay	1982-1986	1.08
Panama	2002-2006	1.08
Bulgaria	1977-1981	1.06
Kuwait	1982-1986	1.05
Uruguay	1987-1991	1.04
Thailand	1987-1991	1.04
Kyrgyz Rep.	1997-2001	1.03
Malta	2002-2006	1.02
Kyrgyz Rep.	2002-2006	1.01
Cyprus	1997-2001	1.01
Israel	1987-1991	1.00
Uruguay	1992-1996	0.99
Romania	1997-2001	0.99
Colombia	1997-2001	0.97
Ukraine	2002-2006	0.97
Iran	2002-2006	0.97
Panama	1997-2001	0.97
Oman	1992-1996	0.97
Bulgaria	1982-1986	0.95
Costa Rica	2002-2006	0.95
Oman	1997-2001	0.92
Bolivia	2002-2006	0.92
Peru	1992-1996	0.92
Uruguay	1997-2001	0.89
Uruguay	2002-2006	0.89
Aruba	1997-2001	0.89
Chile	1992-1996	0.87
Thailand	1997-2001	0.87
Aruba	2002-2006	0.87
Andorra	2002-2006	0.85
Jordan	1997-2001	0.82
Paraguay	2002-2006	0.82
Romania	2002-2006	0.81
Slovenia	1987-1991	0.79
Lebanon	2002-2006	0.79
Iran	1997-2001	0.77
Cyprus	1982-1986	0.77
El Salvador	1997-2001	0.75
Cyprus	2002-2006	0.72
Slovenia	1992-1996	0.69
Thailand	1992-1996	0.67
Tajikistan	2002-2006	0.66
Israel	1992-1996	0.64
Palau	1997-2001	0.60
Belarus	2002-2006	0.59
Thailand	2002-2006	0.55
Peru	2002-2006	0.53
Cuba	2002-2006	0.53
Azerbaijan	2002-2006	0.53
Philippines	1992-1996	0.49
Bulgaria	1987-1991	0.48
Cyprus	1992-1996	0.47
Romania	1992-1996	0.43
Chile	1997-2001	0.43
Israel	1997-2001	0.38
Argentina	1997-2001	0.38
Colombia	2002-2006	0.37
Romania	1987-1991	0.36
Estonia	1997-2001	0.36
El Salvador	2002-2006	0.35
El Salvador	1992-1996	0.35
Oman	2002-2006	0.35
Philippines	1997-2001	0.33
Croatia	2002-2006	0.33
Philippines	2002-2006	0.26
Mongolia	2002-2006	0.25
Slovenia	1997-2001	0.24
Lithuania	2002-2006	0.24
Bulgaria	2002-2006	0.24
Cyprus	1987-1991	0.24
Latvia	1997-2001	0.19
Israel	2002-2006	0.19
Peru	1987-1991	0.15
Estonia	2002-2006	0.11
Chile	2002-2006	0.07
Argentina	2002-2006	0.06
Ukraine	1987-1991	0.02
Azerbaijan	1997-2001	0.02

Country	*5-Year*	*TerTilt*
Peru	1967-1971	0.01
Bulgaria	1997-2001	-0.02
Slovenia	2002-2006	-0.08
Bulgaria	1992-1996	-0.18
Belarus	1997-2001	-0.19
Lithuania	1997-2001	-0.19
Peru	1972-1976	-0.28
South Korea	1982-1986	-0.30
Kazakhstan	2002-2006	-0.34
Latvia	2002-2006	-0.34
Azerbaijan	1992-1996	-0.36
Belarus	1987-1991	-0.37
Peru	1977-1981	-0.38
Peru	1982-1986	-0.41
Ukraine	1992-1996	-0.51
South Korea	1987-1991	-0.63
Belarus	1992-1996	-0.87
South Korea	2002-2006	-0.88
South Korea	1992-1996	-1.03
South Korea	1997-2001	-1.17

Table A7 - TerTilt Values for Yearly Sample: Ordered from Highest to Lowest

Country	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*
Kenya	1998	7.10	Nigeria	1970	4.72	Togo	1986	4.41
Kenya	1997	6.85	Rwanda	1970	4.70	Rwanda	1983	4.41
Kenya	1996	6.59	Togo	1980	4.68	Rwanda	1982	4.41
Kenya	1995	6.34	Lesotho	1981	4.67	Congo Rep.	1975	4.40
Kenya	1994	6.09	Kenya	1999	4.66	Rwanda	1981	4.40
Kenya	1993	5.83	Ghana	1977	4.66	Rwanda	1980	4.40
Malawi	1994	5.80	Togo	1981	4.64	Ghana	1981	4.39
Kenya	1992	5.58	Ghana	1978	4.59	Congo Rep.	1976	4.37
Malawi	1980	5.49	Togo	1982	4.59	Togo	1987	4.37
Malawi	1981	5.42	Kenya	1988	4.57	Lesotho	1984	4.35
Malawi	1979	5.42	Rwanda	1971	4.56	Congo Rep.	1977	4.35
Malawi	1982	5.35	Lesotho	1982	4.56	Ghana	1982	4.33
Malawi	1978	5.35	Togo	1983	4.55	Rwanda	1979	4.33
Kenya	1991	5.33	Ghana	1979	4.53	Togo	1988	4.32
Malawi	1983	5.29	Togo	1984	4.50	Rwanda	2001	4.32
Malawi	1977	5.28	Rwanda	2000	4.48	Congo Rep.	1978	4.32
Malawi	1984	5.22	Rwanda	1999	4.48	Kenya	1987	4.31
Malawi	1976	5.21	Rwanda	1998	4.47	Botswana	1975	4.31
Malawi	1995	5.20	Rwanda	1997	4.47	Rwanda	1973	4.30
Malawi	1985	5.16	Rwanda	1996	4.47	Congo Rep.	1979	4.29
