

Crossing the Threshold

An Analysis of IBRD Graduation Policy

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Abstract

According to World Bank policy, countries remain eligible to borrow from the International Bank for Reconstruction and Development until they are able to sustain long-term development without further recourse to Bank financing. Graduation from the Bank is not an automatic consequence of reaching a particular income level, but rather is supposed to be based on a determination of whether the country has reached a level of institutional development and capital-market access that enables it to sustain its own development process without recourse to Bank funding. This paper assesses how International Bank for Reconstruction and Development graduation policy operates in practice, investigating what income and non-income factors appear to have influenced graduation decisions in recent decades, based on panel data for 1982 through 2008. Explanatory variables include the per-capita income

of the country, as well as measures of institutional development and market access that are cited as criteria by the graduation policy, and other plausible explanatory variables that capture the levels of economic development and vulnerability of the country. The authors find that the observed correlates of Bank graduation are generally consistent with the stated policy. Countries that are wealthier, more creditworthy, more institutionally developed, and less vulnerable to shocks are more likely to have graduated. Predicted probabilities generated by the model correspond closely to the actual graduation and de-graduation experiences of most countries (such as Korea and Trinidad and Tobago), and suggest that Hungary and Latvia may have graduated prematurely—a prediction consistent with their subsequent return to borrowing from the Bank in the wake of the global financial crisis.

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**Crossing the Threshold:
An Analysis of IBRD Graduation Policy**

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Introduction

This paper investigates how income and non-income factors affect graduation from the IBRD (International Bank for Reconstruction and Development). While the Bank does have an income threshold for IBRD borrowing, there is no automatic graduation rule linked to per-capita income of the borrowing country. According to World Bank policy, countries remain eligible to borrow from the IBRD until they are able to sustain long-term development without further recourse to Bank financing and until they have reached a sufficiently advanced level of development. The income threshold (currently \$6725) is simply a trigger for the beginning of discussions on graduation, which then look beyond the income proxy to assess whether the country meets the criteria for graduation. In contrast, eligibility for the World Bank's concessional lending through IDA (International Development Association) is more tightly linked to per capita income, and with a few exceptions ends when a country exceeds a certain threshold (currently \$1165).

This paper assesses how IBRD graduation policy has operated in practice, by investigating what income and non-income factors appear to have influenced graduation decisions over the past three decades. It does so through panel estimation for 1982 through 2008 on the graduation status of countries that were above the IBRD income threshold in those years.¹ Explanatory variables include the per-capita income of the country, as well as measures of institutional development and market access that are cited as criteria by the graduation policy, and other plausible explanatory variables that capture the levels of economic development and vulnerability of the country. We also supplement the graduation analysis with an analysis of the correlates of levels of IBRD borrowing of the non-graduates.

We find that, as expected, per-capita income is an important predictor of graduation: each standard-deviation increase in log income increases the likelihood of graduating by about 4 percentage points. Thus even though all the countries in the sample are above the IBRD threshold, the greater the amount by which a country's income exceeds the threshold, the greater the probability of graduation. But in addition, after controlling for income, advances in the institutional development cited in the graduation policy are significant predictors of graduation. Institutional development (as measured by indicators from the International Country Risk Guide and Freedom House) increases the probability of graduation. A standard-deviation increase in either index increases the likelihood of graduating by about 2 percentage points. Beyond these explicit criteria, we find other significant explanatory variables for graduation that are likely picking up other aspects of institutional development and ability to sustain development, including measures of the economy's vulnerability. These results are broadly consistent with the stated policy.

With a relatively few variables, our graduation model is able to predict correctly the IBRD graduation status of a country in a high percentage of cases. Predicted probabilities generated by the model conform closely to the actual graduation and de-graduation experiences of Korea and Trinidad and Tobago, among others, and suggest that Hungary and Latvia may have graduated

¹ No country below the threshold has graduated from IBRD borrower status, which is why we restricted the estimation to that sample.

prematurely – a prediction subsequently borne out by large recent loans to those countries intended to mitigate the impact of the global financial crisis.

To supplement the graduation analysis, we also analyze the possible determinants of the level of IBRD borrowing. These results are largely consistent with the graduation results: higher incomes are associated with lower levels of borrowing, as are (though less robustly) institutional development and better credit ratings. These results suggest that the path to graduation is evolutionary rather than abrupt: the same factors that gradually reduce a country’s demand for IBRD loans also eventually lead it to graduate.

Background

“Graduation” refers to the Bank’s formal determination that a country has attained a certain level of development that renders it ineligible for new IBRD borrowing. It reflects the achievements of a country in reaching a certain level of development, management capacity, and access to capital markets. The legal cornerstone for graduation is Article III, Section 4 (ii) of the IBRD’s Articles of Agreement.² It states that the Bank may guarantee or make loans if it is satisfied that, in the prevailing market conditions, a borrower would be otherwise unable to obtain the loan under reasonable conditions. The other provision relevant to graduation is Article 1 (ii), which states that Bank financing supplements private investment when private capital is not available on reasonable terms.

The graduation process has evolved over time. A graduation threshold based on a country’s per-capita income was first proposed in 1973, by which point 13 member countries had already permanently ceased borrowing from IBRD. The threshold value of gross national income (GNI—referred to as GNP at the time) per capita, was set at \$1,000 measured in 1970 prices, with provisions for annual adjustments to reflect changes in prices and exchange rates. The Executive Directors approved a more comprehensive policy on graduation in 1982, with a clarification issued in 1984 (Shihata 2000). The policy identifies two key factors on which to base the graduation decision:

- A country’s level of development and overall economic situation
- A country’s capacity to sustain long-term development without further recourse to the Bank’s financial resources

Two substantive criteria underlie assessments of these conditions:

- A country’s ability to access external capital markets on reasonable terms
- A country’s progress in establishing key institutions for economic and social development

GNI per capita is clearly correlated with these hard-to-measure criteria for graduation. The 1982 policy maintained use of the GNI per-capita threshold—updated to account for global inflation—as the benchmark for initiating an assessment of graduation by management. According

² The Articles can be found at <http://go.worldbank.org/WAUZA5KF90>.

to the 1984 clarification, GNI (GNP) per capita is to be used as an indicator that a country has reached a level of development where it can sustain its development process without Bank lending. However, the 1984 Board statement also clarifies that a country's attainment of the prescribed GNI benchmark does not automatically imply that it must graduate. Rather, it is merely a milestone for Bank management to begin reviewing the country's development, its overall economic situation, and capacity to sustain a long-term development program. Graduation is to take place only when the country has met the conditions and substantive factors listed above (Shihata 2000).

This paper takes a positive approach to understanding graduation from IBRD—"positive" in the sense of describing actual behavior, as opposed to a normative approach that specifies how the graduation policy *should* operate. Our approach is analogous to the positive analyses of government, which does not assume that government acts as a welfare-maximizing social planner, but instead analyzes how governments actually perform and what appears to motivate their behavior. In this case, the object is not to assess the merits of the official graduation policy of the Bank, but to analyze how it has been applied in practice.

The current policy on graduation is highly flexible, in part because it is widely recognized that the income threshold is an imperfect proxy for the two criteria of access to capital markets and adequate institutions. A flexible policy does not necessarily imply an inconsistent or non-transparent policy, however. It should be possible to identify a limited set of indicators of institutional development that—together with per-capita income—can explain past decisions on graduation and on pre-graduation IBRD borrowing. The goal is to make observable these unobservable institutional factors that influence decisions on the continued need for engagement as IBRD borrowers.

An alternative would be to survey Bank governors, senior Bank management, and senior government officials about the criteria that went into their decision-making about the timing of graduation. For example, they could be asked whether they regarded the Atlas-based IBRD income threshold as an adequate measure of a country's development progress, whether they took into account some other income measure (such as PPP-based measures), and how non-income factors entered into the graduation decision. That approach has merit too, but our approach here has three advantages over it. First, the decision-makers' stated criteria may not match up directly with the criteria actually used. Given that there is no explicit formula, the process of graduation may have been approached more as an art than as a science, once a country has already met the objective criterion of the per-capita income threshold, and that process may be hard to describe precisely. Second, this empirical methodology allows us to cover nearly three decades of graduation decisions, whereas an interview approach might not allow the same coverage. Third, different actors in the graduation decision-making presumably had different criteria, or at least applied them differently, and it would be hard to know how to aggregate the interview responses. By identifying the factors correlated with actual graduation, we are in effect using a revealed-preference approach to graduation that shows in practice how the preferences and views of the various actors—most notably, the Bank and the officials of the graduating country—were aggregated.

Data and hypotheses

Table 1 presents the list of the 25 countries that have graduated from the Bank since 1970. Six of these nations subsequently “de-graduated” or borrowed again. The goal of this section is to identify the factors that help explain whether and when a country graduates from the IBRD.

As noted above, discussion of graduation is not initiated until a country crosses the IBRD income threshold. We therefore limit our sample to only those nations whose income at the time exceeded the threshold level. As a result, our annual data results in an unbalanced sample, because not every country that exceeded the threshold in a given year exceeded it in all years. The panel is further unbalanced due to some missing data.

