

Capital Flows and Capital Goods*

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Abstract

Studying the relation between equity market liberalization and imports of capital goods, we examine one channel through which international financial integration can promote growth. For the period 1980-1997, we find that after controlling for other policies and fundamentals, stock market liberalizations are associated with a significant increase in the share of imports of machinery and equipment. We hypothesize this can be attributed to the consequences of financial integration, which allows access to foreign capital, and provide evidence consistent with this channel. Our results suggest that increased access to international capital allows countries to enjoy the benefits embodied in capital goods.

JEL Classification: E22, F15, F21, F40, G15.

Key words: capital account liberalization, stock market liberalization, international capital flows, capital goods, machinery and equipment, international technology diffusion.

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1 Introduction

There is an intense debate in academic and policy circles over the merits of international financial integration. On the one hand, financial integration can promote economic growth, for example, by allowing countries to borrow to finance productive investment and increase access to foreign technology. On the other hand, in the presence of pre-existing distortions and weak institutional settings, international capital mobility can potentially exacerbate the misallocation of resources, increase the likelihood of financial crises, and impair growth.

Fueling this debate is the mixed empirical evidence on whether financial integration contributes to growth.¹ A closer look at the evidence, however, indicates that the measurement of international financial integration and its direct linkages to growth are complicated. Given the difficulty in demonstrating direct links to growth, several recent papers study the different mechanisms through which international financial integration can lead to faster growth.² In this spirit, we aim to contribute to the debate by exploring one of these mechanisms. In particular, we examine whether liberalization episodes lead to more imports of capital goods. By lowering the cost of capital and increasing the financial resources available to an economy, financial integration should spur productive investment and, crucially, machinery and equipment investment. In addition, by improving access to foreign technological advances, the increasing share of capital goods imports can enhance the efficiency of these liberalizing countries beyond the effect of increased investment, both key ingredients to economic growth.

We pay particular attention to the effects of stock market liberalization. Stock market liberalizations have represented sizable discrete jumps in capital account openness, allowing for comparison of within country changes. Despite the difficulty in dating liberalization episodes, when using this approach, researchers have obtained robust results. Moreover, because countries tend to impose an array of price and quantity controls on financial transactions, the broad measures of the degree of

¹ In a survey of the literature, Prasad, Rogoff, Wei, and Kose (2003) conclude that the empirical research does not find a robust significant effect of financial integration on growth.

² See Forbes (2004) for an overview of this emerging micro literature.

financial integration used in the cross-country regressions of typical empirical studies may not consistently measure the severity of these restrictions or even the gradualism in changes.

We look at a broad sample of 79 countries for which we have data on imports of machinery and liberalization of the stock market dates in the period between 1980 and 1997 and analyze if the liberalization of the stock market is associated with changes in the composition of imports towards capital goods and an overall increase in machinery imports. Our regression analysis shows that equity liberalization episodes are followed by both an increase in the share of capital goods imports to total imports of 9% and an increase in the share of total machine imports to GDP of 13% in our preferred estimations. These results are robust to controlling for other policies and fundamentals such as trade liberalization and the world business cycle. We also study the dynamics of adjustment in the broad sample and in a smaller sample of the 25 machine importing countries that liberalized their equity markets within our sample period. Finally, we look at direct evidence about possible channels through which stock market liberalization are hypothesis to operate. Our results are suggestive of the fact that stock market liberalizations have been associated with firm incentives to increasingly buy more machinery.³

We focus on imports of capital goods because of their effect both on the quantity and quality of investment. Considering the basic relations among the savings, investment, and net imports, one way international capital flows can affect growth is if the increased resources provided by international financial markets are used to import capital goods, rather than more consumption goods or increased reserves.⁴ Moreover, by increasing liquidity and opportunities for risk sharing, international integration may lower the cost of capital and thus increase productive investment by firms in machinery and

³ Note that a positive correlation cannot simply be interpreted as causal because of concerns related to omitted variables or policy endogeneity. However, we perform a series of robustness tests to mitigate concerns that results are driven by potential omitted variables and illustrate mechanisms consistent with such an interpretation. These tests allow us to be more confident of interpreting our results as causal; see Sections 4 and 5.