Malawi	1975	5.15	Rwanda	1995	4.46	Botswana	1976	4.28
Ghana	1970	5.13	Ghana	1980	4.46	Togo	1989	4.28
Malawi	1986	5.10	Lesotho	1983	4.46	Ghana	1983	4.26
Malawi	1991	5.09	Rwanda	1994	4.46	Congo Rep.	1980	4.26
Kenya	1990	5.07	Togo	1985	4.46	Rwanda	1978	4.25
Ghana	1971	5.06	Rwanda	1993	4.45	Lesotho	1985	4.25
Malawi	1987	5.04	Rwanda	1992	4.45	Botswana	1977	4.25
Malawi	1993	5.00	Rwanda	1991	4.45	Togo	1990	4.23
Ghana	1972	4.99	Rwanda	1990	4.44	Congo Rep.	1981	4.23
Malawi	1988	4.99	Zambia	1994	4.44	Zambia	1995	4.22
Malawi	1989	4.93	Rwanda	1989	4.44	Togo	1991	4.22
Ghana	1973	4.93	Rwanda	1988	4.43	Botswana	1978	4.22
Malawi	1990	4.88	Rwanda	1972	4.43	Chad	2003	4.21
Ghana	1974	4.86	Rwanda	1987	4.43	Togo	1992	4.20
Malawi	1992	4.82	Rwanda	1986	4.42	Congo Rep.	1982	4.20
Kenya	1989	4.82	Rwanda	1985	4.42	Ghana	1984	4.19
Ghana	1975	4.79	Togo	1979	4.42	Togo	1993	4.19
Lesotho	1980	4.77	Rwanda	1984	4.42	Botswana	1979	4.19
Ghana	1976	4.73	Burundi	2001	4.42	Rwanda	1977	4.18
Eritrea	2004	4.72	Burundi	2000	4.41	Congo Rep.	1974	4.18

Country	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*
Togo	1994	4.18	Togo	1996	3.92	Lesotho	2004	3.71
China	1980	4.17	Congo Rep.	1992	3.90	Congo Rep.	1999	3.70
Congo Rep.	1983	4.17	Chad	2000	3.90	Botswana	1987	3.70
Rwanda	1974	4.17	Chad	2005	3.90	Lesotho	1998	3.69
Togo	1995	4.16	Togo	1977	3.89	Lesotho	1991	3.69
Lesotho	1986	4.16	Chad	2004	3.89	China	1983	3.69
Botswana	1980	4.15	Lesotho	1989	3.88	Bhutan	2000	3.69
Rwanda	2002	4.15	Congo Rep.	1993	3.88	Ethiopia	2000	3.68
Togo	1978	4.15	Ethiopia	2004	3.87	Chad	1997	3.68
Eritrea	2003	4.15	Lesotho	1997	3.86	Togo	1997	3.68
Congo Rep.	1984	4.14	Ghana	1989	3.86	Congo Rep.	2000	3.67
Ghana	1985	4.13	China	1982	3.85	Rwanda	2005	3.66
Botswana	1981	4.12	Botswana	1986	3.85	Swaziland	1989	3.66
Chad	2002	4.11	Congo Rep.	1994	3.85	Ghana	1992	3.66
Congo Rep.	1985	4.11	Swaziland	2000	3.84	Congo Rep.	2001	3.64
Rwanda	1976	4.11	Belize	2003	3.84	Ethiopia	1999	3.63
Botswana	1982	4.09	Rwanda	2004	3.83	Togo	1976	3.62
Congo Rep.	1986	4.08	Ethiopia	2003	3.82	Swaziland	1994	3.62
Lesotho	1987	4.06	Lesotho	2005	3.82	Lesotho	1995	3.62
Botswana	1983	4.06	Lesotho	2006	3.82	Chad	1996	3.62
Ghana	1986	4.06	Congo Rep.	1995	3.82	Lesotho	1992	3.60
Kenya	1986	4.06	Burundi	2002	3.81	Ghana	1993	3.59
Congo Rep.	1987	4.05	Kenya	1985	3.81	Lesotho	2003	3.59
Rwanda	1975	4.03	Chad	1999	3.80	Ethiopia	1998	3.58
Lesotho	1996	4.03	Ghana	1990	3.79	Lesotho	1999	3.57
Botswana	1984	4.03	Swaziland	1999	3.79	Zambia	1998	3.57
Congo Rep.	1988	4.02	Swaziland	1993	3.79	Togo	1999	3.55
China	1981	4.01	Congo Rep.	1996	3.79	Swaziland	1988	3.55
Chad	2001	4.01	Zambia	1997	3.79	Botswana	1988	3.54
Zambia	1996	4.00	Lesotho	1990	3.79	Eritrea	2002	3.54
Botswana	1985	4.00	Swaziland	1992	3.78	Lesotho	1993	3.53
Congo Rep.	1989	3.99	Swaziland	1991	3.78	Ethiopia	1997	3.53
Ghana	1987	3.99	Ethiopia	2002	3.77	China	1984	3.53
Rwanda	2003	3.99	Swaziland	1990	3.77	Ghana	1994	3.53
Lesotho	1988	3.97	Congo Rep.	1997	3.76	Swaziland	1997	3.51
Guinea	1991	3.97	Swaziland	1998	3.74	Congo Rep.	1971	3.50
Ethiopia	2006	3.97	Chad	1998	3.74	Burundi	2003	3.49
Congo Rep.	1990	3.96	Congo Rep.	1972	3.73	Ethiopia	1996	3.48
Congo Rep.	1973	3.95	Congo Rep.	1998	3.73	Lesotho	2002	3.48
Congo Rep.	1991	3.93	Ethiopia	2001	3.73	The Gambia	2004	3.47
Ghana	1988	3.93	Ghana	1991	3.73	Mozambique	2004	3.46
Ethiopia	2005	3.92	Cent. Afr.	2006	3.71	Ghana	1995	3.46

Country	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*
Swaziland	1995	3.45	Swaziland	1985	3.23	China	1990	3.06