Graduation reflects the ability of a country to reach a certain level of development, institutional capacity, and access to capital markets. Since income is obviously a proxy for these factors—as reflected in the threshold trigger—wealthier nations should be more likely to graduate. The IBRD threshold is measured in current-dollar GNI per capita, so we take (the log of) the amount by which each country in the sample exceeds the threshold.

The criterion of “progress in developing key institutions of economic and social development” is not given an explicit and detailed definition within the graduation policy. There are references to “management capacity” and, more narrowly, to “economic management capacity” (Shihata 2000). A reasonably good proxy for this concept is the “quality of the bureaucracy” indicator from International Country Risk Guide (ICRG).³

In the last 20 years, institutional accounts of economic development have broadened, as recognized in many World Bank reports (World Bank 2001; 2006). World Bank (2006) provides a three-way classification of institutions for development: Bureaucratic Capability, Provision of Public Services (including regulation of firms and resolution of disputes), and National Checks-and-Balances Institutions. The ICRG provides two additional indicators – on adherence to the “rule of law,” and extent of “corruption in government” – that, along with “quality of the bureaucracy,” proxy reasonably well for this broadened view of institutions for development. Countries are rated on a 0-6 scale by ICRG on each of these three indicators, with higher values representing institutions more favorable to development. We take the sum of the three ICRG variables as a composite indicator of *Institutional Capacity*.

Empirical studies provide evidence that countries with higher ratings on these and similar indicators are associated with higher levels of investment and growth (Acemoglu, Johnson, and Robinson 2001; Knack and Keefer 1995). Part of this statistical association may be due to reverse causation from strong economic performance to more positive assessments of institutional capability (for example, Glaeser, La Porta, Lopez-de-Silanes, and Shleifer 2004). This question is not

³ Similar indicators are available from the Economic Intelligence Unit (EIU) and other sources, but only the ICRG covers a large sample of countries going back to the early and mid-1980s. The World Bank’s Country Policy and Institutional Assessments (CPIA) include several relevant indicators, but beginning only in the late 1990s, and only for countries that have not graduated. They therefore cannot be used for explaining differences between graduates and non-graduates. Moreover, the CPIA ratings are publicly available only for IDA-eligible countries, and only from 2005 onward.

central in the context of graduation decisions, however, as all candidates for graduation have relatively high incomes already. What matters instead is their “capacity to *sustain* a long term development program” [emphasis added] as reflected in part by “the extent of progress in establishing key institutions for economic and social development” (Shihata 2000: 496).

A more cautious approach toward graduation is thus warranted for countries where this sustainability is in question – that is, where the country has a higher likelihood of falling back below the income threshold. Relevant institutional indicators then are those associated with lower volatility in income levels and growth rates (Mobarak 2005; Quinn and Woolley 2001; Rodrik 1999).

Rodrik (1999) emphasizes “institutions of conflict management” that he argues are particularly important following adverse shocks that often trigger distributional conflicts. Institutions of conflict management are those that “adjudicate distributional contests within a framework of rules and accepted procedures,” including “an independent and effective judiciary” and “an honest and non-corrupt bureaucracy.” A stronger rule of law restricts the potential scope of redistribution, reducing the incentive and ability of social groups to make “opportunistic grabs” in countries with latent social conflicts. As empirical proxies, Rodrik uses the ICRG indicators described above, as well as indicators of civil liberties and political freedoms produced by Freedom House, arguing that:

Democratic institutions—political parties, elected representatives, free speech, and the like—can be viewed as the ultimate institutions of conflict management, in that they allow for differences among social groups to be resolved in a predictable, inclusive, and participatory manner (p. 395).

Quinn and Woolley (2001) provide strong empirical evidence that democracies experience much less volatility in income growth than non-democracies, although average income growth is similar in the two groups.⁴ Their explanation is somewhat different from Rodrik’s. They argue that voters are risk-averse, and show that voters reward incumbent governments only modestly for growth, but penalize them severely for volatility. This explanation is consistent with research by Sen and Dreze (1989), attributing India’s ability to avoid major famines (during a period when its average economic performance was weak) to its democratic institutions, including a free media. Mobarak (2005) provides additional supporting evidence, showing that democracy causes reduced volatility rather than the other way around. He argues that if policy makers “unilaterally set policies, the variance of policies and outcomes will generally be higher than if policies are chosen through consensus” by democratic procedures. As noted by Henisz (2004) and others, checks on executive power tend to increase the stability of economic policy.

We therefore use *Political Freedoms* as a second indicator of institutional development. Following Rodrik (1999), Mobarak (2005), and others, we base this indicator on the Freedom House measures of Civil Liberties and Political Rights. The Civil Liberties index captures freedom of

⁴ Many cross-country time-series studies (for example, Burkhart and Lewis-Beck 1994) conclude that the link between democracy and high per capita income is explained mostly by causation from income to democracy. Acemoglu, Johnson, Robinson, and Yared (2008) conclude from their analysis that there is no causal link between income and democracy, but that both are determined jointly by longer-run historical factors.

expression and beliefs, freedom for association and organization, and protection from the state in political, civil, and criminal matters. The Political Rights index captures free and fair elections, political pluralism, and government accountability. Each ranking is measured on a 1-7 scale. Our chosen proxy for *Political Freedoms* is the sum of the two rankings. We have reversed the original scale to make them more intuitive, so that higher values represent more political openness. (There is some conceptual overlap in *Institutional Capacity* and *Political Freedoms*; for example, both measure aspects of the rule of law. Empirically, the two indexes are correlated at .46.) As will be shown below, results obtained using the Freedom House *Political Freedoms* indicator are robust to using alternative measures of democracy and of constraints on the executive from the Polity data base.

Institutional development as measured by our two indicators may affect the graduation decision through other channels, in addition to its implications for income volatility. In countries with greater *Institutional Capacity* and more *Political Freedoms*, growth is likely to be more inclusive, with the benefits of high incomes not confined to elites. Knack (2002) shows that in more institutionally developed countries (as measured by ICRG indicators), growth in incomes is most rapid for the lower-quintile groups in the income distribution in each country. Public resources are also likely to be used more effectively: revenues will be raised and expended in more efficient and equitable ways, producing higher-quality public services (see, e.g., Rajkumar and Swaroop 2008; World Bank 2003). Income inequality and human development are important outcomes in themselves; to the extent that higher-quality public services in health and education increase the human capital of workers, the likelihood that per-capita income will fall below the IBRD threshold will also decline.

As a third indicator of institutional development, we include a transition economy dummy variable for the countries of Central and Eastern Europe and the former Soviet Union. For given income levels, their economic and social institutions for sustained market-based development were relatively backward in the early years of transition. Engagement with the IFIs and other donors – particularly in the early transition years – focused on reform of legal, tax and other systems designed to produce a convergence with other European countries in economic and social institutions. Based on this reasoning, we would expect transition countries to graduate later than others with similar incomes. On the other hand, the desire to be like other European countries – including by joining the EU, OECD and NATO – could cause them to transition from borrower to donor status before other countries at similar income levels. The net effect of these two potential influences of transition status on the likelihood of graduating could be positive or negative.

Graduation is also supposed to depend on the country's ability to access foreign credit markets. Actual borrowing or bond issuance would not be an ideal measure of access, however, because it depends not only on the country's ability to borrow but also on its need or desire to do so. Instead, we measure the willingness for foreign markets to lend by Institutional Investor's Creditworthiness ratings, based on a survey of economists' and risk analysts' perceptions of a country's creditworthiness. The ratings are on a 100-point scale, with larger values representing greater creditworthiness.⁵ This indicator measures the risk of default on sovereign debt, which should be a good proxy for access "on reasonable terms" to private capital markets. The graduation

⁵ Ratings are provided twice a year, in March and September. We took the average of these. We did not use sovereign bond ratings from rating agencies like Fitch and Moody's because of the incompleteness of their coverage. Early in our sample period, in particular, many countries were not rated.

policy emphasizes the latter criterion, but the Bank's Articles of Agreement require lending decisions to take into account a country's ability to repay the loan.

Finally, we consider the role of vulnerability to shocks that may reduce per-capita incomes. For a given level of measured income and institutional quality, countries that are more exposed to shocks seem less likely to meet the criteria for graduation. If they were to graduate, they might be more likely to return to the Bank for assistance because of a realized shock, and so they may be less willing to graduate in the first place. We include two measures of vulnerability to shocks in our analysis. One is the degree of export concentration: countries with exports concentrated in fewer products are likely to face greater volatility and to be more vulnerable to idiosyncratic exogenous shocks. Concentration is measured using a Herfindahl index of export lines.

A second measure of vulnerability is country size. The Bank's IDA classifies countries with under 1.5 million people as small states subject to higher vulnerability to natural disasters and macroeconomic shocks. The same rationale may apply even to middle- or high-income small states.⁶ We therefore include an indicator variable for these small countries, with population data taken from the WB-WDI.

