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TAKEOFFS

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ABSTRACT

This paper identifies factors associated with takeoff -- a sustained period of high growth following a period of stagnation. We examine a panel of 241 "stagnation episodes" from 146 countries, 54 % of these episodes are followed by takeoffs. Countries that experience takeoffs average 2.3% annual growth following their stagnation episodes, while those that do not average 0% growth; 46% of the takeoffs are "sustained," i.e. lasting 8 years or longer. Using probit estimation, we find that de jure trade openness is positively and significantly associated with takeoffs. A one standard deviation increase in de jure trade openness is associated with a 55% increase in the probability of a takeoff in our default specification. We also find evidence that capital account openness encourages takeoff responses, although this channel is less robust. Measures of de facto trade openness, as well as a variety of other potential conditioning variables, are found to be poor predictors of takeoffs. We also examine the determinants of nations achieving sustained takeoffs. While we fail to find a significant role for openness in determining whether or not takeoffs are sustained, we do find a role for output composition: Takeoffs in countries with more commodity-intensive output bundles are less likely to be sustained, while takeoffs in countries that are more service-intensive are more likely to be sustained. This suggests that adverse terms of trade shocks prevalent among commodity exports may play a role in ending long-term high growth episodes.

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1. Introduction and overview

The purpose of this paper is to identify factors associated with growth acceleration from economic stagnation – a process dubbed by Rostow (1960) as *Economic Takeoff*. Understanding economic takeoffs remains the cornerstone of macro development – closing the income/capita gaps between the poorer countries and the OECD may be predicated on their ability to transition towards higher growth rates, potentially leading to a "takeoff." Rostow (1960) was among the first to put stagnation and the transition to growth at the center of macro-development, articulating conditions leading to a takeoff. He conjectured that economies evolves in stages – "The take-off is the interval when the old blocks and resistances to steady growth are finally overcome. The forces making for economic progress, which yielded limited bursts and enclaves of modern activity, expand and come to dominate the society. Growth becomes its normal condition."

Despite the proliferation of cross country growth regressions and the recent studies on "miraculous" growth of emerging markets, empirical investigations of takeoffs have provided mixed results. Easterly (2005) recently investigated takeoffs, using a benchmark definition of a takeoff as going from about zero growth (between -0.5 and 0.5 percents) to "permanent" stable positive per capita growth (above 1.5 percent). He found that, examining the experience of 127 countries, there are only 9 takeoffs, deducing that "The idea of the takeoff does not garner much support in the data. Takeoffs are rare in the data, most plausibly limited to the Asian success stories." Instead, he concluded that "gradual accelerations" are more prevalent than takeoffs. Parente and Prescott (2005) offer a different perspective. They take a political economy view of the obstacles to growth – "a country will catch up to the leading industrial countries only if it eliminates constraints preventing its adoption of leading technologies. Removal of these

constraints is likely to meet resistance, as the constraints are typically constructed to protect specialized groups of factor suppliers and corporate interests."[1]

Other explanations of stagnation in the literature suggest that factor endowments may inhibit adoption of leading technologies and result in stagnation. Basu and Weil (1998) develop a model where stagnation can result from emerging market countries possessing factor proportions too different from leader countries where technological innovation occurs. This leads technological innovations to be "inappropriate" for countries that are too far behind, so that divergence occurs. Benhabib and Spiegel (2005) introduce a model where insufficient endowments of human capital preclude technology adoption from advanced countries. Similarly, Easterly (2005) notes that a poverty trap could emerge in a Lucas-type (1988) model where low skill levels in the labor force might discourage new entrants into the labor force from acquiring higher skills.

In a recent paper, Hausmann, Pritchett and Rodrik [HPR (2005)] examine episodes of sustained rapid acceleration in economic growth. They study a cross-country panel with potential acceleration dates ranging from 1957 through 1992. In contrast to the takeoff results for permanent takeoffs in Easterly, they find that episodes of sustained acceleration are quite frequent. They identify more than 80 such acceleration episodes, with the unconditional probability that a country will experience a growth acceleration during a decade estimated to be at around 25%.

[1] Applying Maddison's data, they find evidence that late starters of takeoffs have been able to double their incomes in far shorter time periods compared to earlier starters. For "early starters," which are those achieving 10 percent of the 1985 U.S. GDP/Capita level before 1950, the median length of the time to double their GDP/Capita is 45 years. For "late starters," defined as those achieving 10 percent of the 1985 U.S. level after 1950, the median length of the doubling period is 15 years.

HPR find that changes in the political regime, identified as a significant changes in a nation's polity score [Marshall and Jaggers (2002)], the death of a national leader, or the end of a war, are important predictors of acceleration episodes. In contrast, they find economic reforms, proxied in their panel as transitions towards open trade policy using the Wacziarg and Welch (2003) update of the Sachs-Warner (1995) data set, have no significant impact on the probability of an acceleration.[2] They conclude that accelerations, while by no means rare, tend to be caused predominantly by idiosyncratic changes difficult to reconcile with country characteristics commonly associated with superior long-term growth in the literature.

Our analysis identifies "takeoffs" as intermediate phenomena between Easterly's more permanent takeoff definition, which revealed only 9 takeoffs in the experience of 127 countries (5 in the 44 country Maddison data set), and HPR's measures of accelerations, which include already fast-growing nations – for example China in 1990, which accelerated from 4.2% to 8.0% growth - and identify 80 accelerations. We define takeoffs as transitions from stagnation to robust growth, where stagnations are defined as five-year periods with average real per capita GDP growth below 1% and significant growth is defined as experiencing a period of real per capita GDP growth exceeding 3% over a minimum of 5 years within 10 years of the stagnation period. Of the 241 stagnation episodes in our full sample of 146 countries, 1950-2000, 54 % are followed within 10 years by takeoffs. The average duration of takeoffs in our sample exceeds 9 years. Moreover, the takeoffs that we examine in our study are phenomena that merit interest. For example, countries that experienced takeoffs according the base definition in our study averaged 2.3% annual real per capita GDP growth from their stagnation episodes, while those

[2] However, they found that economic reform is a statistically significant predictor of growth accelerations that are sustained.

that did not averaged 0% growth.[3] Average growth increases from -0.6% during stagnation episodes to 3.6% during takeoffs; 46% of the takeoffs are relatively "sustained," i.e. lasting 8 years or longer -- the fortunes of countries that either did or did not experience takeoff episodes are therefore markedly different.

Our motivation for examining this intermediate type of takeoff is two-fold: First, relative to the growth accelerations studied by HPR, our definition reflects the view that the first step of the economic takeoff, from stagnation to growth, is likely to differ from an acceleration in a country that is already growing at a significant base. This is consistent with Parente and Prescott's and Rostow's conjecture that the political economy transformation and the hurdles needed to overcome stagnation potentially differ from general growth accelerations. As such, there might be greater scope for economic policy to influence outcomes among these types of takeoffs.

Second, we adopt a takeoff definition that is less stringent than that in Easterly because economic stagnations are themselves costly phenomena that merit attention. While we accept Easterly's conjecture that permanent takeoffs from poverty traps are too rare to be systematically studied, our analysis below demonstrates that takeoffs of substantial duration from stagnation episodes are still relatively common. The data demonstrate that countries that exhibit these long periods of robust growth sometimes fall back into stagnation periods. While such a pattern might preclude the Easterly definition of a takeoff as a permanent increase to robust growth, it is still the case that welfare in the country is increased for having experienced the takeoff episode. As such, the determinants of takeoff episodes warrant attention.

The methodology we adopt is inspired by Hausmann, Pritchett and Rodrik (2005), refocusing on issues dealing with takeoffs. Our baseline criterion for a takeoff is more stringent

[3] These growth figures are calculated from the stagnation episode date to the end of the sample for each country.

than Easterly (2005) in terms of the post takeoff growth, but less stringent in terms of the duration of significant growth needed to be counted as a takeoff. This reflects our conjecture that the capacity to takeoff may differ from the capacity to sustain such a takeoff. It also implies that we may end up with more takeoffs than the one identified by Easterly (2005), some sustainable and some not. Of course, the discrete definition of a takeoff episode is arbitrary, so we subject our findings to a battery of robustness tests.