Swaziland	2001	3.45	Botswana	1999	3.22	Ghana	2001	3.06
Swaziland	1987	3.44	Guyana	1986	3.22	Mauritania	1992	3.06
Swaziland	2003	3.44	India	1971	3.21	Thailand	1971	3.05
Congo Rep.	2002	3.44	Botswana	1998	3.21	The Gambia	1995	3.05
Togo	1998	3.43	Lesotho	1994	3.20	Burkina Faso	1996	3.05
The Gambia	2003	3.43	The Gambia	1998	3.19	Lao PDR	2001	3.05
Ghana	1996	3.39	Ghana	1999	3.19	India	1976	3.05
Botswana	1989	3.39	Swaziland	2002	3.19	Benin	1995	3.05
The Gambia	2002	3.38	Botswana	1997	3.19	Ethiopia	1994	3.04
China	1985	3.37	Burkina Faso	1995	3.19	Madagascar	2002	3.04
Lesotho	2001	3.36	China	1988	3.19	Madagascar	2005	3.03
Togo	1975	3.36	Ethiopia	1986	3.18	Zimbabwe	1994	3.03
Eritrea	2001	3.36	India	1972	3.18	Senegal	1998	3.02
Vietnam	1994	3.35	Botswana	1996	3.17	India	1977	3.01
Zambia	1999	3.35	Mali	1996	3.16	Vanuatu	2001	3.01
Ethiopia	1995	3.34	Botswana	1995	3.16	The Gambia	1994	3.01
Swaziland	1986	3.34	Mauritania	1990	3.15	Senegal	1997	3.00
Lesotho	2000	3.33	The Gambia	1997	3.15	Madagascar	2003	3.00
The Gambia	2001	3.33	India	1973	3.14	China	1991	3.00
Guyana	1985	3.33	Madagascar	2006	3.14	Ghana	2002	2.99
Burkina Faso	1994	3.33	Botswana	1994	3.14	Vietnam	1995	2.99
Botswana	2005	3.33	Zambia	2000	3.13	Mali	1997	2.99
Ghana	1997	3.33	Mauritania	1991	3.13	Guyana	1988	2.99
Mali	1995	3.32	Ghana	2000	3.13	Senegal	1996	2.99
Swaziland	2004	3.31	China	1989	3.12	Cape Verde	2002	2.99
Botswana	2004	3.31	Botswana	1993	3.12	Mauritania	1993	2.99
China	1986	3.31	Swaziland	2005	3.12	Ethiopia	1988	2.99
Botswana	2003	3.29	India	1974	3.11	Madagascar	1999	2.98
The Gambia	2000	3.29	Botswana	1992	3.11	India	1978	2.98
Swaziland	1996	3.28	Guyana	1987	3.10	Senegal	1995	2.97
Congo Rep.	1970	3.28	Burundi	2004	3.10	Zimbabwe	1995	2.97
Ethiopia	1985	3.28	The Gambia	1996	3.10	Madagascar	2004	2.97
Botswana	2002	3.28	Togo	1974	3.10	Senegal	1994	2.96
Thailand	1970	3.27	Togo	2000	3.09	Senegal	1999	2.95
Ghana	1998	3.26	Zimbabwe	1993	3.09	India	1979	2.95
Botswana	2001	3.26	Botswana	1991	3.09	Senegal	1993	2.95
China	1987	3.25	Ethiopia	1987	3.08	China	1992	2.94
India	1970	3.24	Lao PDR	1998	3.08	Nepal	1998	2.93
Botswana	2000	3.24	Samoa	2001	3.08	Senegal	1992	2.93
Botswana	1990	3.24	India	1975	3.08	Ghana	2003	2.93
The Gambia	1999	3.24	Madagascar	2001	3.08	Senegal	1991	2.92

Country	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*
India	1980	2.92	Ethiopia	1990	2.79	Jamaica	1983	2.63
Mauritania	1994	2.92	India	1984	2.79	Thailand	1973	2.63
Burkina Faso	1997	2.91	Zimbabwe	1998	2.78	India	1989	2.62
Zimbabwe	1996	2.91	Mauritius	1992	2.78	Venezuela	1991	2.62
Burundi	2005	2.90	Burkina Faso	1998	2.78	Senegal	2004	2.62
Senegal	1990	2.90	Ethiopia	1991	2.77	Nepal	2000	2.62
Ethiopia	1989	2.89	Mauritius	1987	2.77	Jamaica	1984	2.61
Senegal	1989	2.89	Guyana	1990	2.76	Kuwait	1970	2.60
Senegal	2000	2.88	Cambodia	1999	2.76	Trinidad &	1993	2.60
India	1981	2.88	Ethiopia	1992	2.76	Jamaica	1985	2.59
Guyana	1989	2.88	India	1985	2.75	Nepal	1993	2.59
Benin	1996	2.87	Senegal	2002	2.75	Venezuela	1988	2.59
Senegal	1988	2.87	Mauritius	1986	2.74	India	1990	2.59
Lao PDR	2000	2.86	Ethiopia	1993	2.74	Benin	2000	2.58
Mauritius	1990	2.86	Mauritius	1993	2.74	Jamaica	1986	2.58
Ghana	2004	2.86	Zimbabwe	2000	2.72	Tonga	2004	2.57
Senegal	1987	2.86	India	1986	2.72	Togo	1972	2.57
Zimbabwe	1975	2.86	Zimbabwe	1999	2.72	Niger	2006	2.56
India	1982	2.85	Cameroon	2006	2.71	Jamaica	1987	2.56
Zimbabwe	1976	2.85	Mauritius	1985	2.71	India	1991	2.56
Senegal	1986	2.84	Trinidad &	1990	2.71	Trinidad &	1994	2.56