In addition, we include one measure of actual shocks: a dummy variable representing whether the country has suffered a systemic banking crisis within the previous 5 years. Data for that variable are drawn from Laeven and Valencia (2008).⁷

All regressions control for a linear time trend. This time trend could reflect the net effect of various factors, such as any tendency to interpret the graduation policy more or less stringently over time. For example, if the IBRD was more capital-constrained in the 1980s than in the 2000s, it may have rationed lending and graduated the wealthier above-threshold countries sooner in that early period than in the later decade. This change would show up in our regressions as a negative time trend.

A final variable in the base specification of the graduation regression measures the IBRD income threshold as a share of world average income. The threshold is adjusted to account for inflation (i.e., reduction in the purchasing power of the US dollar), and so it increases over time. It is not adjusted, however, for changes in real income. Most countries have experienced growth in real incomes, not merely in nominal incomes, over the 1982-2008 period. As a share of mean income worldwide, therefore, the IBRD threshold has fallen in most years, and over the period as a whole.⁸ Whether this relative threshold value matters for graduation or not will depend on whether decision makers take into account a country's relative income level, rather than just its absolute (real) income level. If they do, then an above-threshold country may be less likely to graduate in years when the threshold that it has exceeded is low relative to world average income.

⁶ The minutes of the January 26, 1982, discussion of the graduation policy by the Bank's Executive Directors reflect agreement that particular country circumstances, such as "the problems of small countries with narrowly-based economies," should influence how soon a country graduates once it surpasses the income threshold (Shihata 2000).

⁷ The same source provides similar data on debt crises and currency crises, but those turned out to be unrelated to graduation. For simplicity, we report only the results for banking crises.

⁸ It is correlated with the linear time trend at $-.78$.

Our dataset represents an unbalanced panel of annual observations from 1982-2008. We choose 1982 as the starting year in part because the ICRG measures, which comprise our *Institutional Capacity* index, begin only in that year. It is also the year the Board adopted a comprehensive version of the current graduation policy.

The panel is unbalanced for several reasons. First, some countries were not IBRD members until well into the 1982-2008 period. This applies not only to new countries such as those emerging from the former Soviet Union and Yugoslavia, but also to many other countries including Switzerland. Second, because countries are not considered for IBRD graduation until they meet the income threshold, we restrict the sample to country-year observations in which the country's income is above the threshold. Sixty-six member countries exceeded the threshold at some point during our sample period, but many did not do so in every year in the sample period. Third, several nations are missing data for certain variables in different years scattered throughout the sample time period. We are left with complete data for up to 906 total country-year observations, from 55 nations. Of these 55 countries, 21 are high-income countries that graduated from the Bank before the graduation policy was initially formulated in 1973 (or never borrowed at all). Arguably these countries were at very low risk of de-graduating throughout the 1982-2008 period, and their experience may have little relevance to those at higher risk. We therefore check the robustness of our results by dropping these 21 countries from the sample, leaving up to 437 observations in this second, smaller sample.

Descriptive statistics for all variables in both samples are presented in Table 2. The “graduate” variable shows that in 83 percent of the (country-year) observations in which the country exceeds the IBRD threshold, the country had graduated. However, that full sample (Sample 1) includes the high-income countries that never borrowed; without them (Sample 2), the ratio falls to 65%. Similarly, in Sample 1 borrowing commitments occur in 9.1% of the country-year observations, compared to 18.8% in Sample 2. Average scores on *Political Freedoms*, *Institutional Capacity* and *Credit Rating* are lower, and banking crises more frequent, in Sample 2.

Empirical results

Factors predicting graduation

Table 3 presents probit estimates using a dummy variable coded 1 for years in which the country was an IBRD graduate, and 0 otherwise. The first column of results is for Sample 1, including high-income non-borrowers, while the second column reports results for Sample 2, which drops them. Standard errors (in Table 3 and in all subsequent tables) are adjusted for non-independence within country “clusters” of observations.

Wealthier countries are significantly more likely to successfully graduate, as expected. Specifically, even among this sample limited to country-year observations that exceed the IBRD income threshold, graduation is more likely when income exceeds the threshold by a lot than by a little. The marginal effect of income at the mean values for either Sample 1 or Sample 2 suggests

that a standard deviation increase in log income increases the predicted probability of graduation by about 4 percentage points.⁹

The indicators for institutional development are both statistically significant and have the expected signs, in both samples. That is, higher institutional capacity and greater political freedoms both contribute positively to the likelihood of graduation. A standard-deviation increase in either index increases the predicted likelihood of graduating by about 2 percentage points. These results suggest that despite their conceptual overlap, these indicators each independently measure some aspects of institutional development that matter to decision makers.¹⁰

Creditworthiness, as proxied by the Institutional Investor's Credit Rating, also has a positive and (marginally) significant impact on predicted graduation in Sample 1. A standard-deviation increase (about 15 points on the 0-100 scale) is associated with an increase in the probability of graduating of about 1.3 percentage points. Creditworthiness has a positive but not significant coefficient in Sample 2.

Shocks represented by recent banking crises (specifically, a crisis occurring in the last 5 years) reduce the likelihood of graduating by about 1.2 (Sample 1) or 1.5 (Sample 2) percentage points on average. Similar variables were tested for debt crises and currency crises, but those were not significant predictors of graduating, and so for space reasons we did not include them in the tests reported in Table 3.

Smaller countries (those with under 1.5 million population) are significantly less likely to graduate than other nations, as hypothesized. The quantitative effect is about 1.3 percentage points.

Export concentration, contrary to our hypothesis, is positively and significantly related to graduation. An increase of about 0.18 on the 0-1 index increases the likelihood of being a graduate by about 1 percentage point. This result is counterintuitive, as lack of diversity in export composition makes a country more vulnerable to terms of trade or (depending on the commodity) climate-related shocks. A possible explanation for the result is that oil exporters are among the countries with highest concentration, and sentiment for lending to countries receiving large windfall revenues from natural resources may be relatively weak.¹¹

We tested several other proxies for vulnerability to shocks, including terms of trade shifts, exports as a share of GDP, and agricultural value added as a share of GDP. These were not significant predictors of graduation, and are not reported in the tables for space reasons.

⁹ Marginal effects in this section are calculated using the Stata `dprobit` command.

¹⁰ When we test each component of *Institutional Capacity* separately, corruption turns out to be the strongest predictor of graduation, followed by rule of law, and then bureaucratic quality. Of the two *Political Freedoms* components, results for civil liberties are somewhat stronger than for political rights. These results are available on request from the authors.

¹¹ In 1975, the Bank decided to provide IBRD loans “only on an offset basis to oil producing countries in capital surplus”. It is unclear how long this policy lasted. Oil exporters were excluded from access to exceptional resources under the pilot Crisis Response Window in IDA15 (World Bank 2010).

The transition dummy is not significant, a non-result that is likely due to two offsetting influences. Of the 11 transition economies over the IBRD threshold by 2008, only seven had graduated. All seven of these entered the EU in 2004, and graduated soon after (between 2004 and 2008). Two of these seven new graduates, Latvia and Hungary, quickly returned to the IBRD as borrowers in 2009, in response to the global financial crisis. These events are consistent with the hypothesis that the transition economies were slow to graduate because they needed assistance from the IFIs in building institutions for markets: only EU members graduated (not Russia or Croatia), and only after entering the EU. However, these events are also consistent with the hypothesis that some of these countries may have graduated too quickly, with EU accession interpreted prematurely as a signal that their transitions were complete.

The time trend is negative and significant, meaning that a country with a given set of values for income, credit rating, and other variables was less likely to graduate in the 2000s than in the 1980s. The effect is quantitatively small: with the passage of 8 additional years, the likelihood of being a graduate falls by 1 percentage point. This negative trend likely reflects some combination of two factors. First, IBRD lending volumes appear to have been more supply-constrained in earlier years of our sample period, and more demand-constrained in later years.¹² Second, there was an increased awareness later in the period of the importance of non-lending assistance in development, giving even countries that did not need financial resources more reason to stay engaged with the Bank.

The time trend may also capture the steady decline in the value of the IBRD income threshold relative to average world income, a trend noted above. It is plausible that countries are more reluctant to graduate at the threshold—or that the Bank is more reluctant to graduate them—given that the threshold no longer means as much. Yet although we control for changes from year to year in the ratio of the IBRD threshold to average world income, the time trend nevertheless remains significant and negative. The coefficient estimate for the threshold-world income ratio itself is not significant.¹³

Results for Samples 1 and 2 are very similar for most variables, despite the large reduction in number of observations and countries in moving from the former to the latter. Findings are therefore not highly sensitive to the inclusion of wealthy countries that had graduated prior to 1982. The most notable difference is for creditworthiness, which is marginally significant in Sample 1, but loses significance in Sample 2, where its coefficient drops in magnitude by nearly one-half.

Predicted vs. actual graduation

One way to assess the value of this revealed-preference approach to uncovering the determinants of graduation is to compare predicted graduation patterns with actual graduation decisions. With the relatively few variables in Table 3, our graduation model is able to predict correctly the IBRD graduation status of a country in a high percentage of cases. If instead of using

¹² Supply constraints began to bind again during the global financial crisis, but only after the end of our sample period.