Our summary statistics below demonstrate that countries that *do* and *do not* experience takeoff episodes within 10 years of stagnation dates differ markedly in the degree of openness that their countries exhibited during their stagnation episodes. Episodes that yield positive takeoff responses have measurably higher levels of *de jure* and *de facto* trade openness, lower average tariff rates, and higher capital account openness. All of these differences are significant at least a 10% confidence level, with the difference in *de jure* openness being significant at a 1% confidence level. Positive takeoff responses are measurably more likely to occur following the end of a war, among countries with higher average education levels in the population, and have measurably lower shares of commodities in their output bundles relative to GDP. We then turn to parametric evidence, conducting probit estimation concerning the presence or absence of a takeoff within ten years of a stagnation episode. *de jure* trade openness is again positively and significantly associated with takeoffs. We also find that capital account openness encourages takeoff responses, although this channel exhibits less robustness.

In contrast to our results on the determinants of whether a takeoff occurs, we fail to find much of a role for openness in determining whether or not the takeoffs that countries experience are sustained. We again conduct probit estimation over the set of takeoffs to examine the determinants of whether or not a takeoff was sustained, defined as equal to or exceeding eight

years in length. We find that takeoffs sustainability is harder to achieve for countries with high shares of commodities in their output bundle, but easier for countries with high shares of services in their output. This suggests that a commodity-intensive economy is more likely to suffer from swings in terms of trade that may forestall a high growth episode, while the service sector is likely to be more stable.

The low explanatory power of our regressions concerning the duration of takeoffs does not negate the importance of our earlier results concerning the presence or absence of takeoffs, but it does suggest that more research is needed to understand the factors terminating takeoffs. Better understanding of these issues may require looking at non-linear interactions between shocks, social structures and institutions of conflict management, as Rodrik's (1999) study of the growth collapse after the mid-1970s.

The remainder of the paper is divided into six sections. Section 2 discusses the data and methodology. Section 3 overviews the parametric results. Section 4 reviews the robustness checks. Section 5 summarizes the determinants of sustained takeoffs, and Section 6 concludes.

2. Data and methodology

2.1 Data

Our data is an unbalanced panel of 146 countries from 1950 through 2000. Based on our definition of stagnation episodes, outlined below, we end up with 114 countries with potential takeoff dates ranging from 1960 through 1995.

Our main explanatory variables of interest are policy variables associated with national openness. We estimate our *de jure* measure of trade openness, *de jure openness*, using the update of the Sachs-Warner (1995) openness index constructed by Wacziarg and Welch (2003). This

variable takes value 1 during periods identified as open and 0 otherwise. As discussed in Rodriguez and Rodrik (2001), the index considers not only trade openness, but also structural features such as the presence of marketing boards and socialist economic regimes. As such, we follow HPR (2005) in interpreting a country's score on this index as being indicative of broader economic reforms.[4] We estimate *de facto openness* in terms of exports plus imports over GDP, measured in local currency using *IMF International Financial Statistics* data. We also examine tariff averages, *Avg. tariff rate*, using the Dollar-Kraay (2004) data.[5] Finally, *capital account openness,* provides a de jure measure of capital account openness from Chinn and Ito (2006).

Data on national output and population was taken from the Penn World Tables. We use chain-weighted per capita GDP estimates. Output and population are measured in logs, *lgdp* and *lpop* respectively. These variables, combined with regional dummy variables, *Latin America, Sub-Saharan Africa, Asia,* and *OECD,* form our base specification.[6]

We then subject our base specification to the addition of a number of alternative conditioning variables. We condition for changes in the net barter terms of trade using data from the World Development Indicators, or the IMF International Financial Statistics price indices of exports and imports for countries that are missing in our primary data source. Our measured

[4] We measure *de jure* openness as whether a country is open or closed on the stagnation date. As such, the positive coefficient we obtain below suggests that holding all else equal, being open raises the likelihood of going from stagnation to takeoff. In contrast, HPR (2005) measure changes in *de jure* openness, concentrating on changes in the level of openness as indicators of reform. Our use of the level of openness treats countries that have been open for a long time equivalently to those that have just opened, but it distinguishes these countries from those that remain closed.

[5] Tariffs are measured as average tariff rates within 10 years of stagnation date.

[6] All OECD countries are classified as in *OECD.* Non-OECD Latin American and Caribbean countries are classified as in *Latin America.* Sub-Saharan African countries are classified as in *Sub-Saharan Africa.* Non-OECD South and East Asian countries are classified as in *Asia,* and remaining non-OECD countries are classified as in *Other.*

change in the terms of trade *dTOT* is then measured as the average percentage in the terms of trade measure over the five year period beginning in the current year.[7]

We condition for human capital average years of education in the population above the age of 25 from the Barro and Lee (1993) data set.

Following HPR, we estimate political regime changes, *regchange,* as a three-unit change in the Marshall-Jaggers (2002) Polity IV data set. We also examine the *Lead_Death* political variable from the Jones and Olken (2005) data set, which takes value 1 if the country's leader has died within the previous five years newly-deceased leader. We also use the *War_End* and *Civil_War* variables, from the Correlates of War (2002) data base. The former takes value 1 if there has been a cessation of conflict within the previous five years and 0 otherwise, while the latter takes value 1 if there has been an end of a civil war within the previous five years and 0 otherwise.

To condition for financial development, we examine the ratios of domestic credit, liquid liabilities, and cash to GDP, respectively named *DomCredit, Liquid,* and *Money*. Data is obtained from the *World Development Indicators.*

Finally, we also condition for the overall structure of the economy, by introducing measures of manufacturing, commodities, and services as a share of GDP. These variables are labeled *Manuf/GDP, Comm/GDP,* and *Serv/GDP* respectively. Data for these variables was also obtained from the *World Development Indicators.*

[7] To maximize the sample size, in cases where terms of trade data where unavailable in the initial year, but were available within four years of the initial year, we used terms of trade changes over the five year interval beginning in the first year for which data was available. This interval remains within the ten year interval over which we searched for takeoffs.

2.2 Takeoff Definitions

To examine takeoff episodes, we first identify dates during stagnation episodes where takeoffs can potentially occur. These dates are defined as the last year of a five-year interval where real per capita GDP growth is below 1.0%. It is therefore possible (and indeed occurs) that a country in our sample can have more than one potential takeoff date. However, we don't want potential takeoff dates to overlap across five-year episodes or occur during takeoffs. Consequently, we assume that for a country to have a second potential takeoff date, it must achieve at least moderate growth (above 1%) subsequent to the initial stagnation episode date. We also rule out potential takeoff dates during takeoff episodes, as defined below.

A takeoff is then defined as occurring if there is a consecutive five year interval of high growth (more than 3%) within ten years of the potential takeoff date. We are also interested in the determinants of the duration of takeoffs. We time the end of a takeoff episode as occurring in the first year where average growth since the start of the takeoff falls below 3%. The duration of a takeoff is then measured as the time from the first to last years of the high growth period. The full set of takeoffs and non-takeoffs in our sample are listed in the appendix.

We understand that to some extent these values are arbitrary, so we subject our results below to a battery of robustness tests to ensure that our results are not driven by these definitions.

2.3 Characteristics of Takeoffs:

Summary statistics for takeoff episodes by region are shown in Table 1. The data reveal some interesting patterns: First, it can be seen that takeoff episodes are relatively common, similar to the findings for accelerations by HPR. Of the 241 stagnation episodes in our full sample, 54.4%, or 131 are followed within 10 years by takeoffs. Average growth increases from

-0.6% during stagnation episodes to 3.6%. 46.4% of the takeoffs in our sample meet our definition of being "sustained," i.e. lasting 8 years or longer.

The distribution of takeoffs is shown in Figure 1. There are a large number of takeoffs at or close to the minimum takeoff length of five years, but there are also a significant number of takeoffs of much longer duration, with three exceeding 30 years in duration.[8] The average duration of takeoffs in our sample exceeds 9 years.[9]

The distribution of takeoffs across time in our sample is shown in Table 2. While there is a bit of clustering at the initial potential takeoff date, 1960, by and large the takeoffs are distributed relatively evenly across the sample.