Mauritania	1995	2.84	Benin	1997	2.70	Mauritania	1997	2.56
Zimbabwe	1997	2.84	Nepal	1997	2.70	Senegal	2005	2.55
Zimbabwe	1977	2.84	Mauritania	1996	2.70	Nepal	1999	2.55
Belize	2004	2.84	Venezuela	1990	2.70	Venezuela	1992	2.54
Thailand	1972	2.84	Mauritius	1994	2.69	Jamaica	1988	2.54
Zimbabwe	1978	2.83	India	1987	2.69	Cape Verde	2003	2.54
Togo	1973	2.83	Senegal	2003	2.69	Iran	1991	2.54
Mauritius	1989	2.83	Jamaica	1980	2.68	Zimbabwe	1981	2.54
Senegal	1985	2.83	Mauritius	1996	2.68	Venezuela	1987	2.54
Zimbabwe	1979	2.83	Trinidad &	1991	2.67	Benin	1998	2.53
Mali	1998	2.82	Nepal	1994	2.67	Guyana	1992	2.53
Samoa	2000	2.82	China	1993	2.67	India	1992	2.53
Zimbabwe	1980	2.82	Jamaica	1981	2.67	Jamaica	1989	2.52
India	1983	2.82	Lao PDR	1997	2.66	China	1995	2.52
Madagascar	2000	2.82	India	1988	2.66	Trinidad &	1995	2.52
Mauritius	1991	2.82	Jamaica	1982	2.65	Venezuela	1980	2.52
Senegal	2001	2.82	China	1999	2.65	Trinidad &	1999	2.51
Uganda	2004	2.82	Guyana	1991	2.65	Nepal	1995	2.51
Lao PDR	1999	2.82	Venezuela	1989	2.64	Paraguay	1990	2.51
Mauritius	1988	2.80	Burkina Faso	1999	2.64	Jamaica	1990	2.51
Ghana	2005	2.79	Trinidad &	1992	2.63	Burkina Faso	2000	2.50

Country	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*
Myanmar	1999	2.50	Vanuatu	2000	2.40	India	1997	2.25
Venezuela	1981	2.50	Benin	2001	2.40	Chile	1981	2.25
Iran	1992	2.50	India	1996	2.40	Guatemala	1981	2.25
Paraguay	1989	2.50	Guatemala	1989	2.39	Lao PDR	1996	2.24
Iran	1990	2.49	Kenya	2002	2.39	Morocco	1976	2.24
India	1993	2.49	Venezuela	1994	2.39	Venezuela	1996	2.23
Paraguay	1988	2.48	Zimbabwe	1991	2.38	Guatemala	1980	2.23
Venezuela	1986	2.48	Cote d'Ivoire	1998	2.38	Burkina Faso	2002	2.22
Venezuela	1982	2.48	Guatemala	1988	2.38	Kenya	2000	2.22
Trinidad &	1996	2.48	Cameroon	2005	2.38	Lao PDR	1993	2.21
Nepal	1996	2.47	Burkina Faso	2001	2.36	Guatemala	1979	2.21
Vietnam	1996	2.47	Guatemala	1987	2.36	Morocco	1977	2.21
Paraguay	1987	2.47	Iran	1987	2.36	Gabon	1998	2.21
Venezuela	1993	2.46	Kenya	2001	2.35	Jamaica	1993	2.20
Venezuela	1983	2.46	Paraguay	1991	2.35	Kuwait	1972	2.20
Kenya	2004	2.46	Benin	2003	2.35	Thailand	1975	2.20
Zimbabwe	1992	2.46	Myanmar	1998	2.34	Guatemala	1978	2.19
India	1994	2.46	Lao PDR	2002	2.34	Guyana	1995	2.19
Benin	1999	2.46	Guatemala	1986	2.34	Paraguay	1992	2.19
Paraguay	1986	2.46	Mauritius	1995	2.34	Myanmar	1997	2.18
Chile	1980	2.46	Lao PDR	1992	2.34	Morocco	1978	2.18
Iran	1989	2.45	Guatemala	1985	2.32	Guatemala	1977	2.17
Guatemala	1992	2.45	Comoros	1998	2.32	Mauritius	1998	2.17
Paraguay	1985	2.45	China	1996	2.31	Qatar	1975	2.16
Venezuela	1984	2.45	Iran	1986	2.31	Kuwait	2006	2.16
Trinidad &	1997	2.44	Venezuela	1995	2.31	Guatemala	1976	2.16
Guatemala	1991	2.43	Cambodia	2000	2.31	Kuwait	2005	2.16
Venezuela	1985	2.43	Jamaica	1992	2.30	Morocco	1979	2.15
India	1995	2.43	Guyana	1994	2.30	Venezuela	1997	2.15
Kenya	2003	2.43	Togo	1971	2.30	Cyprus	1975	2.15
Mauritius	1997	2.42	Guatemala	1984	2.30	Thailand	1976	2.14
China	1994	2.42	China	1997	2.30	Guatemala	1975	2.14
Guyana	1993	2.42	China	1998	2.29	Morocco	1980	2.13
Thailand	1974	2.41	Guatemala	1983	2.28	Mauritania	2000	2.12
Guatemala	1990	2.41	Benin	2002	2.28	Cameroon	1998	2.12
Mauritania	1998	2.41	Zimbabwe	1990	2.28	Paraguay	1996	2.12
Benin	2004	2.41	Mauritania	1999	2.27	Guatemala	1974	2.12
Jamaica	1991	2.41	Armenia	2001	2.27	Colombia	1980	2.12
Trinidad &	1998	2.40	Guatemala	1982	2.27	India	1998	2.11
Iran	1993	2.40	Morocco	1975	2.26	Trinidad &	2000	2.11
Iran	1988	2.40	Iran	1985	2.26	Zimbabwe	1989	2.10