¹³ When the time trend is omitted from the regressions, the most notable change is that the threshold-world income ratio becomes positive and highly significant—unsurprisingly, given the strong negative correlation between that ratio and the time trend.

the model, we were to rely solely on the IBRD income threshold in predicting whether or not an observation in Sample 2 was a graduate, our prediction would be correct 65% of the time—because in 65% of observations, countries over the threshold had in fact graduated. [The share rises to 83% if we include all high-income countries as well, in Sample 1.] But once we incorporate the institutional variables, the specific income level, and other factors included in the model, we correctly predict 87.2% of the observations (or 93.7% when high-income countries are included).

Korea and Trinidad and Tobago (see Figure 1) illustrate the predictive power of the model. Korea's predicted probability of graduating rose rapidly from 1989-1996, peaking in 1996 just before its actual graduation in 1997. It took out no new IBRD loans in either 1996 or 1997. With the onset of the crisis in 1997, its predicted probability of being a graduate fell rapidly, and it in fact “de-graduated” and borrowed heavily in 1998 and 1999. Korea has not borrowed since 1999, and in the last several years, its predicted probability of graduation has risen to near 90%. In 2010 it is officially joining the OECD-DAC group of aid donors.

Trinidad and Tobago graduated in 1984, when its predicted probability of graduating was well over .5 but declining. Crude oil prices were already well below their 1981 peak, and plummeted below \$10 per barrel in mid-1986. Per-capita income fell each year from 1982 through 1989, as oil prices fell and remained low until 1990. Largely due to declining incomes, Trinidad and Tobago's predicted probability of being an IBRD graduate fell to .10 by 1987. Beginning in 1988 (and continuing through 2000), the country's per-capita income had fallen below the IBRD threshold, so its predicted probability in our framework had effectively fallen to 0. Consistent with the model's prediction, Trinidad and Tobago began borrowing again from the IBRD in 1990, after taking out no new loans in the entire decade of the 1980s.

Even some of the (relatively few) incorrectly predicted observations are quite instructive. Hungary and Latvia graduated in 2007, at a time when their predicted probabilities of graduation were both below 50 percent: 45 percent for Hungary and only 22 percent for Latvia. Yet both countries had to return to the IBRD for financing after the (admittedly major) financial crisis hit in 2008, raising the possibility that they indeed graduated too early. By contrast, when Slovenia graduated in 2004 and the Czech Republic the next year, their predicted probabilities were both above 50 percent, at 82 percent and 59 percent respectively. Neither of those countries was driven to take Bank loans in the wake of the crisis.¹⁴

¹⁴ The probit estimates of graduation underlying this figure implicitly assume that graduation and de-graduation transitions are symmetrical—that is, that the same statistical relationship holds on the way up as on the way down. One commenter noted that these two transitions are fundamentally different: graduation tends to be a gradual process, while de-graduation is typically a sudden result of an economic shock. But the cases of Korea and Trinidad and Tobago in

Figure 1 show that the predicted probability of graduation can also suffers a sudden large drop at the time of de-graduation. This correlation suggests that an assumption of symmetry is plausible.

Alternative per-capita income measures

Columns (iii) and (iv) of Table 3 repeat the analyses from (respectively) columns (i) and (ii), but with one change. In the first two columns, income is measured *ex post*, meaning that the income estimates for each year reflect the best available information as of 2009. In many cases these *ex post* estimates represent a substantial revision from contemporaneous estimates. If graduation decisions at the time were consciously based on the degree to which income was estimated to exceed the threshold, contemporaneous income data – the numbers available to policy makers and Bank officials at the time – may better explain statistically which countries graduate and when. On the other hand, *ex post* estimates, which incorporate revisions based on information available only later, are presumably more accurate and thus better reflect whether or not a country was really ready to graduate at any given time. Bank and government officials may have been operating on that reality as well as on the then-available official numbers. Therefore, it is unclear which set of figures – contemporaneous or *ex post* – might better predict actual graduation decisions.

Contemporaneous and *ex post* estimates are correlated at .96, but for some countries the gap is quite large. Slovakia's *ex post* estimates for 1993-2006 are much higher, with a gap of \$730 in 1993 growing to \$2780 by 2006. For the years 2000-2003, Slovakia's income was under the IBRD threshold (by about \$1200 on average) based on contemporaneous data, but over the threshold (by about \$700 on average) based on *ex post* estimates.

In the last two columns of Table 3, the sample of countries over the threshold is determined using contemporaneous income estimates. The samples are slightly smaller than in the tests using *ex post* estimates: revisions are in most cases upward rather than downward, so more countries were (believed to be) under the threshold based on contemporaneous data. The results are nearly indistinguishable from those obtained using *ex post* estimates. Income coefficients and their associated test statistics, and measures of goodness-of-fit (including percentage of correctly-predicted cases) are very similar. These results are consistent with an interpretation that both sets of estimates matter—the ones available to Bank and government officials at the time they were making decisions, and the ones that better reflect the country's true income levels and thus readiness to graduate, other things equal.

Logit results

Column i in Table 4 reports the logit estimation counterpart to the probit results of column (i) in Table 3. Results are very similar, for the model overall and for the significance of each variable. One advantage to logit over probit is that coefficients can be readily expressed as odds ratios, and these are reported in the table. A 1-unit increase in Political Freedoms is associated with a 27% increase in the odds of being an IBRD graduate, compared to 35% for a 1-unit increase in Institutional Capacity, or a 5% increase for Credit Rating. Odds ratios below one indicate a decrease in the odds, so the time trend odds ratio indicates that other things equal the odds of being a graduate drop by 22% per year.

A second advantage of logit is that we can control for time-invariant influences using country fixed effects, for the limited number of countries in our data set with a change in their

graduation status between 1982 and 2008.¹⁵ Columns (ii) and (iii) in Table 4 report, respectively, random-effects and fixed-effects logit models. Fixed-effects logit estimates are based only on the 14 countries (accounting for 169 observations) for which in the dependent variable varies over time—countries that either graduated or de-graduated during our sample period.¹⁶ In these random- and fixed-effects tests, Political Freedoms and Institutional Capacity (and export concentration) remain significant, with higher odds ratios than in regression 1. Creditworthiness is significant (and positively associated with graduation) in random effects but not in fixed effects. The time trend remains significant in both tests, with each passing year reducing the odds of graduating by more than 30 percent. The banking crisis dummy is significant in fixed effects and positively associated with graduation. However, this estimate is based on only a single crisis (Korea in 1997) in regression (iii), while the negative association of banking crises with graduation in our 55-country sample is based on 11 crises. The small island dummy shows even less variation in the 14-country sample: its coefficient estimate in regression (iii) is based entirely on Oman, which had a population under 1.5 million in its first year (1984) in the sample but over 1.5 million thereafter. The transition dummy drops out of regression (iii) as it does not vary at all over time.¹⁷

Alternative institutional indicators

As noted above, it is difficult to know how to operationalize the phrase “key institutions for economic and social development.” In Table 5 we therefore test alternative institutional development indicators.¹⁸ Regression (i) includes the democracy index from the Polity dataset, commonly used in political science research. In contrast to the Freedom House indicator, the Polity index does not measure *outcomes* (such as individual rights) often associated with democracy, but focuses instead on democratic *processes*, particularly the methods used in selecting chief executives.¹⁹ Despite this difference, the two variables are correlated at .91, and results for the Polity index in column (i) are very similar to results for *Political Freedoms* in Table 3. Its coefficient is positive and significant, and a standard deviation increase (about 4.5 points on the 0-10 scale) is associated with an increase in the probability of graduating of about 2 percentage points.

Regression (ii) of Table 5 includes a different Polity variable, an index of executive constraints. This index is very highly correlated (at .95) with the democracy index from the same source, so it is not surprising that it produces similar results. A standard-deviation increase (about

¹⁵ Fixed-effects probit models cannot be estimated using conditional maximum likelihood, and unconditional fixed-effects probit estimates are biased.

¹⁶ The 14 countries are Cyprus, Czech Republic, Estonia, Gabon, Hungary, Korea, Latvia, Lithuania, Oman, Portugal, Slovak Republic, Slovenia, Trinidad and Venezuela. Barbados graduated in 1984 but is missing data on *Institutional Capacity*. Bahamas graduated in 1989 but is missing data on *Credit Rating* until 2000. Iraq de-graduated in 2003 but is missing data on income.

¹⁷ A Hausman test prefers random over fixed effects estimation, when both are run using the same sample and specification.

¹⁸ Regressions in this table are all based on the larger sample of observations (Sample 1), and use the *ex post* measure of per capita income. However, we obtain similar results for the institutional variables if we switch to Sample 2 or to contemporaneous income data.

¹⁹ Our main regressions, in Table 3, use the Freedom House indicator rather than Polity to preserve sample size. Polity does not cover some small countries covered by Freedom House.