The breakdowns by region reveal a significant amount of heterogeneity at the regional level. The Sub-Saharan Africa region contains the greatest number of stagnation dates and exhibits the smallest share of stagnation dates followed by takeoffs (41.1%). The Asia and Other regions exhibit the highest takeoff percentages, at 70.8% and 88.5% respectively.[10] The OECD nations as a group also exhibit a relatively high incidence of takeoff (66.7%) suggesting that once a level of development is reached, countries are unlikely to become mired in very low growth episodes for significant periods of time before returning to robust growth.

There are also notable differences in takeoff characteristics across regions. The Sub-Saharan Africa region exhibited the smallest share of sustained takeoffs, with only 31.6% of

[8] The three countries with takeoffs equal to or exceeding thirty years in duration are the Congo, Israel, and Morocco.

[9] There are also 41 takeoffs in our sample that last beyond the end of our data, precluding measurement of their duration. These takeoffs have lasted an average of 13.4 years by the end of our sample, so our estimate of average takeoff duration would be increased if these episodes could be included. Takeoffs are considered unsustained if we have data that demonstrates that the takeoff ended within eight years of its beginning and sustained if data exists that demonstrates that the takeoff lasted at least eight years. Takeoffs with missing data that precludes them from inclusion into either category are treated as missing in our examinations of takeoff sustainability below.

[10] Countries included in the "Other" region in our sample include Algeria, Cyprus, Egypt, Hungary, Iceland, Iran, Israel, Jordan, Morocco, Poland, Romania, Syria, and Tunisia.

takeoffs exceeding the 8 year threshold, while the Other region exhibited the highest share of sustained takeoffs at 76.5%. However, the Sub-Saharan African region exhibited the highest average growth during takeoff episodes, averaging around 3.8% during takeoff episodes, a major jump from the -0.8% average growth the observations from that region exhibit during stagnation episodes.

Table 2 summarizes the differences in summary statistics for sub-samples of countries that do [dubbed positive] and do not experience [dubbed negative] takeoff episodes within 10 years of stagnation dates. It can be seen that positive and negative takeoff responses differ markedly in the degree of openness that their countries exhibited during their stagnation episodes. Episodes that yield positive takeoff responses have measurably higher levels of *de jure* and *de facto* trade openness, lower average tariff rates, and higher capital account openness. All of these differences are significant at least a 10% confidence level, with the difference in de jure openness being significant at a 1% confidence level.

Among the other explanatory variables, only three exhibit significant differences. Positive takeoff responses are measurably more likely to occur following the end of a war, among countries with higher average education levels in the population, and have measurably lower shares of commodities in their output bundles relative to GDP. All of these measurable differences appear to enter as one would predict.

Whether or not a country responds to stagnation episode with a takeoff has significant implications for its subsequent growth experience. Figure 3 displays the histograms of average growth rates subsequent to the stagnation date for countries that did and did not achieve takeoffs. These distributions are quite different, as countries that experienced takeoffs according the base

definition in our study averaged 2.3% annual growth following their stagnation episodes, while those that did not averaged 0.0% growth.

3. Parametric results

To examine the relationship between openness and takeoffs more formally, we next turn to parametric evidence. Since the presence or absence of a takeoff within ten years of a stagnation date is a qualitative variable, we estimate our specifications using probit estimation with White's heteroskedasticity correction. As we have some countries in our sample with more than one stagnation episode, we cluster our standard errors to allow for correlations by country. We also estimate our specifications with regional dummies to control for fixed effects by region. Our base specification also conditioning variables for GDP per capita and population, both measured in logs.

Our baseline parametric results are shown in Table 3. Models 1 through 4 introduce each openness measure one at a time. Model 5 introduces all four variables at once. It can be seen in Models 3 and 5 that the introduction of the average tariff variable results in a substantial reduction in our sample size. We therefore drop this variable in Model 6, which serves as our base specification.[11]

Looking at the results as a whole, it is apparent that there is significant explanatory power associated with openness. *De jure openness* is particularly robust, consistently entering at a 1% confidence level with a coefficient estimate around 1. Our coefficient point estimate also suggests that the variable has economic significance. For example, given the variable's standard

[11] We also ran all of the specifications reported in Table 4 with the average tariff variable included as the openness measure. This measure was fairly robust, usually entering at at least a 10% confidence level despite the reduced sample size. These regressions are available from the authors on request.

deviation of 0.45, a one standard deviation increase in *de jure openness* results in an increase in the probability of a takeoff of 55% in our default specification (Model 6).

In contrast to the *de jure* results, our *de facto openness* variable is constantly insignificant at standard levels, suggesting that *de facto openness* is a poor predictor of takeoffs. However, our other measure of *de jure* openness, average tariff levels, does enter marginally significant at exactly a 10% confidence level when entered on its own. Nevertheless, the variable is insignificant when introduced in a specification including our other openness measures.

Our *capital account openness* measure is also statistically significant at at least a 10% confidence level in all three specifications in which it is included, with its predicted positive sign. Moreover, as was the case for the *de jure* openness variable, we also obtain an economically significant point estimate, as a one standard deviation increase in *capital account openness* is predicted to result in a 29% increase in the probability of a takeoff.

Concerning our other regressors, the log of GDP tends to enter significantly negatively, with the exception of Model 3 with its reduced sample size. Population also usually receives a negative point estimate at statistically significant levels, again with the lone exception being a specification (Model 5) in which average tariff levels are introduced and the sample size is markedly smaller. Among the regional dummies, the Sub-Saharan Africa variable is robustly significant, which would be expected given our results above that showed this region as having the lowest takeoff incidence. The other regional dummies that exhibit robust results include *Latin America*, which is robustly negative at statistically significant levels, and the constant term, which reflects the Other regions and obtains a consistently positive coefficient estimate at statistically significant levels.

Overall, our results strongly indicate that "policy matters" for takeoffs, in the sense that *de jure* measures of both trade and capital account openness were found to be positively associated with takeoffs after stagnation episodes at statistically and economically significant levels.

4. Robustness checks.

4.1 Additional conditioning variables

In this section, we subject our default specification to a variety of robustness checks. First, we introduce a variety of additional conditioning variables in Table 4. These include a measure of changes in the terms of trade; an indicator of years of schooling in the population; a measure of political regime change; indicators of political changes, such as being at the end of a civil or other war or the death of a national leader; indicators of levels of domestic financial development, and finally indicators of economic structure as measured by the share of manufactures, commodities and services.

Overall, our results for the openness policy variables are quite similar to those we obtained in our default specification. *de jure openness* enters at at least a 10% confidence level in all specifications with similar coefficient magnitudes to those obtained in Table 3. *de facto openness* continues to be insignificant. Capital account openness tends to enter significantly positive at at least a 10% confidence level, with the lone exception being Model 4, which introduces the *War End*, *Civil War* and *Leader Death* indicators of political changes.

For space reasons, coefficient estimates for the other regressors have not been reported.[12] However, these results were largely similar to those reported in Table 3. The Sub-Saharan Africa dummy and the constant term reflecting the Other region again enter robustly at statistically

[12] These estimates are available on request from the authors.

significant negative and positive coefficient estimates respectively. There was some reduction in the robustness of the *lgdp* and *lpop* variables, although these continue to tend to enter with negative coefficient estimates.

Concerning the additional conditioning variables, most are insignificant, with the exception of the *regchange* variable, which enters negatively at a 10% confidence level.

4.2 Alternative samples

Table 5 considers a number of different sample populations. For space considerations, we again suppress the coefficient estimates on the GDP and population variables, as well as the regional dummies, and concentrate on the coefficient estimates for the openness coefficient estimates of interest. To highlight the implications of sample changes, we run our default specification throughout.

We first drop countries with large (greater than 100 million) and then small (less than 5 million) populations. We next drop wealthy countries, those earning more than $20,000 in GDP per capita, and then drop poor countries, those earning less than $1,000 per capita. Finally, we drop each of the four regions from the sample one at a time.