Kuwait	1971	2.40	Zimbabwe	1982	2.26	Jamaica	1994	2.10

Country	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*
Guatemala	1973	2.10	Mexico	1988	1.98	Colombia	1984	1.88
Morocco	1981	2.10	Macao, China	2000	1.98	Malaysia	2000	1.87
Paraguay	1995	2.09	Mauritania	2001	1.98	Bangladesh	2005	1.87
Thailand	1977	2.09	Thailand	1979	1.98	Myanmar	1995	1.87
Burkina Faso	2003	2.09	India	1999	1.97	Malaysia	1995	1.87
Lao PDR	1994	2.09	Zimbabwe	1983	1.97	Kuwait	1990	1.87
Mexico	1985	2.08	Kuwait	2002	1.97	Kuwait	2000	1.86
Cameroon	1999	2.08	Mexico	1983	1.97	Namibia	2006	1.86
Guatemala	1972	2.08	Cameroon	2002	1.96	Mexico	1981	1.85
Malaysia	1993	2.08	Morocco	1986	1.96	Cambodia	2001	1.85
Guyana	1996	2.07	Namibia	1998	1.96	Morocco	1990	1.85
Venezuela	1998	2.07	Guyana	1997	1.96	Guyana	1998	1.85
Kuwait	2004	2.07	Lao PDR	1995	1.96	Venezuela	2001	1.84
Morocco	1982	2.07	Paraguay	1997	1.96	Chile	1983	1.84
Guatemala	1971	2.06	Malaysia	1997	1.95	Namibia	1999	1.83
Colombia	1981	2.06	Mexico	1989	1.95	Mauritania	2002	1.83
Kuwait	2003	2.06	Burkina Faso	2004	1.95	India	2000	1.83
Paraguay	1994	2.06	Cyprus	1976	1.94	India	2001	1.83
Kuwait	1991	2.05	Colombia	1983	1.94	Mexico	1991	1.83
Mexico	1986	2.05	Kuwait	1992	1.94	India	2002	1.83
Guatemala	1970	2.05	Morocco	1987	1.93	Morocco	1991	1.82
Chile	1982	2.05	Zimbabwe	1988	1.93	India	2003	1.82
Morocco	1983	2.04	Malaysia	1994	1.93	Morocco	2000	1.82
Cameroon	2000	2.04	Cameroon	2003	1.92	Kuwait	1993	1.82
Togo	1970	2.04	Mauritius	1999	1.92	Thailand	1981	1.82
Malaysia	1999	2.04	Malaysia	1992	1.92	Colombia	1985	1.82
Thailand	1978	2.03	Thailand	1980	1.92	Bangladesh	2004	1.81
Burkina Faso	2006	2.03	Venezuela	2000	1.92	Bangladesh	1998	1.81
Mexico	1984	2.03	Mexico	1990	1.92	Burkina Faso	2005	1.81
Myanmar	1996	2.03	Kuwait	2001	1.91	Kuwait	1974	1.81
Paraguay	1993	2.03	Cape Verde	2004	1.91	Kuwait	1999	1.81
Nepal	2001	2.02	Mexico	1982	1.91	Jamaica	1997	1.80
Mexico	1987	2.02	Malaysia	1996	1.91	Cuba	1996	1.80
Guatemala	1993	2.02	Morocco	1988	1.91	Morocco	1992	1.80
Morocco	1984	2.02	Malaysia	2001	1.90	Mexico	1980	1.80
Kuwait	1973	2.01	Lao PDR	2003	1.90	Namibia	2005	1.79
Cameroon	2001	2.00	Jamaica	1996	1.90	Paraguay	1998	1.79
Jamaica	1995	2.00	India	2005	1.89	Costa Rica	1991	1.77
Colombia	1982	2.00	India	2004	1.89	Morocco	1993	1.77
Venezuela	1999	2.00	Cameroon	2004	1.89	Venezuela	2002	1.76
Malaysia	1998	1.99	Nepal	2002	1.88	Brazil	1999	1.76
Morocco	1985	1.99	Morocco	1989	1.88	Colombia	1986	1.76

Country	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*
Zimbabwe	1987	1.76	Costa Rica	1992	1.64	Guatemala	1999	1.53
Kuwait	1998	1.75	Guatemala	1995	1.63	Mexico	1997	1.52
Nepal	2003	1.75	Chile	1984	1.63	Israel	1980	1.52
Mexico	1992	1.74	Morocco	1998	1.63	Mexico	1998	1.52
Morocco	1994	1.74	Tunisia	2000	1.63	Colombia	1990	1.52
Cyprus	1977	1.74	Paraguay	1999	1.63	Brazil	2001	1.51
Cuba	1995	1.73	Jamaica	2000	1.63	Brazil	2002	1.51
Guyana	1999	1.73	Bangladesh	2002	1.63	Costa Rica	1994	1.51
Namibia	2004	1.73	Malaysia	2002	1.63	Morocco	2004	1.51
Morocco	2001	1.73	Thailand	1983	1.62	Guyana	2001	1.50
Morocco	1999	1.73	Guyana	2000	1.62	U.A.E.	2001	1.50
Thailand	1982	1.72	Malaysia	2003	1.62	Guatemala	2000	1.50
Trinidad &	2001	1.71	Kuwait	1975	1.61	Hong Kong	2004	1.50
Tunisia	1999	1.71	Guatemala	1996	1.61	Kuwait	1988	1.49
Morocco	1995	1.71	Venezuela	2004	1.61	Jamaica	2002	1.49
Myanmar	1994	1.71	Cuba	1997	1.60	Tunisia	2001	1.48
Namibia	2000	1.71	Jamaica	1999	1.60	Dominican	1985	1.48
Kuwait	1994	1.71	Kuwait	1995	1.59	Kuwait	1977	1.47
Kuwait	1997	1.70	Bolivia	1996	1.59	Guatemala	2001	1.47