⁴ The production of capital goods for most countries is quite small, contributing to our motivation to use machinery imports. Indeed, we find a non-significant increase in machinery production following stock market liberalization in our sample of countries.

equipment. Indeed, based both on our evidence and the literature, stock market liberalizations are associated with increased foreign resources and a fall in a liberalizing country's cost of capital.⁵

Besides their quantity effect on investment, by transmitting the benefits of technological advances across borders, imports of capital goods may have additional benefits to an economy. As DeLong (2004) notes, there is an expectation following capital account liberalization "that developing countries and industries would enjoy the benefits from technology advances and from learning-by-doing using modern machinery." Technological advances, in the form of world production of capital equipment and world R&D activity, are highly concentrated in a small number of countries. Most other countries, in particular developing countries, import the bulk of their machinery and equipment.⁶ Thus, while only a few countries do much R&D, the benefits may spread around the world through exports of capital goods that embody new technology. In other words, imported machinery may be a crucial mechanism for transmitting knowledge spillovers across borders.⁷

Critically, the fact that developing countries tend to import the bulk of their machinery and equipment from a small group of R&D intensive exporters suggests that imports of capital goods are an adequate proxy for a certain type of equipment investment.⁸ As such, with machine imports as a proxy, we emphasize capital goods, allowing us to focus on the effect of liberalization on productive investment. Ideally we would use data on business investment. However, it is difficult to find comparable long-term data across countries. Nevertheless, data on machinery and equipment investment arguably provide a better proxy for true productive investment than national accounts investment statistics, which includes residential construction.⁹ In addition, although there is not a clear consensus in the literature, researchers

⁵ See Bekaert and Harvey (2000), and Henry (2000a, b).

⁶ Eaton and Kortum (2001) document these facts. The authors also present a model linking imports of capital goods to productivity gains.

⁷ The work by Coe and Helpman (1995) and Coe, Helpman, and Hoffmaister (1997) relate international trade to technology diffusion.

⁸ See DeLong and Summers (1993) and Caselli and Wilson (2003).

⁹ Broadly speaking, investment can be divided into residential structures and business investment, which can further be divided into machinery and business structures. Business structures can often reflect price increases as well as non-productive firm "consumption," such as lavish offices that perhaps should be deemed managerial perks. More generally, the building of new structures for investment tends to be dominated by domestic production of

have found that the strong positive relationship between investment rates and growth is driven primarily through machinery and equipment investment.¹⁰

Combining these strands of literature, our basic hypothesis is that following capital account liberalization, one direct mechanism for capital flows to increase growth is to finance productive investment. In addition, imports of capital goods can also positively affect the efficiency of investment (TFP). While the final effect of capital goods on growth depends on the institutional environment and incentive structure in the country, stock market liberalization should also be associated with greater incentives to modernize (invest in new machines) and deploy knowledge efficiently. A lower cost of capital, for example, should encourage firms to install new machines as some investment projects that were not profitable before the stock market liberalization become more profitable after liberalization. Thus while other explanations are possible, our evidence suggests that stock market liberalization provides incentives to invest in technological improvements via the import of capital goods. While this work complements the research on the real effects of stock market liberalization by providing a more refined measure of productive investment, it also investigates a new channel through which capital mobility can contribute to growth. And although imports of consumption goods can have positive welfare effects, our view is that the effect of such imports on growth is, at best, indirect.

Based on these arguments, in this paper we ask this simple question: does capital account liberalization lead to more imports of capital goods? Section 2 presents the data. Section 3 studies the effect of stock market liberalization on the imports of capital goods. Section 4 analyzes the dynamics of adjustment before and after liberalization. Section 5 analyzes the channels consistent with this result. Section 6 concludes.

nontradables. We hypothesize that additional machines are a necessary complement to the new structures for these to lead to a further increase in output.

¹⁰ Caselli and Wilson (2003) find the composition of capital investment to account for large part of the observed differences of TFP across countries. DeLong and Summers (1991, 1993) provide quantitative evidence that the accumulation of machinery is an important determinant of growth. In contrast, Blomstrom, Lipsey and Zejan (1996) find strong evidence that lagged growth rates have explanatory power for investment rates. However, in recent work, Binder and Broeck (2005), using panel methods to allow for heterogeneity in country-specific dynamics, find feedback from investment to growth beyond those that appear in Bloomstrom, Lipsey and Zegan (1996). Similarly, Bond, Leblebicioglu, and Schiantarelli (2004), paying particular attention to econometric issues related to the use of Granger causality tests in panel data, find strong evidence that investment has a causal effect on growth.

2 Data

2.1 Machinery and Equipment Data

We use import data on capital goods from the *World Trade Flows, 1980-1997* database. We associate capital equipment with the non-electrical equipment, electrical equipment, and instruments industries.¹¹ We exclude 11 major machine exporters: United States, the United Kingdom, Japan, Germany, France, Sweden, Italy, the Netherlands, Switzerland, Canada, and South Korea. These 11 countries represent over 70% of world machine exports in a given year. As major producers of machinery and equipment, imports of capital goods to these countries cannot serve as a proxy for capital goods investment.¹² We also exclude Singapore, which as an entr pot presents special problems for using imports as a proxy for productive investment. In total, we exclude 12 countries.