As before, the *de jure openness* variable is positive and significant at a 1% confidence level for all of the sample permutations, usually with a coefficient value around 1. The one exception is when we drop the countries in the Latin America region, which results in the variable losing its statistical significance, although it still enters with a point estimate of 0.77, which is also insignificantly different from 1. It is also noteworthy that we obtain a very large coefficient estimate of 2.33 when we drop the smaller countries below 5 million in population,

suggesting that the probability of a takeoff among the larger countries in our sample is quite sensitive to a countries openness policy.

For all of the alternative samples we again fail to find a significant impact of *de facto openness,* except for the sub-sample which excludes the OECD countries. For this alternative sample, *de facto openness* enters negatively at a 10% confidence level.

Capital account openness obtains a positive coefficient estimate for all of the alternative samples we consider. However, the estimate is only statistically significant at a 10% level for three of samples where one of the regions is dropped, the exception being when the OECD observations are dropped. Overall, the results are in keeping with the rest of our specifications, in that the *capital account openness* variable consistently enters with a positive coefficient estimate, but demonstrates less robustness than the *de jure openness* variable.

4.3 Alternative takeoff definitions

We next examine some perturbations of our takeoff definitions. First, we consider a stricter definition of stagnation episodes. As in Easterly (2005), we limit our stagnation episodes to those periods with growth below 0.5%. Second, we again follow Easterly by reducing the threshold for takeoff episodes to growth periods exceeding 1.5%. Finally, we consider a tighter definition of takeoffs, only considering growth episodes which average over 4% growth in real per capita GDP over five years as takeoff episodes.

We then increase the minimum duration of takeoff episodes to eight years, the time period considered by HPR. We first examine takeoffs and stagnation episodes with the same parameters as those above, so that only the minimum takeoff duration is changed. Next, we

examine the combination of the perturbations considered above with minimum eight year takeoff durations. In all, Table 6 examines 7 alternative takeoff definitions.

Our primary openness measure *de jure openness,* consistently enters with a positive coefficient estimate at or above 1 at at least a 5% confidence level for all specifications except the final one, which considers minimum eight year takeoff episodes averaging at least 4% growth. This is the most restrictive takeoff definition, and as such results in the fewest designated takeoff episodes.

The de facto openness variable still tends to enter insignificantly with a negative point estimate, with the exception of the specification with stagnation episodes limited to five-year periods below 0.5% average growth where it enters at a 5% significance level. However, this is the only specification in our study in which this variable is significant, so we still consider this result very fragile.

The capital account openness variable is insignificant throughout the seven alternative specifications, entering with a positive point estimate for all but the final specification, the one with eight year minimum takeoff episodes exceeding 4% in average growth.

5. Determinants of sustained takeoffs

This section examines the determinants of sustained takeoffs, defined as those lasting at least eight years at high average growth rates. We examine a qualitative specification based on the set of observations that yielded positive takeoff responses. As such, our samples are much smaller than those in the main portion of the study. To compensate for this, we introduce only one conditioning variable at a time.

Our results are shown in Table 7. It can be seen that our openness variables do not seem to be robust predictors of whether or not takeoffs will be sustained. The *de jure openness* variable usually enters with a positive point estimate, but is only statistically in one of the eight specifications reported (Model 3). The de facto openness variable is insignificant, as it was generally for the takeoff response specifications above. However, the most interesting change is that the *capital account openness* variable now tends to enter negatively, and usually (but not always) at statistically significant levels. This provides some support for the contention that open capital accounts can be associated with greater output growth volatility, as countries with open capital accounts in our sample appears to be less likely to experience sustained takeoffs conditional on the occurrence of a takeoff.

The conditioning variables tend to enter insignificantly, but there are some notable exceptions. The *regchange* variable enters negatively at a 5% confidence level, suggesting that takeoffs that take place after political regime changes tend to be of shorter duration than those that do not. The domestic credit variable enters positively at a 10% confidence level, providing some evidence that sustained takeoffs are associated with more developed domestic financial systems.

However, the most interesting results among the conditioning variables concern the proxies for the composition of the country output bundle. Because we were particularly interested in this variable for the determinants of the presence or absence of a sustained takeoff, we introduced the three variables considered above one at a time.[13] Two of the composition variables, the share commodities and the share of services, enter at least a 5% confidence level, with commodities entering negatively and services entering positively. These signs are intuitive

[13] When the three variables are introduced simultaneously, all enter insignificantly, but this is probably attributable to the small sample with this specification (45 observations) and the high correlations among thes output share measures.

if one thinks that a commodity-intensive economy is more likely to suffer from swings in terms of trade that may forestall a high growth episode, while the service sector is likely to be more stable.

6. Conclusion

This paper examines the characteristics of nations that experience takeoffs, long periods of high growth subsequent to stagnation episodes. Given the marked difference in growth experiences countries exhibited subsequent to their stagnation episodes depending on whether or not they achieved a takeoff, the determinants to such takeoffs are of important policy concern.

Our results indicate that policy clearly does matter in determining whether or not countries move from low growth episodes to takeoffs, with *de jure* trade openness policies playing a prominent role in determining whether or not a takeoff occurs. We also found some evidence that capital account openness encouraged takeoff responses, although this channel exhibited less robustness.

We failed to find much of a role for openness policy in determining whether or not countries experienced sustained takeoffs, conditional on a takeoff having occurred. However, we did find some role for economic structure. Countries with output bundles that were more commodity-intensive exhibited a smaller share of sustained takeoffs, while those that were more service-intensive exhibited a greater share of sustained takeoffs. This analysis suggests that adverse terms of trade shocks prevalent among commodity exports may play a role in ending long-term high growth episodes.

The results in our study re-raise the question of what is the meaning of a takeoff episode. We obtained different results than some of the previous literature in part because of the

difference in takeoff definitions used in our study. We do not intend to suggest that our definition is superior; in many ways we are measuring different phenomena than, for example, the permanent takeoffs studied by Easterly (2005). Still, as we discussed in the introduction, the takeoffs that we examine in our study are important phenomena that merit interest. Countries that experienced takeoffs in our study averaged 2.3% growth following their stagnation episodes, while those that did not averaged 0.0% growth. Regardless of the fact that the definition of a takeoff episode is somewhat arbitrary, then, these are certainly phenomena that merit attention.

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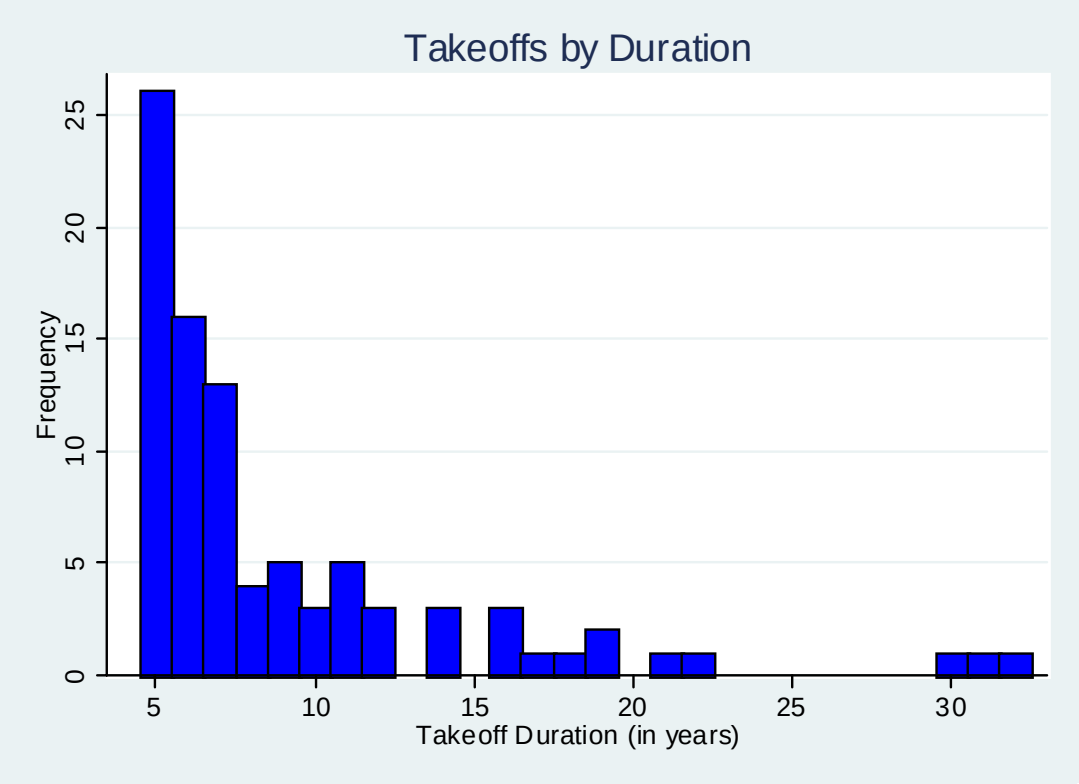
Figure 1