2.5 points on the 1-7 scale) is associated with an increase in the probability of graduating of about 2 percentage points. Results on *Institutional Capacity* and other variables are affected very little by this substitution of Polity indicators for Freedom House.

It could be argued that “institutions” should be limited to a narrower set most directly relevant for economic development, and that political institutions may influence graduation decisions only indirectly, if at all.²⁰ Accordingly, in regression (iii) we exclude the Polity indicators as well as *Political Freedoms*. The main results from Table 3 still hold. In particular, the coefficients on income and institutional ratings (ICRG) remain statistically significant and of a similar magnitude. In fact, the ICRG coefficient rises somewhat, presumably because of the substantial correlation between the ICRG and political ratings.

Regression (iv) of Table 5 includes tax revenue as a share of GDP. This measure is often called “tax effort” and interpreted as an indicator of administrative capacity (see for example Brautigam, Fjelstad, and Moore 2008). Greater tax effort may encourage graduation through a second channel, separate from this “institutional” interpretation: governments with access to higher tax revenues have a greater potential to reduce poverty through progressive expenditure and transfer programs.²¹ We do not include tax effort in most of our regressions because it is available in a comparable series only beginning in 1990, and its inclusion cuts the sample size by nearly half. Despite the relatively small sample, its coefficient in regression (iv) is positive and significant. A standard deviation increase in tax effort – about 8 percentage points – is associated with an increase in the probability of graduating of about 1 percentage point. Results for tax effort are robust to inclusion in the regression of the Polity democracy index, in column (v) of Table 5.

Regression (vi) includes a standard indicator of financial development, M2 (a measure of money supply) as a share of GDP, which is computed using data from the IMF’s International Financial Statistics database. Because missing data on M2/GDP reduces our sample size by more than one-third, we do not include this indicator of institutional development in our main tests in Table 3. Its coefficient is positive and significant in Table 5, however, suggesting that financial institutions are among the social and economic institutions taken into account in graduation decisions.²²

²⁰ According to the World Bank’s Articles of Agreement (Article IV, section 10): “The Bank and its officers shall not interfere in the political affairs of any member; nor shall they be influenced in their decisions by the political character of the member or members concerned. Only economic considerations shall be relevant to their decisions...” Of course, political considerations may influence a member government’s own decisions with respect to graduating from the IBRD.

²¹ Ravallion (2009) constructs an indicator of countries’ capacity to eliminate extreme poverty through income redistribution, measured in terms of the marginal income tax rates on the non-poor that would be required. This indicator is available for only a very few countries with incomes exceeding the IBRD threshold, so we are unable to use it in our tests.

²² A final variation on the credit rating and ICRG measures (not shown here) is to make use of lags. One commenter on this paper suggested that the credit ratings and ICRG scores could reflect reverse causality: a country’s graduation could cause raters to increase scores in the year of graduation. For countries as developed and integrated into global markets as the typical new graduate, it seems unlikely that IBRD graduation is taken as providing much new information on the level of institutional development and creditworthiness. Nevertheless, we tested the possibility by using lagged score rather than contemporaneous score. In the case of both variables, lagging the variable one year made the coefficient both larger and more statistically significant, which may allay concerns about reverse causality.

Additional income, human development, and interaction variables

In each of the six regressions reported in Table 6, an additional variable is added to the model from the first column of Table 3, using the larger sample of observations and the *ex post* income measure. The added regressor in each test is indicated in bold in the respective column headings, with the coefficient and t-statistic for the added regressor shown in bold in a row towards the bottom of Table 6.

The added variable in the first column is (the log of) PPP-adjusted per-capita income. If PPP-adjusted income is a better measure of living standards than income based on exchange rates, it may provide additional explanatory power in our graduation tests. Results show it is in fact positively and significantly related to the probability of being a graduate. Moreover, with its inclusion the coefficient on GNI per capita (based on exchange rates) falls and is no longer significant.

The second and third columns add human development outcome indicators, as proxies for the broad concept of “economic and social institutions.”²³ Column (ii) adds a measure of educational attainment – average years of completed education for the population age 25 and over – from Barro and Lee (2010).²⁴ Column (iii) adds instead a health outcome indicator, infant mortality, that has reasonably good data coverage.²⁵ Neither of these human development outcome proxies for economic and social institutions turns out to be significantly related to the probability of graduation. Column (iv) adds instead a gender equality indicator, the female labor force participation rate. This variable is also not significant.

Column (v) adds income inequality, as measured by the Gini coefficient.²⁶ For a given level of average income, a higher Gini will tend to be associated with higher poverty rates. Higher poverty in turn may be associated with a greater need for continued access to IBRD loans. However, the regression coefficient for the Gini measure, while positive, is insignificant in Table 6.²⁷

²³ The graduation policy does not define institutional development explicitly, but an unpublished 1982 memorandum to the Executive Directors describes as an example of institutional weakness “countries that have recently experienced rapid increases in real income because of improved terms of trade or new mineral discoveries” but with “social indicators such as health and education levels [that] are often much lower than in other countries at the same income level.” The same memorandum implies that a failure to address development disparities between groups or regions within a country reflects institutional weaknesses.

²⁴ Data retrieved from the World Bank EdStats database. Barro and Lee provide estimates only for every fifth year between 1970 and 2010, so we linearly interpolate for the years in between. Results are very similar to those reported here if we treat the in-between years as missing data.

²⁵ Data are from the World Bank’s World Development Indicators (WDI).

²⁶ Data are from the World Bank’s World Development Indicators (WDI). Other measures of income equality (e.g. income share going to the middle quintile) or inequality (e.g. share going to the top decile or quintile) produced similar results.

²⁷ Inequality changes slowly over time in most countries, so results in Table 4 are based on the country average values for Gini, from all available data over the 1982-2008 period. If we instead use the annual values and drop all years with missing data, the available sample is far smaller, and Gini is again not significant. Similarly, poverty headcount measures are available only for a very small number of annual observations, and we do not take period averages for poverty headcount because it often exhibits strong variability over time within countries.

Column (vi) adds an interaction term, equal to the product of *Credit Rating* and the time trend. Middle-income countries had increasing access to funds raised on private capital markets over the 1982-2008 period (Ceballos, Didier, and Schmukler 2010), so their creditworthiness – measured by the perceived likelihood that sovereign debt obligations will be honored – may have become more relevant to graduation decisions later in the period. The positive and significant coefficient on the interaction term is consistent with this hypothesis.²⁸

One institutional and governance variable that we are not able to use in our model variations is the World Bank Country Policy and Institutional Analysis (CPIA). CPIA scores are available only for non-graduates, and so cannot be used for a probit to explain graduation status. But looking at the data permits us to answer the question of whether there appears to be a “threshold level” of average CPIA score above which graduation is likely. The CPIA indicators have been defined consistently since 1998, and over that period seven countries (all in Eastern and Central Europe) have graduated, all between 2004 and 2008. On a scale of 1 to 6, their average CPIA score a year before graduating was 4.9, with a range of 4.4 to 5.5. By comparison, the above-threshold countries that had not yet graduated had an average score of 4.2 in these years, with an average minimum score of 2.4 and an average maximum of 5.2. In every case but two, some non-graduate had a CPIA score exceeding that of the new graduate. So while there is no single threshold CPIA level that is necessary and sufficient for graduation, countries this decade have not graduated without relatively high CPIA scores.²⁹

We also considered the possible relevance of political economy explanations for World Bank decision making. Specifically, we tested for the impact of temporary UN Security Council membership on graduation. Dreher, Sturm and Vreeland (2009) find that temporary members of the UNSC receive more World Bank projects, although loan size is unaffected. One interpretation of this finding is that large donor countries represented on the Bank’s Executive Board may sometimes approve loans in exchange for favorable votes in the UNSC. However, we believe this argument has little relevance to graduation decisions, which have been largely consensual in practice, although the Executive Directors have the authority to graduate a country involuntarily (Shihata, 2000). Consistent with this view, a dummy for temporary UNSC membership falls far short of significance when added to our graduation regressions.³⁰

²⁸ Calculating coefficient estimates and standard errors for *Credit Rating* conditional on different years (i.e. the time trend variable), we find negative but insignificant point estimates for 1982 through 1989; with positive estimates thereafter, becoming significant at the .10 level in 1996 and at the .05 level in 1998. Results on *Credit Rating* shown in the table are conditional on the average value (1997) of the time trend variable.

²⁹ CPIA ratings for individual IBRD countries cannot be made public under Bank policy, which is why only aggregates are reported here.

³⁰ Results available on request. Similarly, voting compatibility with the interest of major donors in the UN General Assembly does not help explain graduation decisions. Kilby (2006), among others, finds evidence that the geopolitical interests of large donor countries, as proxied by General Assembly voting patterns, affect aid allocations of some international financial institutions.

Factors predicting borrowing

One way of assessing how above-threshold countries approach graduation is to see what factors predict their reliance on the IBRD for finance. While non-graduates retain their eligibility for borrowing, a country that has not graduated does not always borrow in any given year. Among the 154 country-year observations in our main sample for which a country had not graduated, new borrowing commitments were made 78 times. We therefore analyze also whether the factors predicting graduation also help to explain the decision to borrow or not, and how much the country borrows.