In the regression analysis, we use as dependent variables both the percentage of capital goods imports to GDP and also the percentage of capital goods imports to total imports. Each measure captures a different feature of the data and is necessary to capture the change in investment in foreign capital goods. If the percentage of machine imports in GDP rises without an increase in machine imports as a percent of imports, this could reflect an increase in international trade overall. Similarly, if the composition of imports shifts, but the fraction of machine imports in GDP does not rise, then the overall importance of foreign capital goods in the economy has not increased. We use log values of these variables in our regression analysis, and we have 79 machine-importing countries with machine import data. Appendix A explains all data in detail.

2.2 Capital Account Liberalization Data

A key issue in constructing estimates associated with a country's initial opening up of the capital markets lies in the complicated task of establishing the date of liberalization. The process of international

¹¹ We follow Eaton and Kortum (2001). See also DeLong and Summers (1991) for a similar treatment.

¹² Following Eaton and Kortum (2001), the United States, the United Kingdom, Japan, Germany, France, Sweden, and Italy fall in this category. We also exclude the Netherlands, Switzerland, and Canada, which are among the top ten exporters in most of our sample years and often export more than the seven countries previously mentioned. We treat South Korea as a machine exporter, which entered the top 10 countries in more than one third of the 18 years.

financial integration—that is, the change in the degree to which a country’s government restricts cross-border financial transactions—is complex and involves multiple phases. Markets may be liberalized gradually, so the effects are smoothed.¹³ At the same time, *de jure* liberalization dates might not reflect the *de facto* liberalization process. If one part of the system is liberalized, investors may use it to circumvent other controls. Other reforms may not be credible, or countries may not have access to foreign capital despite being officially open. All these factors contribute to the difficulty of choosing a single liberalization date. To address some of these issues, we focus on stock market liberalization for reasons discussed below. Complications notwithstanding, researchers have found robust results using this methodology. We also use yearly data to minimize the effects of small timing errors.

Stock Market Liberalization Dates

Equity market liberalization is a specific type of capital account liberalization in which a country’s government allows foreigners to purchase shares in the domestic equity market. We focus on this narrow definition of capital account openness for several reasons. Equity market liberalizations are relatively easier to establish than broader capital account liberalization and are much more easily comparable across countries.¹⁴ Moreover, the discrete jump in openness provides enough of a change to be able to isolate its effects.

Henry (2000a), Bekaert and Harvey (2000) and Bekaert, Harvey, and Lundblad (2005) (henceforth BHL) have constructed data on equity market liberalization. In order to construct the dates for the opening of the equity markets to foreigners, Henry (2000a) uses information from various sources and defines a country’s first stock market liberalization as the first month with a verifiable occurrence of a liberalization by policy decree, the establishment of the first country fund, or a 10% increase in the IFC Investability Index. These dates are available for 12 countries. Bekaert and Harvey (2000) and BHL

¹³ Anticipation and gradualness should bias our results away from finding an effect.

¹⁴ Access to contingent liabilities following equity market liberalizations is arguably more likely to have a direct effect on the cost of capital and firms’ investment decisions than financial opening to non-contingent liabilities such as bank loans which, in emerging markets, are usually intermediated through a poorly regulated financial system. See Henry (2003) and Obstfeld and Taylor (2004).

develop different sets of equity market liberalization dates. They include the “official liberalization date,” which coincides with regulatory changes that mark the period when the equity markets are opened to foreigners and often coincides with the IFC liberalization date. The data are available for 95 countries. For 14 machine importing countries, the authors also provide data on the year the first closed-end country fund was introduced.

In our main analysis, we use the BHL “official liberalization dates” because of the larger sample size.¹⁵ Of the 95 countries with the official date of liberalization presented in BHL, we have 79 machine-importing countries with disaggregated trade data. Of these, 25 liberalized between 1980 and 1997.¹⁶ As a robustness check, we also use the dates the first close-end country fund was introduced and equity market liberalization dates constructed by Henry (2000a). Most dates are clustered around the late eighties and nineties, but overall there is variation within the sample. Appendix A lists all the countries included in the BHL data set. Table 1 presents the liberalization dates for the countries that liberalized in the sample period.

IMF Capital Account Index

As a proxy for a government’s restrictions on capital flows and international financial transactions, the literature commonly uses an index based on the International Monetary Fund’s (IMF) *Annual Report on Exchange Arrangements and Exchange Restriction (AREAER)*. The index uses data from four different restrictions (multiple exchange arrangements, payments restrictions on current transactions and on capital transactions, and repatriation requirements for export proceeds). A corresponding dummy variable takes the value of 1 if each of the restrictions is present in each country

¹⁵ Edison and Warnock (2001) construct a measure of restrictions on foreign ownership of domestic equities that focuses on the intensity of controls. The initial relaxation of controls shown by the Edison and Warnock (2001) index corresponds closely to the BHL liberalization dates.