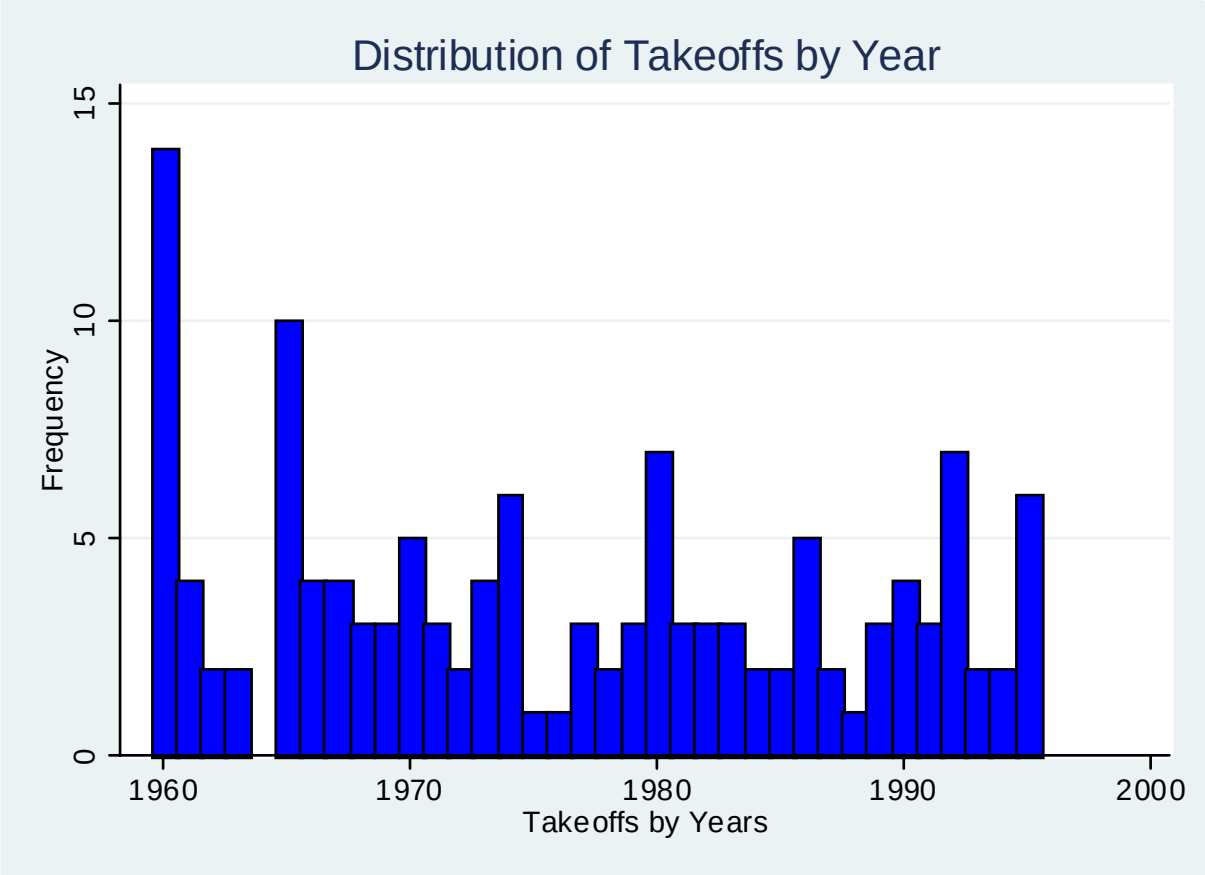
Takeoff Durations



Note: Histogram of measurable durations of takeoffs in sample. The average of takeoffs of measurable duration exceeds 9 years, but there are also 41 takeoffs in our sample that last beyond the end of our data, precluding measurement of their duration. These takeoffs have lasted an average of 13.4 years by the end of our sample, so our estimate of average takeoff duration would be increased if these episodes could be included.

Figure 2

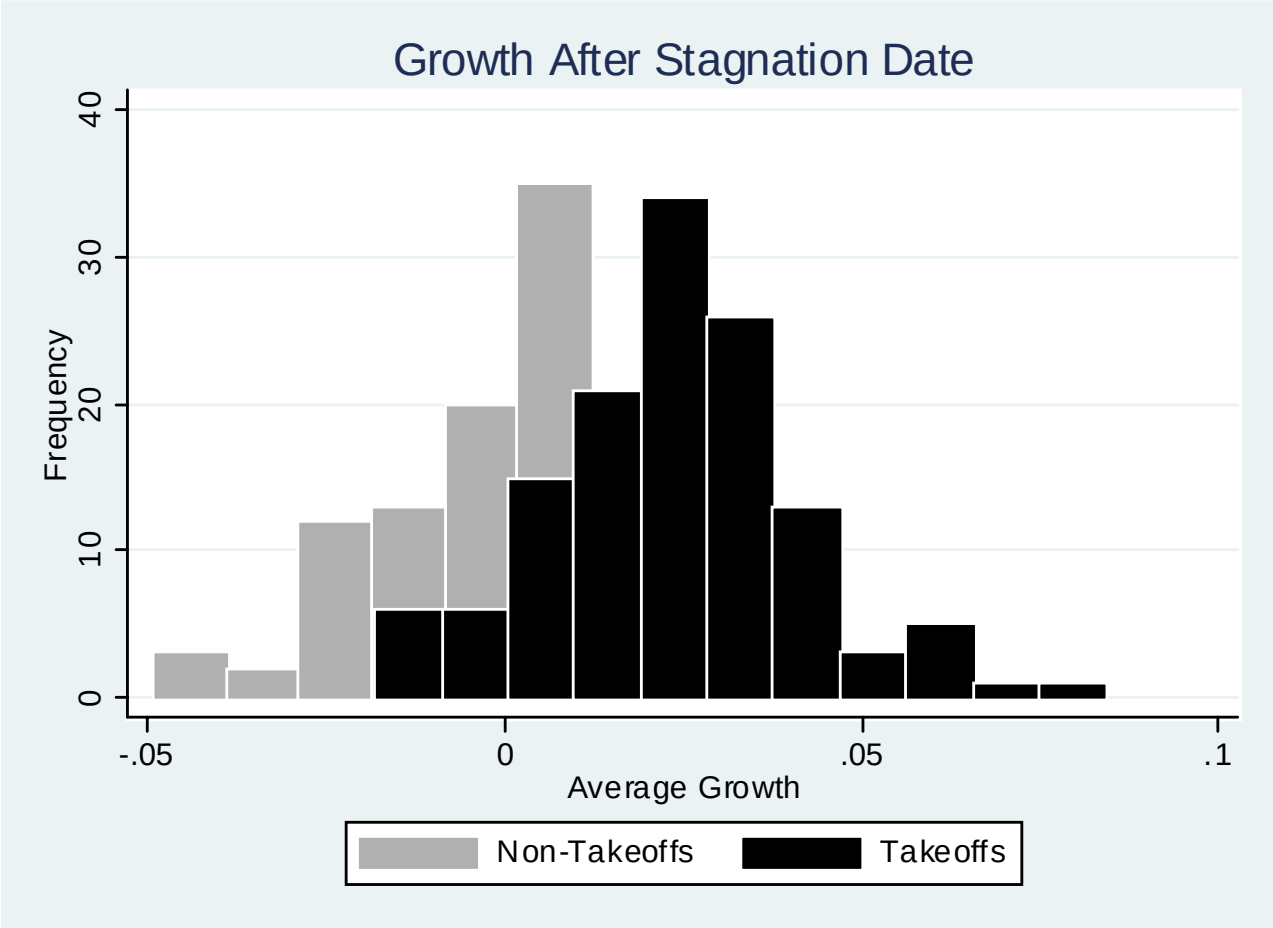
Timing of Takeoffs in Sample



Note: Histogram of takeoffs by year. Total of 131 takeoffs out of 241 stagnation dates.