Table 7 presents probit estimates where the dependent variable takes the value of 1 for borrowing, and 0 for not borrowing in that year. If the same factors are at play for graduating as for borrowing, the coefficient estimates in Table 7 should be of opposite sign as for Table 3. Results for Sample 1 are shown in the first two columns, and for Sample 2 in the third column.

Results are generally consistent with the graduation results. Non-graduates with higher GNI per capita are markedly less likely to borrow from the IBRD, perhaps because as incomes rise, countries gain access to more capital from private sources. As shown in column (ii) of Table 7, PPP measures of income have additional predictive power: even controlling for GNI per capita, countries with higher PPP income (GDP) per capita are less likely to borrow. In general, institutional capacity, political freedom, and creditworthiness are associated with a lower likelihood of borrowing from the IBRD, although these effects are not always statistically significant. The results also show that over time, the likelihood of IBRD borrowing by non-graduates in any given year has grown. As shown in column (iii), these results hold even when the high income countries that never borrowed are dropped from the sample.³¹

Findings are somewhat different in Table 8, where the dependent variable is (the log of) lending per capita.³² The first column shows results for Sample 1. As expected, non-graduates with higher incomes borrow substantially less per capita, and by extension borrow less as a share of their income. This finding is consistent with the story that wealthier countries have more opportunities to access private financing. Greater institutional capacity and political freedoms also appear to be associated with less borrowing per capita, but these results are mostly not statistically significant. By contrast, the country's credit rating is a strong predictor of the amount borrowed: countries with better credit ratings borrow significantly less from the IBRD. Over time, the use of IBRD financing measured on a per-capita basis has risen, although this reflects increases in nominal price levels.

³¹ In contrast to the case with graduation, when we analyze borrowing the random effects logit model fails to achieve convergence.

³² Borrowing is observed in only 82 country-year observations (for Samples 1 and 2), so tobit estimation is used, treating non-borrowing observations as censored at zero. The log of borrowing is undefined when borrowing is zero, so we use the formula $\log((\text{per capita IBRD lending} + .01)/.01)$ to retain these observations in the sample with a value on the dependent variable of zero.

Column (ii) reports results from a random-effects tobit model.³³ In general, results are very similar to column (i). A notable exception is that the positive time trend is no longer significant when using random effects.

Column (iii) follows the method and specification for column (i), but for Sample 2 instead of Sample 1. Results based on this smaller sample of borrowers are nearly identical to those for the larger sample.

Columns (iv) and (v) of Table 8 present results on lending per capita for expanded samples. (Summary statistics for these expanded samples are presented in Table 9.) Sample 3 expands on Sample 1 by adding all country-year observations with per-capita incomes exceeding the IDA operational cutoff. Some of these observations are technically eligible for concessional IDA loans, despite having incomes over the IDA cutoff, for example because of the exception for small island economies. As shown in column (iv), income and creditworthiness remain significant in this sample, although with diminished coefficients relative to results for Samples 1 and 2. In this expanded sample, we can add a dummy for observations over the IBRD threshold (in samples 1 and 2 all observations were over it). The coefficient for this dummy is negative and significant, indicating (unsurprisingly) that countries over the notional threshold borrow less. We can also control for the volume of IDA borrowing per capita in this test. Lending from these two sources appears to be substitutes: more IDA borrowing is negatively associated with IBRD borrowing.

Sample 4 expands on Sample 3 by adding in observations below the IDA income cutoff. Results on income per capita, IDA borrowing, and the over-IBRD-threshold dummy in this sample (with results reported in column (v) of Table 8) are all similar to results in column (iv). There are several notable differences in results using Samples 3 and 4. First, institutional capacity is significant in column (v). Second, creditworthiness is insignificant. Third, the transition dummy is positive and significant. Fourth, we add a dummy for observations over the IDA income cutoff.³⁴ Per-capita IBRD borrowing is higher for these observations than for those below the IDA cutoff, even when controlling for the volume of IDA borrowing.

Overall, the similarities in results for borrowing and graduation outweigh the differences, and the same variables that predict a greater probability of graduation also tend to predict reduced likelihood of borrowing from IBRD and reduced amounts borrowed. Because the most likely graduates—high-income countries with strong institutions and credit ratings—are also attractive low-risk borrowers from the standpoint of the Bank’s balance sheet, it is unlikely that the reduction in borrowing is driven by unwillingness of the Bank to lend to these countries. Therefore, these results are consistent with a graduation model that is evolutionary rather than abrupt: the same factors that gradually reduce a country’s demand for IBRD loans also eventually lead it to graduate.

³³ Fixed-effects tobit models (similarly to probit) cannot be estimated using conditional maximum likelihood, and unconditional fixed-effects tobit estimates are biased.

³⁴ Data on the IDA operational cutoff threshold begin only in 1987, so the period covered is 1987-2008.

Conclusion

In this paper, we have presented what is to our knowledge the first attempt to model empirically the correlates of IBRD graduation. Under Bank policy, graduation from the IBRD is not an automatic consequence of reaching a particular income level, and the IBRD per-capita income threshold is used only as a trigger to initiate discussions about the country's readiness. Graduation is instead supposed to be based on a determination of whether the country has reached a level of institutional development and capital-market access that enables it to sustain its own development process without recourse to Bank funding.

We assess how this policy is implemented in practice through a panel analysis of 55 countries, including 34 countries that were IBRD borrowers at some time since 1970. We find that the observed correlates of Bank graduation are generally consistent with the stated policy. Among the countries that have crossed the IBRD income threshold (currently \$6725), those that are wealthier, more institutionally developed, and are less vulnerable to trade, financial, and other shocks are more likely to have graduated.

With a relatively few variables, our graduation model is able to predict correctly the IBRD graduation status of a country in a high percentage of cases. Predicted probabilities generated by the model conform closely to the actual graduation and de-graduation experiences of Trinidad and Tobago and Korea, and suggest that Hungary and Latvia graduated prematurely – a prediction subsequently borne out by their return to borrowing from the IBRD in the wake of the global financial crisis.

We supplement the graduation analysis with an analysis of the level of borrowing from the Bank, which is a continuous variable. Interestingly, the findings are largely consistent with the analysis of the (discrete) graduation variable: as countries become wealthier, develop higher-quality institutions, and become more creditworthy, they rely less on IBRD financing for their development needs. This finding is consistent with the expectation under the policy that as the country develops, it will have less need for IBRD assistance and thus will be ready for graduation.

A concern raised by these findings is about possible moral hazard effects of the IBRD graduation policy. In theory, because countries with stronger institutions and higher creditworthiness are more likely to have graduated and to receive less financing from the Bank, above-threshold countries could have an incentive not to improve their ratings on those scores. But in practice this is not likely to be a serious concern. Countries already theoretically face such a tradeoff when their per-capita incomes increase, but the benefits of increased income presumably so outweigh any costs in terms of reduced IBRD financing that the theoretical tradeoff is unlikely to enter into their calculations. Similarly, stronger institutions bring a host of benefits and higher creditworthiness increases access to private credit, so any perverse incentives will be outweighed by these benefits. As with social programs, one way to minimize any moral hazard is to withdraw a benefit gradually to ensure that there is no discrete cutoff at a given income level or institutional rating; our empirical results suggest that IBRD graduation follows this gradualist approach. Another approach is to provide assistance in ways designed to strengthen institutional capacity—for example,

via technical assistance or development policy loans that include institutional reforms as prior actions for disbursement.³⁵

³⁵ This problem is anticipated in the graduation policy. An unpublished 1982 memorandum to the Bank's Executive Directors states: "the failure of a nation to take appropriate actions" to reduce poverty does not justify delaying graduation. "Assessment of a country's seriousness in addressing problems" and "receptivity to Bank advice... will be considered in determining the graduation timetable".