¹⁶ BHL have 95 countries in their sample, 27 of which liberalized between 1980 and 1997. As mentioned, we exclude the 12 major machine exporters and entrêpôts. In addition, Belgium is excluded because the trade data are reported with Luxembourg. Botswana, Swaziland, and Lesotho are also excluded because there are no individual trade data reported for these countries. These exclusions result in South Korea and Japan being excluded from the 27 liberalized country sample, leaving 25 countries for our sub-sample regressions. See Appendix A for a detailed list of the countries included in each sample.

each year. We use this measure as a broader capital account indicator. Note, however, that this measure does not control for the fact that legal restrictions are sometimes circumvented. In addition, the way the IMF index is constructed results in a general indicator that distinguishes varying intensities of capital restrictions in a very limited way.¹⁷

2.3 Other Reforms, Policies, and Control Variables

In our analysis, we consider the role of other reforms, macroeconomic fundamentals, the world business cycle, and additional variables correlated with both liberalization and imports of machinery. First, since we focus on imports of capital goods, we control for the role of trade liberalization. More generally, we want to isolate the effects of stock market liberalization from reduction in the barriers that may limit or restrict the import of capital goods. As noted by Obstfeld and Taylor (2004), developing countries' access to imported physical capital has been "affected by tariffs, quotas, commercial policies, exchange rate controls and the like." As such, we take our trade liberalization dates from Wacziarg and Welch (2003) (henceforth WW), which capture broad trade liberalization episodes.¹⁸ The authors review and update the Sachs and Warner (1995) database of trade liberalization indicators for the 1990s. Importantly for our analysis, WW cross-checked systematically the liberalization dates against a case study literature of reforming developing countries, increasing the confidence that they reflect important shifts in trade policy.¹⁹ The WW data set includes information for 141 countries, 66 of which liberalized trade between 1980 and 1997. As shown in Table 1, only Turkey and Brazil liberalized trade and finance

¹⁷ Quinn (1997) improves the IMF restriction measure by reading through the IMF's narrative descriptions and assigning scores of the intensity of capital restrictions. This measure is only available for intermittent years for some countries, and as a result we do not use this indicator.

¹⁸ To the best of our knowledge, there are no time series measures on the trade liberalization of capital goods that are consistent across countries and incorporate both tariff and non-tariff barriers to capital goods imports. As Anderson and Van Wincoop (2004) note in a survey of the literature on trade costs, the question how 'high are policy barriers to trade' usually cannot be answered with accuracy for most goods in most countries at most dates. However, as mentioned, the broader liberalization date such the one constructed by WW may be more suitable for our exercise.

¹⁹ The Sachs and Warner (1995) indicator uses data on tariffs, non-tariff barriers, black market premium (BMP) and export market premium (XMB) (see Appendix A for a detailed description). Rodríguez and Rodrik (2000) criticize this index arguing that the BMP and XMB play a major role in the classification of countries as open or closed. However, as described in detail in WW, policy changes that reduced the BMP or removed XMB were generally accompanied by changes in the level of other types of trade barriers. Hence, liberalization dates do not simply capture changes in these variables, but also reflect broader liberalization.

in the same year, half the countries liberalized trade and finance more than 2 years apart, and most countries liberalized trade before equity investment.²⁰ Note that once they opened, the countries in our sample all remain open.

We also control for additional macroeconomic variables that could impact the imports of capital goods, including the level of inflation, terms of trade, lagged growth and deviation from trend growth, growth in high-income countries, real interest rates in the U.S., and the level of financial development proxied by private credit by deposit banks. Finally, for a sub-sample of countries, we have data on exogenous growth opportunities from Bekaert, Harvey, and Lundblad (2005), which are calculated using global Price-to Earnings (PE) ratios weighted by the industry's share in the local economy.

3 Empirical Results: Effect of Liberalization on Imports of Capital Goods

3.1 Descriptive Statistics

Table 2 presents descriptive statistics for the main variables. The sample of 25 countries that liberalized within the sample time period has a smaller dispersion of income; this is due to the fact that the wealthier countries tend to have liberalized before 1980, and many of the poor African countries still had not liberalized by the end of the nineties. For all 79 countries, machine imports as a percentage of total imports have a mean of 23.82%; while for the 25 country sub-sample, the mean is slightly higher, 27.09%. For the 79-country sample, the mean of machine imports as a percentage of GDP was 6.16% and 6.31% for the 25-country sample. As also seen in Table 2, in the 25-country sample, 40% of country-year observations occur in a liberalized regime. For such countries, the conditional means for machine imports as a percent of total imports and for machine imports as a percent of GDP in a liberalized regime are respectively, 30.30% and 7.93%. The means in a non-liberalized regime are, respectively, 24.97% and 5.24%. Notice that the conditional means for the 79-country sample are very similar. A test of means for both samples shows these differences to be significant at a 1% level.