Figure 3

Growth of Takeoff and Non-takeoff countries



Note: Histograms of average growth rates from stagnation date to end of sample for samples of countries which did and did not exhibit takeoffs. Sample includes 131 stagnation episodes that did result in takeoffs and 110 that did not.

Table 1

Summary Statistics by Region

	All obs.	Sub-Saharan Africa	South & East Asia	Latin Amer. & the Caribbean	Other	OECD
Number of Stagnation episodes	241	107	24	57	26	27
Number of takeoffs	131	44	17	29	23	18
Takeoff Percentage	54.4%	41.1%	70.8%	50.9%	88.5%	66.7%
Sustainable Takeoff Percentage (takeoff > 8 yrs.)	46.4%	31.6%	47.1%	52.2%	76.5%	40.0%
Average Duration of Takeoff	9.04	7.13	7.92	9.33	15.18	9.14
Average Growth during Stagnation episode	-0.6%	-0.8%	-0.04%	-0.1%	-1.9%	0.5%
Average Growth During Takeoff	3.6%	3.8%	3.5%	3.4%	3.5%	3.3%

Note: Table lists number of stagnation episodes and takeoffs by region. See text for methodology used in calculating stagnation episodes and takeoffs.

Table 2
Summary Statistics: Takeoffs vs. Non-Takeoffs

Conditioning Variables	TO = 0	TO=1	DIFF
lgdp	7.725 (0.091)	7.892 (0.096)	-0.168 (0.132)
lpop	15.670 (0.117)	15.354 (0.173)	0.316 (0.209)
de facto openness	0.556 (0.033)	0.636 (0.036)	-0.080* (0.049)
de jure openness	0.124 (0.032)	0.344 (0.043)	-0.220*** (0.054)
capital account openness	-0.735 (0.114)	-0.323 (0.164)	-0.412** (0.200)
avg. tariff rate	27.324 (2.264)	18.355 (2.598)	8.969** (3.446)
dtot	-0.0001 (0.007)	0.031 (0.026)	-0.031 (0.027)
Years of schooling	3.273 (0.301)	4.043 (0.304)	-0.770* (0.428)
Lead_Death	0.032 (0.018)	0.033 (0.019)	-0.001 (0.026)
War_End	0.116 (0.033)	0.207 (0.042)	-0.091* (0.054)
Civil_War	0.063 (0.025)	0.043 (0.021)	0.020 (0.033)
regchange	0.255 (0.042)	0.183 (0.034)	0.071 (0.054)
Money	25.097 (2.183)	29.853 (1.880)	-4.756 (2.880)
DomCredit	35.553 (2.995)	42.110 (3.682)	-6.557 (4.747)
Liquid	29.727 (2.418)	33.439 (2.179)	-3.711 (3.255)
Comm/GDP	0.328 (0.018)	0.273 (0.018)	0.055** (0.025)
Manuf/GDP	0.135 (0.009)	0.146 (0.009)	-0.012 (0.012)
Serv/GDP	0.456 (0.013)	0.480 (0.014)	-0.024 (0.019)

Note: Table compares summary statistics for sub-samples of countries that do and do not experience takeoff episodes within 10 years of stagnation dates. * indicates significance at 10% level; ** at 5% level; and *** significant at 1% level.

Table 3
Openness and Takeoffs

Dependent variable: Realization of a takeoff

	(1)	(2)	(3)	(4)	(5)	(6)
constant	6.978***	7.296***	6.762**	9.000***	11.641*	11.032***
	(1.931)	(2.072)	(3.274)	(2.583)	(6.224)	(3.148)
de jure openness	0.812***	--	--	--	1.395***	1.222***
	(0.299)				(0.471)	(0.411)
de facto openness	--	0.062	--	--	-0.428	-0.565
		(0.373)			(0.835)	(0.445)
capital account openness	--	--	--	0.181*	0.563**	0.229*
				(0.109)	(0.263)	(0.122)
Avg. tariff rate	--	--	-0.024	--	-0.023	--
			(0.015)		(0.016)	
lgdp	-0.453***	-0.367**	-0.259	-0.588**	-1.007**	-0.656**
	(0.163)	(0.169)	(0.296)	(0.233)	(0.512)	(0.293)
lpop	-0.142**	-0.195**	-0.194**	-0.197***	-0.110	-0.282***
	(0.065)	(0.087)	(0.099)	(0.074)	(0.173)	(0.108)
Latin America	-1.300***	-1.306***	-1.172**	-1.089**	-0.757	-1.047**
	(0.387)	(0.342)	(0.569)	(0.442)	(0.721)	(0.463)
Sub-Saharan Africa	-1.906***	-1.975***	-1.817**	-2.097***	-2.455**	-2.061***
	(0.455)	(0.422)	(0.798)	(0.523)	(1.244)	(0.629)
Asia	-0.835*	-0.498	0.510	-0.111	0.452	0.433
	(0.470)	(0.499)	(0.984)	(0.558)	(1.321)	(0.699)
OECD	-0.611	-0.277	-0.588	0.097	-1.377	-0.815
	(0.495)	(0.453)	(0.756)	(0.544)	(1.207)	(0.657)
Observations	227	187	70	145	57	120
Pseudo R-squared	0.14	0.14	0.23	0.16	0.34	0.23

Notes: Probit estimation with clustering by country and robust standard errors in parentheses. Standard errors are in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 4
Additional Conditioning Variables

Dependent variable: Realization of a takeoff

	(1)	(2)	(3)	(4)	(5)	(6)
constant	7.78*	12.03***	9.92***	10.91***	11.36***	11.69***
	(4.09)	(4.09)	(3.10)	(3.66)	(3.14)	(4.16)
de jure openness	1.03**	1.20***	1.18***	0.85*	1.33***	1.24***
	(0.43)	(0.42)	(0.39)	(0.43)	(0.44)	(0.43)
de facto openness	-0.43	-0.54	-0.47	-0.85	-0.27	-0.60
	(0.69)	(0.52)	(0.47)	(0.62)	(0.67)	(0.45)
capital account openness	0.31*	0.23*	0.26**	0.22	0.28**	0.22*
	(0.17)	(0.12)	(0.12)	(0.14)	(0.14)	(0.13)
dTOT	-0.22	--	--	--	--	--
	(0.75)					
Years of schooling	--	0.07	--	--	--	--
		(0.11)				
regchange	--	--	-0.63*	--	--	--
			(0.34)			
Civil_War	--	--	--	-0.57	--	--
				(0.79)		
War_End	--	--	--	0.07	--	--
				(0.41)		
Lead_Death	--	--	--	-0.02	--	--
				(0.53)		
DomCredit	--	--	--	--	0.01	--
					(0.01)	
Liquid	--	--	--	--	-0.001	--
					(0.03)	
Money	--	--	--	--	-0.02	--
					(0.03)	
Comm/GDP	--	--	--	--	--	-0.55
						(2.88)
Manuf/GDP	--	--	--	--	--	1.06
						(3.74)
Serv/GDP	--	--	--	--	--	0.41
						(2.78)
Observations	87	102	120	109	104	149
Pseudo R-squared	0.22	0.23	0.25	0.22	0.24	0.18

Note: Probit estimation with clustering by country and robust standard errors in parentheses. Variables included in specification but not reported: *lgdp, lpop, Latin America, Sub-Saharan Africa, Asia, OECD.* * indicates significance at 10% level; ** at 5% level; and *** significant at 1% level.
For space reasons, coefficient estimates for the other regressors have not been reported.