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Table 1
Graduation and Degradation years, 1970-2008

Country	Graduation	Degradation
New Zealand	1972	
Iraq ¹	1973	2003
Iceland	1974	
Venezuela	1974	1989
Finland	1975	
Israel	1975	
Singapore	1975	
Ireland	1976	
Gabon	1977	1988
Spain	1977	
Greece	1979	
Trinidad and Tobago	1984	1990
Oman	1987	
Bahamas ²	1989	
Portugal	1989	
Cyprus	1992	
Barbados ³	1994	
Korea, Rep	1995	1998
Slovenia	2004	
Czech Republic	2005	
Estonia	2006	
Lithuania	2006	
Hungary	2007	
Latvia	2007	
Slovak Republic	2008	

¹*Iraq is excluded from the analysis due to missing data on income*

²*Bahamas is missing data on creditworthiness prior to 2000, so only post-graduation years are included in the analysis*

³*Barbados began borrowing again in 2001, but did not officially degrade; it is not included in the analysis due to missing data on ICRG*

Table 2
Descriptive Statistics

	Sample 1				Sample 2			
	Over IBRD income threshold (N=906)				High-income non-borrowers dropped (N=437)			
	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev
Graduate dummy	0.83	0	1	0.38	0.65	0	1	0.48
Borrow Dummy	0.09	0	1	0.29	0.19	0	1	0.39
IBRD borrowing per capita	2.45	0	117.70	11.17	5.69	0	117.70	16.49
GNI p.c. over threshold	14331	45	80615	12119	8477	45	51870	8564
Political Freedoms	12.3	2	14	3.1	11.7	3	14	3.1
Institutional Capacity	14.3	3.9	18	3.24	12.8	3.9	18	3.00
Credit Rating	73.3	23.6	97.30	16.20	63.3	23.6	95.30	14.7
Bank crisis dummy (last 5 years)	0.06	0	1	0.23	0.06	0	1	0.25
Small nation dummy	0.14	0	1	0.35	0.23	0	1	0.42
Herfindahl exports concentration	0.07	0.002	1	0.14	0.08	0.006	0.79	0.12
Transition dummy	0.08	0	1	0.27	0.16	0	1	.37
Time Trend (year)	1996.6	1982	2008	7.8	1997.5	1982	2008	7.9
Threshold as share of world mean	0.95	0.725	1.2	0.13	0.94	0.725	1.2	0.14

Table 3
Probit Estimates for Graduate (1=graduate, 0=non-graduate)

column	i	ii	iii	iv
Sample	1	2	1	2
Income data	ex post		contemporaneous	
Constant	257.53** (4.89)	242.92** (4.03)	265.15** (4.80)	250.30** (4.07)
Log of GNI per capita in excess of threshold	0.924** (4.41)	0.843** (3.52)	0.899** (4.70)	0.823** (3.82)
Political Freedoms	0.139** (2.47)	0.158** (2.70)	0.149** (2.62)	0.167** (2.88)
Institutional Capacity	0.160** (2.32)	0.184** (2.14)	0.163** (2.33)	0.188** (2.19)
Credit Rating	0.024* (1.72)	0.014 (0.92)	0.022 (1.47)	0.011 (0.69)
Bank crisis in last 5 years % of GDP	-1.182** (-3.60)	-1.483** (-3.17)	-1.211** (-3.04)	-1.518** (-2.68)
Small nation Dummy	-1.338** (-2.52)	-1.344** (-2.53)	-1.408** (-2.57)	-1.416** (-2.59)
Export concentration	5.864** (4.35)	5.561** (3.93)	5.644** (4.28)	5.312** (3.67)
Transition economy Dummy	-0.180 (-0.28)	-0.122 (-0.19)	-0.159 (-0.23)	-0.101 (-0.15)
Time trend	-0.134** (-5.05)	-0.126** (-4.17)	-0.137** (-4.98)	-0.129** (-4.22)
Threshold as share of world mean income	-0.810 (-0.55)	-0.986 (-0.60)	-0.986 (-0.64)	-1.186 (-0.68)
<i>Number of observations</i>	<i>906</i>	<i>437</i>	<i>884</i>	<i>415</i>
<i>Number of nations</i>	<i>55</i>	<i>34</i>	<i>55</i>	<i>34</i>
<i>Adj. pseudo-R²</i>	<i>0.66</i>	<i>0.56</i>	<i>0.65</i>	<i>0.55</i>
<i>Correctly predicted</i>	<i>93.7%</i>	<i>87.2%</i>	<i>93.7%</i>	<i>86.8%</i>

Dependent variable is graduation status. t-statistics are shown in parentheses. A * indicates significance at the 10 percent level, ** indicates significance at the 5 percent level. Standard errors are adjusted for non-independence within country clusters of observations.

Table 4
Logit Estimates for Graduate (1=graduate, 0=non-graduate)

Column	i	ii	iii
Method	logit	RE logit	FE logit
Log of GNI per capita in excess of threshold	5.068** (4.11)	17.257** (4.04)	22.624** (2.89)
Political Freedoms	1.273** (2.59)	1.758* (1.85)	4.254** (2.69)
Institutional Capacity	1.352** (2.24)	2.683** (3.23)	3.266** (2.98)
Credit Rating	1.048* (1.74)	1.129* (1.78)	1.064 (0.63)
Bank crisis in last 5 years % of GDP	0.129* (-3.10)	13.043 (1.36)	100.403** (2.02)
Small nation Dummy	0.094** (-2.25)	0.066 (-1.61)	0.001 (0.01)
Export concentration	501.681** (3.29)	17159.66** (3.38)	21115.49** (2.70)
Transition economy Dummy	0.744 (-0.20)	0.043 (-1.30)	
Time trend	0.782** (-4.34)	0.652** (-3.75)	0.672** (-2.83)
Threshold as share of world mean income	0.272 (-0.42)	0.001 (-1.51)	0.001* (-1.71)
<i>Number of observations</i>	<i>906</i>	<i>906</i>	<i>169</i>
<i>Number of nations</i>	<i>55</i>	<i>55</i>	<i>14</i>
<i>Pseudo-R²</i>	<i>0.66</i>	<i>0.79</i>	<i>0.42</i>
<i>Correctly predicted</i>	<i>93.8%</i>		

Dependent variable is graduation status. t-statistics are shown in parentheses. Coefficients are converted into the change on odds ratios. A * indicates significance at the 10 percent level, ** indicates significance at the 5 percent level. Standard errors are adjusted for non-independence within country clusters of observations in column (i). The change in odds ratios for export concentration is for a 1 percentage point increment, e.g. from the mean value of 0.09 to 0.10.

Table 5
Probit Estimates for Graduate with Alternative Institutional Indicators
(1=graduate, 0=non-graduate)

Column	i	ii	iii	iv	v	vi
Constant	262.27** (4.45)	293.35** (5.58)	204.404** (3.25)	239.71** (2.83)	263.68** (2.90)	249.73** (3.35)
Log of GNI per capita in excess of threshold	0.983** (4.54)	0.982** (4.55)	0.841** (3.99)	1.057** (3.36)	1.040** (3.33)	0.703** (3.43)
Institutional Capacity	0.144* (1.80)	0.141* (1.72)	0.195** (1.72)	0.095 (1.08)	0.097 (1.06)	0.201** (3.20)
Democracy index (Polity)	0.124** (2.54)				-0.023 (-0.23)	
Executive constraints (Polity)		0.234** (2.55)				
Tax revenue/GDP				0.088** (2.02)	0.092** (1.96)	
M2/GDP						0.014** (2.64)
Credit Rating	0.023* (1.78)	0.024* (1.79)	-0.131 (0.22)	0.057** (2.63)	0.055** (2.43)	0.012 (0.74)
Bank crisis in last 5 years % of GDP	-1.104** (-3.46)	-1.089** (-3.48)	0.025* (1.75)	-0.651 (-1.30)	-0.628 (-1.23)	-0.767* (-1.89)
Small nation Dummy	-1.497** (-2.72)	-1.507** (-2.74)	-1.196** (2.13)	-1.108 (-1.56)	-1.272 (-1.59)	-1.250** (-2.06)
Export concentration	5.675** (3.73)	5.810** (3.97)	-1.213** (3.66)	8.837** (2.54)	8.378** (2.46)	4.995** (2.63)
Transition economy Dummy	-0.043 (-0.07)	-0.070 (-0.11)	3.700** (2.36)	0.415 (0.46)	0.399 (0.44)	0.495 (0.74)
Time trend	-0.149** (-5.46)	-0.152** (-5.85)	-0.107** (3.41)	-0.142** (-3.00)	-0.139** (-3.06)	-0.129** (-3.47)
Threshold as share of world mean income	-1.346 (-0.87)	-1.376 (-0.88)	-0.434 (0.29)	-0.363 (-0.15)	-0.577 (-0.23)	-1.597 (-0.93)
<i>Number of observations</i>	853	853	914	455	428	581
<i>Number of nations</i>	51	51	55	49	45	42
<i>Adj. pseudo-R²</i>	0.68	0.68	0.64	0.70	0.69	0.63
<i>Correctly predicted</i>	93.8%	93.7%	93.3%	92.5%	92.1%	90.2%

Dependent variable is graduation status. All regressions are based on Sample 1. t-statistics are shown in parentheses. A * indicates significance at the 10 percent level, ** indicates significance at the 5 percent level. Standard errors are adjusted for non-independence within country clusters of observations.