²⁰ Only Argentina, India, Nigeria, Pakistan, Venezuela, and Zimbabwe liberalized finance before trade.

3.2 Regression Analysis

Before exploring the dynamics before and after liberalization in more detail, we first ask the simple question of whether machine imports were higher after liberalization than they were before. We estimate the following panel regression:

$$\ln(\text{Imports of Machinery}_{it}) = \alpha_i + \gamma \text{Liberalize}_{it} + \beta \text{Controls}_{it} + D_t + \varepsilon_{it} \quad (1)$$

where $\text{Imports of Machinery}_{it}$ are the imports of machinery in country i in the period t . We use as dependent variables both the percentage of capital goods imports to total imports and the percentage of capital goods imports to GDP, both in logs. Liberalize_{it} is a dummy variable that takes on the value 1 on or after the liberalization date. In the main specification, we use the BHL liberalization dates for the 79 machine importing countries with stock market liberalization dates. α_i refers to country dummies which capture time invariant country specific factors which may drive cross-country differences in machine imports. D_t is a vector of year dummies included to control for cross country correlation over time due to common world shocks. Controls_{it} is a set of control variables and ε_{it} is an error term.²¹ The estimation procedure uses White's correction for heteroskedasticity in the error term and errors are clustered at the country level.

The liberalization process is intricately linked with the macro-economy, and as a result may coincide with other economic reforms that would also impact machinery imports. Therefore, in addition to controlling for country-specific effects and common worldwide shocks, we also consider the role of other reforms and macroeconomic fundamentals correlated with both liberalization and imports of machinery. For example, a natural question is whether the changes in imports are driven by a reduction in trade restrictions on the imports of capital goods rather than equity liberalization. To take into account trade reform, we include a trade liberalization dummy in our main regression, which takes on a value of 0 in the years a country has not opened to trade according to WW trade liberalization dates, and 1 in the

²¹ Tests for stationarity based on Levin, Lin and Chu (2002) reject the hypothesis of a unit root for both measures of machine imports.

years including and following trade liberalization. We also control for inflation as low inflation can coincide with increased stability and high expected growth due to government stabilization policies, leading to an increase in machinery imports. We also control for terms of trade. By affecting the relative price of exports to imports, terms of trade could affect our dependent variables. The expected direction, however, is ambiguous, as an improvement in the terms of trade can lead to an overall increase in imports, including more imports of machinery, and also to a higher GDP through its effect on exports. To control for omitted variables such as favorable economic outcomes that could both increase capital goods imports and induce policy makers to liberalize the stock market, we control for lagged GDP growth and the deviation from trend GDP growth. We also check whether our results are not simply driven by the level of financial development. We use private credit by deposit banks as a percent of GDP as a proxy for financial development that may occur independently of the equity market liberalization channel. Finally, another factor that could be driving our results is the flow of foreign direct investment (FDI) into the economy. Foreign companies may be more likely to use inputs from their parent country and, more generally, may be more likely to use sophisticated technology than would domestic companies.

Machine Imports in Liberalized versus non Liberalized Regime

Column (1) of Table 3 presents the main results in the full sample. We find a country's machine imports as a percentage of total imports in a liberalized regime to be 8.8% higher than in a non-liberalized regime.²² This result, which is significant at 5%, suggests that countries tend to react to equity market liberalization by buying disproportionately more capital goods, not simply more consumption goods. Column (1) in Panel B presents the results for machine imports as a percentage of GDP. The estimated coefficient is positive and significant, equal to a 12.7% increase.²³ Our results are also economically

²² We obtain similar results when controlling for a time trend and a time trend squared. Results are also robust to excluding outliers (Malaysia); India and Brazil, which produce an important share of capital goods; and Portugal, Spain, and Greece, which joined the European Union around the time of liberalization. The liberalization dummy coefficient remains significant and changes little when we do not use additional controls.

²³ We also replicated the regression using real investment as the natural log of the percent of GDP from Penn World Tables. The estimated coefficient for the liberalization dummy was 0.16 (s.e. 0.60). If we use nominal investment as

significant in terms of the implied impact on TFP across the liberalization period. Coe, Helpman, and Hoffmaister (1997) estimate that the (semi) elasticity of TFP with respect to machine imports is 0.279.²⁴ Using their estimates, a 12.7% increase in machine imports as a percent of GDP, which corresponds to an increase of 0.782 percentage points over the sample mean, implies a total 0.218% increase in TFP as a result of liberalization.