Table 5
Alternative samples

Dependent variable: Realization of a takeoff

Change	*de jure openness*	*de facto openness*	*capital account openness*	# obs.	Pseudo R^2
Base Regression	1.22***	-0.56	0.23*	120	0.23
	(0.41)	(0.44)	(0.12)		
Drop countries with population > 100m	1.20***	-0.55	0.20	115	0.21
	(0.41)	(0.44)	(0.13)		
Drop countries with population < 5m	2.33***	0.38	0.12	76	0.45
	(0.63)	(1.01)	(0.20)		
Drop countries > 20k GDP per capita	1.21***	-0.46	0.19	116	0.23
	(0.42)	(0.46)	(0.13)		
Drop countries < 1k GDP per capita	1.01**	-0.25	0.20	99	0.29
	(0.44)	(0.52)	(0.12)		
Drop Latin America	0.77	-0.56	0.07	87	0.22
	(0.49)	(0.61)	(0.17)		
Drop Sub-Saharan Africa	1.49***	-0.84	0.27**	74	0.22
	(0.51)	(0.64)	(0.13)		
Drop Asia	1.19***	-0.53	0.22*	111	0.19
	(0.41)	(0.44)	(0.12)		
Drop OECD	1.20***	-0.84*	0.25	101	0.28
	(0.45)	(0.44)	(0.16)		
Drop Other	1.52***	-0.16	0.27**	107	0.24
	(0.45)	(0.46)	(0.13)		

Note: Probit estimation with clustering by country and robust standard errors in parentheses. Variables included in specification but not reported: *lgdp, lpop, Latin America, Sub-Saharan Africa, Asia, OECD.* * indicates significance at 10% level; ** at 5% level; and *** significant at 1% level.
For space considerations we suppress the coefficient estimates on the GDP and population variables, as well as the regional dummies, and concentrate on the coefficient estimates for the openness coefficient estimates of interest. To highlight the implications of sample changes, we run our default specification throughout.

Table 6
Alternative Takeoff Definitions

5 Year Minimum Growth Intervals					
Change	*de jure openness*	*de facto openness*	*capital account openness*	# obs.	Pseudo R^2
Stagnation episodes below 0.5%	2.03***	-1.33**	0.19	111	0.24
	(0.53)	(0.62)	(0.14)		
Takeoff episodes above 1.5%	1.05**	0.43	0.21	121	0.19
	(0.50)	(0.53)	(0.13)		
Takeoff episodes above 4%	0.90**	-0.59	0.03	112	0.15
	(0.45)	(0.44)	(0.13)		
8 Year Minimum Growth Intervals					
Change	*de jure openness*	*de facto openness*	*capital account openness*	# obs.	Pseudo R^2
Base Regression	1.52***	-0.80	0.15	109	0.11
	(0.54)	(0.62)	(0.13)		
Stagnation episodes below 0.5%	1.47***	-1.04	0.21	109	0.23
	(0.57)	(0.69)	(0.13)		
Takeoff episodes above 1.5%	1.38***	-0.77	0.15	113	0.35
	(0.41)	(0.57)	(0.15)		
Takeoff episodes above 4%	1.01	-0.29	-0.05	109	0.24
	(0.62)	(0.69)	(0.15)		

Note: Probit estimation with clustering by country and robust standard errors in parentheses. Variables included in specification but not reported: *lgdp, lpop, Latin America, Sub-Saharan Africa, Asia, OECD.* * indicates significance at 10% level; ** at 5% level; and *** significant at 1% level.

Table 7
Determinants of Sustained Takeoffs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
constant	-1.37	-0.82	-4.58	-1.08	-0.17	9.05	-1.25	0.26
	(5.13)	(7.71)	(6.81)	(4.94)	(5.91)	(7.30)	(5.08)	(5.56)
de jure openness	0.94	1.19	1.53**	0.92	0.92	0.65	0.84	1.01
	(0.74)	(1.00)	(0.76)	(0.81)	(0.71)	(0.86)	(0.72)	(0.78)
de facto openness	0.64	1.12	0.21	0.57	0.81	-0.21	0.68	0.05
	(0.97)	(1.71)	(0.97)	(0.98)	(1.07)	(1.03)	(0.97)	(1.02)
capital account openness	-0.33**	-0.43	-0.23	-0.31*	-0.44**	-0.20	-0.33**	-0.34**
	(0.16)	(0.28)	(0.17)	(0.17)	(0.21)	(0.15)	(0.16)	(0.15)
dTOT	--	1.42	--	--	--	--	--	--
		(0.99)						
Years of schooling	--	--	-0.22	--	--	--	--	--
			(0.15)					
regchange	--	--	--	-0.97**	--	--	--	--
				(0.49)				
DomCredit	--	--	--	--	0.02*	--	--	--
					(0.01)			
Comm/GDP	--	--	--	--	--	-9.25***	--	--
						(2.73)		
Manuf/GDP	--	--	--	--	--	--	2.06	--
							(2.74)	
Serv/GDP	--	--	--	--	--	--	--	4.70**
								(2.34)
Observations	45	27	39	45	44	45	45	45
Pseudo R-squared	0.17	0.26	0.23	0.20	0.23	0.30	0.18	0.21

Note: Probit estimation with clustering by country and robust standard errors in parentheses. Variables included in specification but not reported: *lgdp, lpop, Latin America, Sub-Saharan Africa, Asia, OECD.* * indicates significance at 10% level; ** at 5% level; and *** significant at 1% level.

APPENDIX: Data Sources (Mnemonics in parentheses where available)

Penn World Table Mark 6.2 (http://www.pwt.econ.upenn.edu):

- Real GDP using the chain rule (rgdpch)
- Population (pop)

World Development Indicators (http://www.worldbank.org/data):

- Net Barter Terms of Trade
- Domestic Credit/GDP
- Liquid Liabilities/GDP
- Money/GDP
- Educational Attainment

International Financial Statistics (http://ifs.apdi.net/imf/about.asp):

- Export Price Index (???)
- Import Price Index (???)

Polity IV Project Data Set (http://www.cidcm.umd.edu/polity)

- Polity2 (polity2)
-

Years of schooling

- Barro and Lee (1993)

Average Tariff Rates

- Dollar and Kraay (2004)

Periods of openness (http://www.stanford.edu/~wacziarg/downloads/liberalization.xls):

- Wacziarg and Welch (2003)

Leader Death

- Jones and Olken (2005)

Tenure

- Jones and Olken (2005)

War End (http://webapp.icpsr.umich.edu/cocoon/ICPSR-STUDY/09905.xml)

- Singer and Small, Correlates of War International and Civil War Database (2003)

Civil War (http://webapp.icpsr.umich.edu/cocoon/ICPSR-STUDY/09905.xml)

- Singer and Small, Correlates of War International and Civil War Database (2003)

Capital Account Openness (http://www.ssc.wisc.edu/~mchinn/kaopen_2005.xls)

- Chinn and Ito (2006)

Appendix 2: Takeoffs in our sample

Country	Stagnation year	Start of takeoff	End of takeoff	Takeoff duration
Algeria	1970	1972	1987	16
Antigua	1995	1996	5†	
Argentina	1963	1964	1974	11
Bangladesh	1979	1981	1986	6
Bangladesh	1989	1990	1998	9
Barbados	1984	1985	1994	10
Barbados	1995	1996	5†	
Belarus	1995	1996	5†	
Belgium	1985	1986	1990	5
Belize	1985	1986	1997	12
Bolivia	1960	1962	1967	6
Bolivia	1968	1971	1977	7
Botswana	1965	1966	34†	
Burkina Faso	1972	1974	1979	6
Burundi	1980	1984	1988	5
Cameroon	1965	1971	1975	5
Canada	1960	1961	1981	21
Canada	1982	1983	1989	7
Canada	1991	1996	5†	
Cape Verde	1965	1966	1973	8
Cape Verde	1974	1975	26†	
Chad	1982	1984	1989	6
Chile	1973	1976	1981	6
Chile	1983	1984	17†	
China	1961	1962	1967	6
China	1971	1975	26†	
Congo, Republic of	1967	1968	1998	31
Costa Rica	1963	1968	1974	7
Cyprus	1960	1961	1974	14
Cyprus	1975	1976	21†	
Denmark	1981	1982	1986	5
Dominican Republic	1965	1966	1984	19
Dominican Republic	1986	1991	10†	
Ecuador	1966	1968	1986	19
Egypt	1974	1975	26†	

Note: Countries not appearing in this table either did not experience stagnation episodes in our sample, or experienced stagnations episodes, but not takeoffs. The later group is listed in Appendix 3 as non takeoff.