Jamaica	1998	1.70	Malaysia	2004	1.59	Paraguay	2000	1.47
Colombia	1987	1.70	Namibia	2001	1.58	Lao PDR	2004	1.46
Zimbabwe	1984	1.69	Zimbabwe	1986	1.58	Namibia	2002	1.46
Mauritius	2002	1.69	Guatemala	1997	1.58	Colombia	1991	1.46
Mauritania	2003	1.69	Iran	1994	1.58	Israel	1981	1.46
Morocco	1996	1.69	Colombia	1989	1.58	South Africa	1998	1.45
Venezuela	2003	1.68	Cuba	1994	1.57	Venezuela	2006	1.45
Kuwait	1989	1.68	Costa Rica	1993	1.57	Costa Rica	1995	1.44
Macao, China	2001	1.68	Morocco	2003	1.57	Ukraine	2001	1.44
Guatemala	1994	1.67	Ukraine	2000	1.56	Guatemala	2002	1.44
Mauritius	2000	1.67	Guatemala	1998	1.55	Thailand	1985	1.43
El Salvador	1998	1.67	Mexico	1993	1.55	Chile	1985	1.43
Namibia	2003	1.67	Albania	2002	1.55	Mauritius	2001	1.42
Bangladesh	2000	1.66	Mauritania	2004	1.55	Hong Kong	2006	1.42
Bangladesh	1999	1.66	Mexico	1994	1.55	Bolivia	1997	1.42
Jamaica	2001	1.66	Kuwait	1976	1.54	South Africa	1999	1.42
Morocco	1997	1.66	Malta	2001	1.54	Guatemala	2003	1.42
U.A.E.	2000	1.66	Mexico	1995	1.54	U.A.E.	2002	1.41
Morocco	2002	1.65	Mexico	1996	1.53	Zimbabwe	1985	1.41
Brazil	2000	1.65	Cyprus	1978	1.53	Cape Verde	2006	1.41
Bangladesh	2001	1.65	Hong Kong	2003	1.53	Cuba	1998	1.41
Kuwait	1996	1.64	Venezuela	2005	1.53	Hong Kong	2005	1.41
Colombia	1988	1.64	Thailand	1984	1.53	Kuwait	1978	1.41

Country	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*
Tunisia	2002	1.40	Fiji	2004	1.28	Cuba	2001	1.13
Morocco	2005	1.40	Colombia	1994	1.28	Kuwait	1982	1.13
Mauritania	2005	1.40	Guyana	2003	1.27	Oman	1997	1.12
Colombia	1992	1.40	Kuwait	1980	1.27	Thailand	1998	1.12
Chile	1986	1.39	Macedonia,	1994	1.26	Cyprus	1980	1.12
Bangladesh	2003	1.39	Chile	1990	1.26	Kuwait	1986	1.11
Israel	1982	1.39	Israel	1984	1.26	Uruguay	1980	1.11
Guyana	2002	1.39	South Africa	2005	1.25	Peru	2001	1.11
Guatemala	2004	1.39	Costa Rica	1998	1.25	Barbados	2001	1.10
Costa Rica	1996	1.38	Bolivia	1998	1.25	Andorra	2006	1.10
South Africa	2000	1.38	Mexico	2002	1.24	Uruguay	1981	1.10
Macao, China	2002	1.38	South Africa	2004	1.23	Barbados	2000	1.10
Guatemala	2005	1.36	Thailand	1987	1.23	Peru	2000	1.10
Chile	1987	1.36	Iran	2002	1.23	Uruguay	2003	1.10
Papua N.	1998	1.36	Chile	1991	1.23	Israel	1987	1.10
Mexico	1999	1.35	Mauritius	2004	1.23	Colombia	1997	1.09
Romania	2001	1.35	Peru	1996	1.22	Uruguay	1982	1.09
Cyprus	2000	1.34	Oman	1996	1.22	Peru	1999	1.09
Bolivia	2000	1.34	Brazil	2003	1.22	Uruguay	1983	1.09
Iran	2001	1.34	Tajikistan	2002	1.22	Peru	1998	1.08
Kuwait	1979	1.34	Tunisia	2003	1.22	Panama	1999	1.08
Colombia	1993	1.34	Colombia	1995	1.22	Bulgaria	1980	1.08
Guatemala	2006	1.33	Cuba	1999	1.21	Uruguay	1984	1.08
South Africa	2001	1.33	Cuba	2000	1.21	Panama	2003	1.08
Thailand	1986	1.33	Kuwait	1981	1.20	Bolivia	1999	1.07
Cyprus	1979	1.33	Israel	1985	1.19	Peru	1995	1.07
Chile	1988	1.33	Ukraine	1999	1.19	Uruguay	1985	1.07
Israel	1983	1.32	Costa Rica	1999	1.19	Cyprus	1999	1.06
South Africa	2003	1.32	Romania	2000	1.17	Ukraine	2003	1.06
Bolivia	2001	1.32	Mexico	2000	1.16	Mauritius	2006	1.06
Costa Rica	2000	1.32	Guyana	2004	1.16	Kuwait	1983	1.06
South Africa	2002	1.32	Colombia	1996	1.15	Iran	2003	1.06
Costa Rica	1997	1.32	Peru	1997	1.15	Uruguay	1986	1.06
Mauritius	2003	1.31	Kyrgyz Rep.	2000	1.15	Jamaica	2003	1.06
Malta	2002	1.31	Israel	1986	1.14	Iran	2000	1.06
Ukraine	2002	1.30	Marshall	2002	1.14	Uruguay	1987	1.05
Kuwait	1987	1.30	El Salvador	1997	1.14	Bulgaria	1981	1.05
Cape Verde	2005	1.30	Costa Rica	2002	1.14	Chile	1992	1.05
Tunisia	2004	1.30	Panama	2002	1.14	Mexico	2003	1.05