The Role of Other Reforms, Policies, and Control Variables

In terms of the control variables, trade liberalization appears to have a non-significant impact on the share of capital goods imports to GDP. We suspect that the insignificant effect of trade liberalization may be due to the fact that for many countries in our sample which had followed import substitution strategies, initial tariffs on consumption goods tended to be much higher than on capital goods. Since trade liberalization episodes tend to be broad liberalizations across many categories of goods, they often disproportionately impact consumption goods.²⁵ Unfortunately, consistent cross-country time series data on capital good trade restrictions are difficult to obtain, and investigating the effects of trade liberalization is beyond the scope of this paper. Nevertheless, in terms of our research question, these results suggest that the changes in machine imports are not driven by trade policy.

Inflation and terms of trade seems to exert a positive effect on imports of capital goods, although these effects are not significant at conventional levels.²⁶ Measures of the domestic economic environment have a positive and significant effect on the share of imports of capital goods. The coefficient on financial development is positive, but as mentioned, the equity market liberalization variable remains statistically and economically significant. We obtain similar results if we use private credit by all financial institutions

a percent of nominal GDP, the estimated coefficient was 0.02 (s.e. 0.04). As Henry (2000b) notes, the evidence on whether capital account liberalization has any effect on total investment is ambiguous.

²⁴ Coe, Helpman, and Hoffmaister (1997) estimate a model where TFP depends on machine imports as a percent of GDP, the interaction of machine imports and the trade weighted foreign R&D stock, and other control variables.

²⁵ Bulmer-Thomas (1994), for example, documents that in Latin America, the degree of nominal protection on capital goods was less than half of the overall degree of nominal protection.

²⁶ The real exchange rate is also a measure of the relative price of domestic goods. Results for the real exchange rate are generally similar but are not shown due to the large number of missing observations in the standard sources. Most of these missing observations are due to episodes of high inflation, which complicates constructing our own series in a consistent way.

suggesting that access to international capital markets has an effect beyond the development of the local financial markets. Our results also remain robust after controlling for FDI inflows. While year dummies already control for common world factors, we also run a regression using the industrialized country output growth rates and the U.S. real interest rate as controls to isolate the impact of world business cycles, obtaining similar results.²⁷

As mentioned above, the process of capital account liberalization is a complex one that may involve different steps. Therefore, we test whether our results are driven by changes in other capital account policies. As explained in Appendix B, the results are robust to controlling for the IMF Index as a proxy for broad capital account liberalization.

Column (2) in Panels A and B of Table 3, presents the results of using the sample of 25 countries that liberalized between 1980 and 1997. Our estimated coefficients are very similar.²⁸ We find that for the countries that liberalized between 1980 and 1997, the within country machine imports as a percentage of total imports in a liberalized regime are 7% higher than in a non-liberalized regime. In Panel B, Column (2) shows that machine imports as a percentage of GDP is 12% higher after liberalization. For the small sample, data on exogenous growth opportunities constructed by Bekaert, Harvey, and Lundblad (2005) is also available. The coefficient of the financial liberalization indicator changes little and remains significant to including various measures of exogenous, forward-looking growth opportunities.²⁹ In addition, we obtain consistent results using other equity market integration dates such as those presented in Henry (2000a) and the date of the first closed end country fund from BHL.³⁰

²⁷ As Bartolini and Drazen (1997) point out, countries may have liberalized during a time when interest rates were low, thus increasing their ability to take advantage of international capital flows.

²⁸ Note that when not including time variant controls, the coefficient on liberalization is necessarily the same in both the large and the small sample. However, we check the small sample to see if the coefficients change once we control for other variables that vary across time. We indeed find that our coefficients to be similar. Note also that estimates are more precise in the large sample due to the additional information.

²⁹ We obtain similar results in the sample of 38 countries for which we have growth opportunities data.

³⁰ For the Henry liberalization dummy, summary statistics for the ratio of capital goods imports to total imports: mean 30.8, std. dev. 8.95; for ratio of capital goods to GDP: mean 7.14, std. dev. 8.65. The means before and after liberalization are respectively 26.65 and 34.04; 4.34 and 9.33. The estimated coefficient for the Henry liberalization dummy were, respectively, 0.12 (s.e. 0.04) and 0.23 (s.e. 0.07). For the first country fund dates, summary statistics for the ratio of capital goods imports to total imports: mean 27.89 std. dev. 6.43; for the ratio of capital goods to GDP: mean 7.14, std. dev. 8.65. The means before and after liberalization are, respectively, 23.45 and 31.27; 4.20