† indicates takeoffs that did not end prior to end of sample for that country. Takeoff duration reported for countries with ongoing takeoffs at end of sample indicates length of duration up to the sample end. Stagnation year corresponds to last year of stagnation episode.

Appendix 2: Takeoffs in our sample

(continued)

Country	Stagnation year	Start of takeoff	End of takeoff	Takeoff duration
El Salvador	1960	1961	1967	7
Equatorial Guinea	1965	1970	1974	5
Ethiopia	1991	1993		8†
Fiji	1965	1966	1982	17
Fiji	1983	1988	1994	7
Finland	1978	1979	1990	12
Finland	1992	1994	7†	
Gabon	1981	1986	1991	6
Gambia, The	1979	1980	1984	5
Ghana	1960	1966	1976	11
Greece	1990	1996	5†	
Grenada	1994	1995	6†	
Guinea-Bissau	1966	1971	1979	9
Guinea-Bissau	1980	1981	1985	5
Guinea-Bissau	1986	1987	1991	5
Guinea-Bissau	1992	1993	8†	
Guyana	1960	1964	1972	9
Guyana	1992	1993	7†	
Haiti	1972	1976	1980	5
Honduras	1970	1975	1981	7
Hungary	1990	1996	5†	
Iceland	1960	1961	1967	7
Iceland	1969	1970	1991	22
Iceland	1992	1994	7†	
India	1966	1967	1971	5
India	1974	1980	21†	
Indonesia	1965	1966	35†	
Iran	1987	1989	12†	
Israel	1967	1968	1997	30
Jordan	1969	1972	1989	18
Kenya	1961	1962	1967	6
Kenya	1970	1971	1982	12
Korea, Republic of	1960	1961	40†	
Latvia	1995	1996	5†	
Lesotho	1969	1970	1974	5
Lesotho	1990	1996	5†	
Luxembourg	1977	1982	19†	
Malawi	1960	1962	1967	6
Malawi	1970	1971	1981	11
Malawi	1994	1995	6†	
Malaysia	1986	1987	14†	
Mali	1973	1974	1979	6
Mali	1993	1995	6†	
Mauritius	1960	1961	1967	7

Appendix 2: Takeoffs in our sample
(continued)

Country	Stagnation year	Start of takeoff	End of takeoff	Takeoff duration
Mauritius	1968	1970	31†	
Mexico	1995	1996	5†	
Morocco	1960	1961	1992	32
Mozambique	1966	1967	1973	7
Mozambique	1993	1996	5†	
Nepal	1980	1981	1985	5
New Zealand	1968	1969	1974	6
Nicaragua	1960	1961	1970	10
Nigeria	1965	1967	1971	5
Norway	1991	1992	1998	7
Pakistan	1960	1961	1976	16
Panama	1976	1977	1986	10
Panama	1987	1990	1994	5
Papua New Guinea	1970	1971	1975	5
Papua New Guinea	1988	1989	1994	6
Peru	1961	1962	1975	14
Philippines	1992	1993	1997	5
Poland	1984	1985	1989	5
Poland	1990	1992	9†	
Portugal	1978	1984	1994	11
Romania	1980	1981	20†	
Rwanda	1965	1966	1970	5
Rwanda	1974	1975	1983	9
Sao Tome and Principe	1980	1981	1985	5
Sao Tome and Principe	1986	1987	10†	
Seychelles	1965	1966	35†	
Sierra Leone	1967	1968	1972	5
Sierra Leone	1973	1979	1984	6
Slovak Republic	1992	1993	1999	7
Slovenia	1995	1996	5†	
Spain	1979	1985	1991	7
Sri Lanka	1974	1979	1986	8
Syria	1967	1968	1972	5
Syria	1977	1978	1988	11
Syria	1989	1990	11†	
Tanzania	1980	1983	1987	5
Togo	1971	1972	1976	5
Trinidad &Tobago	1971	1972	1985	14
Trinidad &Tobago	1992	1995	6†	
Tunisia	1989	1994	7†	
Turkey	1962	1963	1978	16
Turkey	1980	1983	1988	6

Appendix 2: Takeoffs in our sample
(continued)

Country	Stagnation year	Start of takeoff	End of takeoff	Takeoff duration
Uganda	1973	1979	1984	6
Uganda	1986	1990		11†
United Kingdom	1981	1982	1989	8
United States	1960	1961	1969	9
United States	1982	1983	1990	8
Uruguay	1974	1975	1981	7
Uruguay	1983	1985	1989	5
Venezuela	1961	1962	1967	6
Zimbabwe	1962	1963	1967	5
Zimbabwe	1977	1979	1983	5

Appendix 3: Non-takeoffs in our sample

Year corresponds to last year of stagnation episode.

Country	Year	Country	Year	Country	Year
Algeria	1988	Gambia, The	1970	Paraguay	1966
Angola	1974	Gambia, The	1986	Paraguay	1984
Argentina	1976	Ghana	1977	Peru	1978
Argentina	1981	Ghana	1983	Philippines	1984
Australia	1982	Ghana	1990	Rwanda	1984
Bangladesh	1964	Greece	1981	Senegal	1965
Benin	1964	Guatemala	1983	Senegal	1977
Benin	1969	Guinea	1964	Senegal	1984
Benin	1982	Guinea	1979	Sierra Leone	1985
Benin	1989	Guyana	1979	South Africa	1978
Bolivia	1980	Haiti	1982	South Africa	1985
Brazil	1982	Honduras	1961	Sri Lanka	1960
Brazil	1990	Honduras	1983	Sri Lanka	1965
Burkina Faso	1964	Iran	1975	Sweden	1978
Burkina Faso	1981	Jamaica	1975	Switzerland	1975
Burkina Faso	1987	Jordan	1990	Switzerland	1985
Burundi	1975	Kenya	1983	Tanzania	1975
Cameroon	1988	Lesotho	1983	Tanzania	1988
Central African Republic	1965	Madagascar	1965	Togo	1977
Central African Republic	1971	Madagascar	1973	Togo	1985
Chad	1965	Malawi	1982	Trinidad&Tobago	1986
Chad	1990	Mali	1965	Uganda	1960
Colombia	1960	Mali	1981	Uganda	1967
Colombia	1983	Mauritania	1973	Uruguay	1960
Comoros	1972	Mauritania	1979	Venezuela	1969
Comoros	1983	Mexico	1984	Zambia	1969
Comoros	1990	Mozambique	1974	Zambia	1977
Congo, Dem. Rep.	1960	Namibia	1980	Zimbabwe	1985
Congo, Dem. Rep.	1967	Nepal	1965		
Congo, Dem. Rep.	1972	Nepal	1971		
Costa Rica	1981	Netherlands	1981		
Costa Rica	1989	New Zealand	1977		
Cote d`Ivoire	1980	New Zealand	1989		
Denmark	1975	Nicaragua	1971		
Ecuador	1987	Nicaragua	1979		
El Salvador	1971	Niger	1966		
El Salvador	1980	Niger	1980		
Equatorial Guinea	1976	Nigeria	1975		
Ethiopia	1960	Nigeria	1981		
Ethiopia	1974	Papua New Guinea	1977		
Ethiopia	1984	Paraguay	1960		