Chile	1989	1.29	Mauritius	2005	1.14	Israel	1988	1.05
U.A.E.	2003	1.29	Costa Rica	2001	1.14	Bolivia	2002	1.05
Paraguay	2001	1.29	Thailand	1988	1.13	Uruguay	1988	1.04

Country	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*
Uruguay	1989	1.04	Costa Rica	2003	0.95	Slovenia	1991	0.79
Thailand	1989	1.04	Thailand	1997	0.94	Lebanon	2005	0.79
Cyprus	1981	1.03	Thailand	1990	0.94	Peru	2002	0.79
Colombia	1998	1.03	Bulgaria	1985	0.94	Aruba	2000	0.79
Cyprus	1998	1.03	Brazil	2004	0.94	Iran	2006	0.79
Uruguay	1990	1.03	Kuwait	1985	0.93	Cyprus	2001	0.79
Oman	1998	1.02	Aruba	2002	0.93	Andorra	2004	0.78
Bulgaria	1982	1.02	Oman	1999	0.92	Guyana	2005	0.78
Uruguay	1991	1.02	Iran	2004	0.92	Cyprus	1984	0.77
Lao PDR	2005	1.02	Peru	1994	0.92	Iran	1999	0.77
Mexico	2004	1.02	Colombia	2000	0.91	Peru	1993	0.77
Malta	2003	1.02	Thailand	1999	0.91	Thailand	1996	0.76
Chile	1993	1.01	Aruba	2003	0.91	Uruguay	2005	0.76
Mexico	2005	1.01	Chile	1994	0.91	Paraguay	2004	0.76
Kyrgyz Rep.	2002	1.01	Israel	1991	0.90	Uruguay	2006	0.75
Uruguay	1992	1.01	Kyrgyz Rep.	2001	0.90	Iran	1995	0.75
Panama	2004	1.01	Aruba	2004	0.90	Costa Rica	2004	0.75
Panama	2001	1.01	Uruguay	2002	0.88	Chile	1995	0.75
Uruguay	1993	1.00	Paraguay	2003	0.87	Uruguay	2001	0.74
Israel	1989	1.00	Cuba	2003	0.87	Thailand	1992	0.74
Kuwait	1984	1.00	Israel	1992	0.86	Aruba	2005	0.74
Uruguay	1994	0.99	Cyprus	1983	0.86	Azerbaijan	2000	0.73
Bulgaria	1983	0.99	Iran	2005	0.86	Israel	1993	0.72
Aruba	2001	0.99	El Salvador	1999	0.85	Oman	2001	0.72
Romania	1999	0.99	Colombia	2001	0.85	Malta	2004	0.72
Ukraine	2004	0.99	Uruguay	2000	0.84	Oman	1995	0.71
Uruguay	1995	0.99	Slovenia	1992	0.84	Thailand	2000	0.70
Tunisia	2005	0.98	Thailand	1991	0.84	Belarus	2006	0.70
Romania	2002	0.98	Ukraine	2005	0.83	Belarus	2004	0.70
Uruguay	1996	0.98	Paraguay	2002	0.83	Bulgaria	1987	0.70
Uruguay	2004	0.97	Slovenia	1994	0.83	Belarus	2005	0.69
Colombia	1999	0.97	Oman	2000	0.82	Cyprus	1985	0.69
Mexico	2001	0.97	Jordan	1999	0.82	Ukraine	2006	0.68
Macao, China	2003	0.97	Panama	2000	0.82	Thailand	2001	0.66
Cuba	2002	0.97	Bulgaria	1986	0.82	Slovenia	1993	0.66
Uruguay	1997	0.97	Romania	1998	0.81	Andorra	2005	0.65
Bulgaria	1984	0.97	Ukraine	1998	0.81	Tajikistan	2003	0.65
Cyprus	2003	0.96	Cyprus	1997	0.81	Azerbaijan	2001	0.65
Uruguay	1998	0.96	Romania	2004	0.80	Thailand	1995	0.65
Uruguay	1999	0.95	Cyprus	2002	0.80	Romania	2003	0.65
Israel	1990	0.95	Bolivia	2003	0.80	Argentina	1998	0.64
Cyprus	1982	0.95	Romania	2005	0.79	Thailand	1993	0.64

Country	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*
Chile	1996	0.64	Peru	1991	0.46	Peru	1990	0.31
Romania	1997	0.63	Bulgaria	1989	0.46	Peru	2005	0.30
Oman	2002	0.62	Chile	1999	0.46	Israel	2001	0.30
El Salvador	2005	0.62	Romania	1996	0.46	Estonia	2001	0.30
El Salvador	1996	0.61	Cuba	2004	0.45	Estonia	2000	0.30
Peru	1992	0.61	Romania	1992	0.45	Estonia	1999	0.30
Peru	2003	0.61	Croatia	2003	0.44	Philippines	2004	0.30
Chile	1997	0.61	Cyprus	1987	0.44	Chile	2000	0.30
Slovenia	1995	0.61	Romania	1995	0.44	Philippines	2005	0.29
Thailand	2002	0.61	Israel	1997	0.44	Lithuania	2004	0.29
Palau	2001	0.60	Ukraine	1997	0.43	Israel	2003	0.27
Cyprus	1996	0.59	Slovenia	1997	0.43	Tajikistan	2004	0.27
Israel	1994	0.59	Cyprus	1993	0.43	Philippines	2002	0.27
Cyprus	1992	0.59	Romania	1994	0.42	Colombia	2004	0.26
Chile	1998	0.58	Colombia	2003	0.41	Latvia	1999	0.26
Azerbaijan	2002	0.58	Peru	2006	0.41	Mongolia	2003	0.25
Bulgaria	1988	0.58	Bulgaria	2004	0.41	Slovenia	1999	0.24
Cyprus	1986	0.56	Israel	2000	0.40	Colombia	2005	0.23