Serial Correlation

One concern that emerges from these results is that the estimation of equation (1) is that our standard errors may be biased downward due to the fact that the dependent variables may be positively serially correlated. In addition, our main independent variable is by construction highly serially correlated, exacerbating the downward bias in standard errors. We follow the solutions proposed in BHL and Bertrand, Duflo, and Mullainathan (2004), performing a series of tests to address this issue.³¹ First, all specifications adjust standard errors allowing for country clustered heteroskedasticity and autocorrelation. The results are significant at standard levels. For the 25 countries, we also run a test of means between liberalized and non-liberalized regimes, for five years before and after liberalization. Using this method, we find that machine imports as a percentage of GDP rise by 1% and machine imports as a percentage of total imports by 2% after liberalization. These differences are significant at 5% and 1% respectively, despite the substantial reduction in the number of observations.³²

Finally, we performed a randomization inference test by randomly assigning one of the existing liberalization dummies to each one of the 79 countries (thereby keeping the same distribution of liberalization dates). We re-run regression (1) using the random allocation of liberalization dates and repeat this experiment one thousand times. As reported in Table 4, the 95% percentile of the distribution shows a coefficient of 7.5% and t-statistic of 1.79 for machine imports to total imports and a coefficient of 13.9% and a t-statistics of 1.56 for machine imports as a percentage of GDP. This is well below our estimated coefficients. We repeated the exercise for the 25 sample that liberalized within the sample period and obtained similar results as seen in Table 4. The randomization exercise suggests that our results are not driven by biases in the standard errors.

and 8.13. The estimated coefficient for the country fund dummy were, respectively, 0.12 (s.e. 0.03) and 0.02 (s.e. 0.05).

³¹ As Bertrand, Duflo, and Mullainathan (2004) emphasize, other solutions typically employed to address serial correlation issues are not appropriate for the type of panel data used in this study.

³² In the sample of 25 countries, following liberalization, the average share of machinery imports as a percentage of total imports and as a percentage of GDP were higher for 21 and 23 countries respectively.

While we believe our estimation procedure addresses issues related to serial correlation, a related concern is that capital goods imports seem to be trending upward even before the liberalization of stock markets—that is, results may be spurious. In addition, there are issues related to endogeneity. We discuss these concerns in the next section.

4 Timing of Effect, Dynamics and Endogeneity

An important concern from the previous analysis is whether the increasing trend in both measures of capital goods imports in fact began before liberalization of the stock market. Two questions arise from this. One is whether the liberalization dates are a clear demarcation between distinct periods. A related issue is whether, given this trend, our results are spurious. To address this concern, we explore the dynamics of the relationship illustrated in the initial regressions. In particular, we run

$$\ln(\text{Imports of Machinery}_{it}) = \alpha_i + \lambda_1 \text{PreLib3}_{it} + \lambda_2 \text{PreLib2}_{it} + \lambda_3 \text{PreLib1}_{it} + \gamma_0 \text{LibDate}_{it} + \gamma_1 \text{PostLib1}_{it} + \gamma_2 \text{PostLib2}_{it} + \gamma_3 \text{PostLib3}_{it} + \gamma_n \text{After}_{it} + \beta \text{Controls}_{it} + D_t + \varepsilon_{it} \quad (2)$$

where PreLib1_{it} , PreLib2_{it} , and PreLib3_{it} take the value of one respectively in the first, second, and third years before country i liberalized the stock market and zero otherwise, LibDate_{it} takes the value of one in the year in which country i liberalized the stock market and zero in every other year; PostLib1_{it} , PostLib2_{it} , and PostLib3_{it} take the value of one respectively in the first, second, and third years after liberalization and zero otherwise; and After_{it} takes the value of one beginning the fourth year after liberalization. Regression (2) uses White's correction for heteroskedasticity in the error term and clustered errors at the country level.

Table 3, column (3) in panels A and B shows the main results. In our regressions, we see that there is no significant increase in both measures of machine imports before liberalization, but there is a significant increase in the years after liberalization. A test that the post-liberalization dummies are equal to each other cannot be rejected. However, a test that the post-liberalization dummies are equal to the pre-liberalization dummies rejects the null at standard significance levels. This result indicates that there is a one time level shift in the composition of the imports immediately following liberalization. For machine

imports over GDP, we find similar results. It appears that a more significant effect of capital account liberalization on the imports of capital goods begins to take place in the second and third year after liberalization. Thus, by suggesting that machine imports did not change before liberalization, these results help mitigate concerns that the results are spurious or caused by a trend in the data.