Table 6
Probit Estimates for Graduate with Added Regressors (1=graduate, 0=non-graduate)

column	I	ii	iii	iv	v	Vi
Added regressor	Log GDP per capita (PPP)	Mean years education	Infant mortality	Female labor force participation	Gini income inequality	Credit rating x time
Constant	262.27** (4.45)	254.87** (3.61)	511.46** (3.88)	247.63** (4.74)	488.50** (4.42)	-9.094** (-3.79)
Log of GNI per capita in excess of threshold	0.312 (1.22)	1.187** (4.85)	0.771** (2.83)	0.967** (4.58)	1.698** (3.84)	0.870** (4.31)
Political Freedoms	0.221** (3.28)	0.197** (2.42)	0.177** (2.52)	0.167** (3.11)	0.193* (1.72)	0.121** (2.19)
Institutional Capacity	0.133* (1.87)	0.123* (1.72)	0.273** (2.38)	0.161* (2.28)	0.003 (0.04)	0.202** (2.79)
Credit Rating	0.009 (0.66)	0.019 (1.11)	0.061** (3.13)	0.022* (1.66)	0.031* (1.83)	0.025* (1.83)
Bank crisis in last 5 years % of GDP	-1.097** (-3.36)	-1.099** (-2.63)	-0.954** (-2.58)	-1.118** (-3.25)	-0.986* (-1.84)	-1.058** (-3.05)
Small nation Dummy	-1.463** (-2.60)	-1.278** (-2.48)	-0.890 (-1.46)	-1.316** (-2.41)	-1.146** (-2.04)	-1.402** (-2.55)
Export concentration	6.200** (4.70)	5.052** (4.85)	6.943** (5.32)	5.773** (4.41)	2.838 (1.33)	6.329** (4.75)
Transition economy Dummy	-0.218 (-0.31)	-0.029 (-0.04)	0.087 (0.12)	-0.129 (-0.19)	1.069 (0.86)	-0.071 (-0.10)
Time trend	-0.147** (-4.83)	-0.132** (-3.74)	-0.260** (-3.99)	-0.128** (-4.90)	-0.252** (-4.40)	-0.078** (-2.49)
Threshold as share of world mean income	-1.385 (-0.87)	-0.860 (-0.55)	-5.258* (-1.67)	-0.759 (-0.52)	-2.831 (-1.27)	-0.157 (-0.11)
Added regressor	3.023** (3.35)	-0.115 (-0.07)	0.007 (0.02)	-0.017 (-0.08)	0.081 (1.36)	0.004** (2.80)
<i>Number of observations</i>	904	880	605	906	734	906
<i>Number of nations</i>	54	53	51	55	45	55
<i>Adj. pseudo-R²</i>	0.69	0.69	0.78	0.67	0.76	0.68
<i>Correctly predicted</i>	93.9%	94.1%	96.7%	93.7%	95.2%	94.2%

Dependent variable is graduation status. All regressions are based on Sample 1. t-statistics are shown in parentheses. A * indicates significance at the 10 percent level, ** indicates significance at the 5 percent level. Standard errors are adjusted for non-independence within country clusters of observations.

Table 7
Probit Estimates for Decision to Borrow (1=borrow, 0=not borrow in given year)

Column	i	ii	iii
Sample	1	1	2
Constant	-117.68** (-2.17)	-77.56 (-0.95)	-100.50** (-1.76)
Log of GNI per capita in excess of threshold	-0.474** (-2.70)	0.505** (2.07)	-0.406** (-2.22)
Political Freedoms	-0.070 (-1.34)	-0.211** (-3.85)	-0.093* (1.62)
Institutional Capacity	-0.134** (-2.27)	0.025 (0.46)	-0.153** (-2.12)
Credit Rating	-0.042** (-2.21)	-0.020 (-1.37)	-0.036* (-1.83)
Bank crisis in last 5 years % of GDP	0.093 (0.23)	0.541 (1.25)	0.187 (0.46)
Small nation Dummy	-0.352 (-0.74)	0.132 (0.26)	-0.424 (-0.82)
Export concentration	-7.214** (-4.06)	-7.972** (-3.39)	-7.477** (-3.78)
Transition economy Dummy	-0.743 (-1.47)	-0.270 (-0.54)	-0.728 (-1.46)
Time trend	0.063** (2.33)	0.073* (1.78)	0.054* (1.89)
Threshold as share of world mean income	-1.434 (-1.01)	-0.999 (-0.40)	-1.500 (-1.02)
Log of GDP per capita constant dollars (PPP)		-7.404** (-4.89)	
<i>Number of observations</i>	<i>906</i>	<i>904</i>	<i>437</i>
<i>Number of nations</i>	<i>55</i>	<i>54</i>	<i>34</i>
<i>Adj. pseudo-R²</i>	<i>0.53</i>	<i>0.69</i>	<i>0.41</i>
<i>Correctly predicted</i>	<i>94.5%</i>	<i>95.5%</i>	<i>88.8%</i>

Dependent variable is borrowing status, equal to 1 for countries receiving new loans during the year and 0 otherwise. t-statistics are shown in parentheses. A * indicates significance at the 10 percent level, ** indicates significance at the 5 percent level. Standard errors are adjusted for non-independence within country clusters of observations.

Table 8
Tobit Estimates for Log IBRD borrowed amount per capita

Column	i	ii	iii	iv	v
<i>Sample</i>	1	1	2	3	4
<i>Method</i>	<i>tobit</i>	<i>RE tobit</i>	<i>tobit</i>	<i>tobit</i>	<i>tobit</i>
Constant	-390.40** (-3.19)		-362.97** (-2.67)	6.10 (0.12)	76.44* (1.74)
Log of GNI per capita	-4.481** (-3.62)	-2.986*** (-3.15)	-4.148** (-3.04)	-0.523** (-2.02)	-0.491** (-2.04)
Over IBRD threshold Dummy				-1.148** (-1.94)	-1.844** (-2.87)
Log of IDA borrowing per Capita				-1.587** (-4.19)	-1.393** (-5.87)
Over IDA threshold Dummy					2.186** (3.58)
Political Freedoms	-0.190 (-1.56)	-0.153 (-1.10)	-0.215 (-1.59)	0.018 (0.29)	0.024 (0.48)
Institutional Capacity	-0.128 (-0.85)	-0.063 (-0.52)	-0.132 (-0.78)	-0.097 (-1.26)	-0.141** (-2.20)
Credit Rating	-0.086** (-2.15)	-0.088** (-2.55)	-0.081** (-2.01)	-0.034** (-1.94)	-0.006 (-0.40)
Bank crisis in last 5 years % of GDP	1.170 (1.38)	-0.182 (-0.27)	1.179 (1.39)	0.308 (1.06)	0.318 (1.17)
Small nation Dummy	-0.421 (-0.03)	-0.243 (-0.21)	-0.151 (-0.11)	-0.789 (-1.51)	-0.597 (-1.10)
Export concentration	-18.816** (-3.73)	-14.962** (-3.70)	-18.318** (-3.72)	-3.234** (-2.83)	-3.363** (-3.54)
Transition economy Dummy	-1.540 (-1.59)	0.323 (0.26)	-1.528 (-1.59)	0.611 (1.50)	0.712* (1.82)
Time trend	0.220** (3.51)	0.082 (1.48)	0.205** (2.92)	0.001 (0.05)	-0.035 (-1.61)
Threshold as share of world mean income	-3.370 (-1.02)	-2.980 (-1.21)	-3.316 (-0.98)	-0.875 (-0.93)	-0.843 (-0.97)
<i>Number of observations</i>	906	906	437	1567	2020
<i>Number censored observations</i>	824	824	355	968	1330
<i>Number of nations</i>	55	55	34	96	124
<i>Adj. pseudo-R²</i>	0.38	.65	0.27	0.21	0.21

Dependent variable is log of per capita IBRD borrowing. t-statistics are shown in parentheses. A * indicates significance at the 10 percent level, and ** at the 5 percent level. Standard errors are adjusted for non-independence within country clusters of observations except in column (ii).

Table 9
Descriptive Statistics for Expanded Samples

	Sample 3 Over IDA operational cutoff (N=1567)				Sample 4 All IBRD members (N=2020)			
	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev
Graduate dummy	0.41	0	1	0.49	0.32	0	1	0.47
Borrow Dummy	0.38	0	1	0.49	0.34	0	1	0.47
IBRD borrowing per capita	5.76	0	168.15	12.76	4.65	0	168.15	11.49
IDA borrowing per capita	0.42	0	40.72	2.8	1.78	0	46.72	4.92
Over IBRD threshold	0.50	0	1	0.50	0.38	0	1	0.49
Over IDA threshold	1.00	0	1	0	0.78	0	1	0.42
GNI per capita (current US \$)	11698	650	87340	12920	9183	120	87340	12304
Political Freedoms	10.7	2	14	3.5	10.0	2	14	3.6
Institutional Capacity	11.6	3	18	3.7	10.7	2	18	3.8
Transition dummy	0.14	0	1	0.35	0.12	0	1	0.32
Credit Rating	55.5	7.9	96.40	16.20	48.4	4.6	96.4	25.1
Small Country dummy	0.09	0	1	0.29	0.07	0	1	0.26
Bank crisis dummy (1 st 5 years)	0.12	0	1	0.33	0.14	0	1	0.34
Herfindahl exports concentration	0.10	0.002	1	0.16	0.11	0.002	1	0.16
Threshold as share of world mean	0.93	0.725	1.07	0.11	0.93	0.725	1.07	0.11
Year	1998.6	1982	2008	6.2	1998.6	1982	2008	6.1

Figure 1
Predicted graduation probability vs. actual graduation, selected countries