Colombia	2002	0.56	Romania	1993	0.40	Estonia	2002	0.23
Thailand	2003	0.55	Bulgaria	2003	0.40	Croatia	2005	0.21
Thailand	1994	0.54	Israel	1999	0.40	Iran	1997	0.21
Estonia	1998	0.54	Cyprus	2004	0.40	Chile	2001	0.21
Peru	2004	0.54	Cyprus	1994	0.39	Lithuania	2002	0.20
Israel	1995	0.54	El Salvador	2004	0.39	Bulgaria	1993	0.19
Azerbaijan	2006	0.54	Romania	1991	0.39	Chile	2004	0.19
Belarus	2003	0.52	Israel	1998	0.38	Cyprus	1989	0.19
Slovenia	1996	0.52	Latvia	1998	0.38	Philippines	2003	0.18
Azerbaijan	2003	0.52	Colombia	2006	0.38	Cyprus	1991	0.18
Croatia	2002	0.51	Cyprus	1995	0.37	Philippines	2000	0.18
El Salvador	2006	0.51	Argentina	2000	0.36	Argentina	2002	0.18
Azerbaijan	2004	0.50	Oman	2004	0.36	Belarus	2001	0.17
Philippines	1995	0.49	Lithuania	2003	0.36	Philippines	2001	0.17
Thailand	2004	0.49	Argentina	1999	0.35	El Salvador	2003	0.16
Philippines	1996	0.49	Belarus	2002	0.35	Croatia	2006	0.16
Oman	2003	0.49	Bulgaria	1990	0.34	Peru	1989	0.15
Azerbaijan	2005	0.49	Slovenia	1998	0.34	Slovenia	2000	0.15
Iran	1998	0.49	Philippines	1999	0.33	Israel	2002	0.15
Philippines	1997	0.49	Bulgaria	1991	0.33	Bulgaria	2002	0.15
Philippines	1998	0.49	Romania	1990	0.33	Bulgaria	2001	0.15
Israel	1996	0.49	Croatia	2004	0.33	Argentina	2001	0.14
Tajikistan	2005	0.48	Cuba	2005	0.32	Estonia	2003	0.14
Mongolia	2004	0.47	Cyprus	1988	0.31	Latvia	2000	0.14

Country	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*	*Country*	*Year*	*TerTilt*
Israel	2004	0.14	Oman	2005	-0.08	Peru	1985	-0.46
Bulgaria	1992	0.13	Slovenia	2002	-0.09	Kazakhstan	2004	-0.48
Lithuania	2005	0.13	Slovenia	2005	-0.10	Latvia	2004	-0.51
Chile	2002	0.12	Lithuania	2000	-0.11	Ukraine	1992	-0.52
El Salvador	1995	0.09	Peru	1972	-0.12	South Korea	1988	-0.54
Bulgaria	2000	0.08	Slovenia	2003	-0.13	Belarus	1997	-0.54
El Salvador	2002	0.07	Peru	1987	-0.15	Kazakhstan	2005	-0.56
Cyprus	1990	0.07	Latvia	2002	-0.16	Bulgaria	1996	-0.57
Slovenia	2001	0.06	Belarus	1999	-0.19	Azerbaijan	1997	-0.57
Peru	1970	0.06	Peru	1973	-0.21	South Korea	1989	-0.63
Ukraine	1996	0.06	South Korea	1985	-0.25	Bulgaria	1995	-0.67
Chile	2006	0.06	Lithuania	1999	-0.26	South Korea	2003	-0.69
El Salvador	2001	0.05	Kazakhstan	2003	-0.27	Ukraine	1994	-0.70
Lithuania	2001	0.05	Azerbaijan	1995	-0.29	Belarus	1996	-0.72
Bulgaria	1994	0.04	Peru	1974	-0.29	Azerbaijan	1998	-0.72
Mongolia	2002	0.04	Peru	1986	-0.31	South Korea	1990	-0.73
Argentina	2004	0.04	Bulgaria	1997	-0.31	South Korea	2004	-0.76
El Salvador	2000	0.04	Ukraine	1995	-0.32	Belarus	1992	-0.79
Ukraine	1991	0.02	South Korea	1986	-0.35	South Korea	1991	-0.81
Cuba	2006	0.02	Latvia	2003	-0.35	South Korea	1993	-0.88
Bulgaria	1999	0.02	Belarus	1998	-0.36	Belarus	1993	-0.89
Bulgaria	2005	0.01	Belarus	1991	-0.37	Belarus	1995	-0.89
Azerbaijan	1999	0.01	Peru	1980	-0.37	South Korea	1992	-0.94
Peru	1988	0.00	Peru	1979	-0.38	South Korea	1994	-1.04
Chile	2003	0.00	Peru	1978	-0.38	Belarus	1994	-1.05
Slovenia	2004	0.00	Peru	1977	-0.38	Ukraine	1993	-1.07
Latvia	2001	-0.01	Peru	1976	-0.38	South Korea	1995	-1.15
Belarus	2000	-0.01	Peru	1975	-0.38	South Korea	1996	-1.15
Peru	1971	-0.03	Peru	1981	-0.39	South Korea	1997	-1.16
Chile	2005	-0.03	Peru	1982	-0.41	South Korea	1998	-1.16
Bulgaria	1998	-0.05	Lithuania	1998	-0.42	South Korea	1999	-1.17
Argentina	2003	-0.05	Peru	1983	-0.42	South Korea	2000	-1.17
Estonia	2004	-0.05	Azerbaijan	1996	-0.43	South Korea	2001	-1.18
Kazakhstan	2002	-0.05	South Korea	1987	-0.44	South Korea	2002	-1.18
Iran	1996	-0.08	Peru	1984	-0.44			