Table 3, column (4) in panels A and B explores the robustness of these results to limiting the sample to the 25 countries that liberalized in our sample period. In this sample, machine imports over total imports show a similar pattern to the 79 country sample as seen in Panel A. There is a change in the composition of imports following liberalization, but not before, consistent with the interpretation that liberalization had a causal impact on the imports of capital goods. Column (4) in panel B shows the results for machine imports over GDP. The coefficients on the pre-liberalization dummies are positive and significant, and so there appears to be an increase in machine imports in the years before liberalization. However, this increase in machine imports as a percentage of GDP, without a commensurate increase in imports as a percent of total imports, reflects the significant increase in imports overall in the 25 country sample during this time period. There is no evidence for a similar increase in imports across the whole time period in the full sample. This perhaps reflects the fact that the countries that liberalized were indeed enacting other reforms and becoming more open, in contrast to the other countries in the sample. Thus, it appears that for the countries that liberalized, total imports began to rise before equity liberalization, but the composition of imports began to shift towards machinery and equipment only after stock market liberalization.

As mentioned previously, as an additional diagnostic test we randomized the distribution of liberalization dates for each country and ask whether a random liberalization year would have also produced a similar result. The results of this exercise, as seen in Table 4, suggest both that our results are not driven by size biases in the t-statistics and also that the impact of the liberalization indicator is not a statistical artifact driven merely by chance.

Discussion: Endogeneity Issues

Two final concerns are whether both capital goods imports and stock market liberalizations might be determined by a potential omitted third factor or that reverse causality might be driving our results. Although it is hard to argue this is a “natural experiment,” it is also hard to believe that the policymakers were observing the share of capital good imports when deciding whether to liberalize the economy or not. As a consequence, omitted variables seem to be a more fundamental concern. In particular, it may be possible that policy makers liberalize at a time when the world economy is booming or after they observe favorable economic outcomes. However, this does not seem to be borne out by the facts. Henry (2000b) shows that countries do not pursue stock market liberalizations in response to investment booms. Using a probit analysis, Bekaert, Harvey, and Lundblad (2005) find that past GDP growth cannot explain liberalization. Consistent with their findings, we also do not find any significant change in growth immediately preceding liberalization, but growth is significantly higher after liberalization.³³ Moreover, our dynamic analysis of the full sample does not suggest this to be the case. Finally, we have controlled for other reforms and macroeconomic variables that might influence the policy maker’s timing in opening up the markets, including lagged GDP growth and proxies for the world business cycle. The results remain robust, thus strengthening our confidence that our results are not driven by omitted variables.

Nevertheless, lacking a valid instrument, it is impossible to rule out the possibility that policy makers liberalized in anticipation of favorable economic outcomes, and so estimates should be taken with caution. However, as mentioned, for a subsample of countries we have a proxy for forward-looking growth opportunities that can help strengthen our confidence in the direction of causality. As described in detail in Appendix A, Bekaert, Harvey, and Lundblad (2005) construct an exogenous measure of a country’s growth opportunities by taking the average of global industry price-to-earnings ratio weighted

³³ We regress growth on a dummy for the post liberalization period and a dummy for the three years before the liberalization date. We cannot reject the null that the coefficient on the pre-liberalization period is zero, suggesting that there was no significant change in growth before liberalization. However, the coefficient on the post liberalization period dummy is positive and significant (0.92, s.e. 0.51), suggesting a positive correlation between growth and liberalization. While we are cautious interpreting this coefficient, the analysis does find further support for evidence in the literature that liberalization did not follow periods of increased economic growth.

by the fraction of the stock market that each industry represents in the domestic economy. While local measures of forward-looking growth opportunities could reflect the improvement in growth prospects due to equity liberalization, a measure based on a country's predetermined (at the time of liberalization) industrial structure reflects exogenous world factors. These authors show that their measure can explain growth but does not explain equity liberalizations, and in fact find that growth opportunities are negatively associated with the decision to liberalize. Reassuringly, our results are robust to including this measure.³⁴ These results further suggest that it is not the case that the liberalization indicator is simply picking up strong expected growth at the time of liberalization.

All of these factors support the idea that policy makers were not looking at observable characteristics of future growth when they decided to liberalize. Moreover, the notion that policy makers anticipated future growth gives quite a bit of credit to policy makers who already had tried to implement a host of other, often unsuccessful, reforms. Additionally, political liberalization processes are lengthy and complex; it would be quite remarkable if policy makers were able to successfully anticipate the positive economic future of their countries and liberalize their equity markets quickly enough to capture it. Notwithstanding the battery of robustness tests, we acknowledge the difficulties of establishing causation.

At our most cautious, we conclude that the within correlation of capital goods imports and stock market liberalization is positive and significant. At the same time, given the limitations of available data, the use of event studies seems to provide a better link from the policy change to the observed outcomes.

5 Channels: Capital Flows, Capital Goods and Stock Market Indicators

Complementing the previous analysis, we explore the channels through which equity market liberalization can lead to higher imports of capital goods, focusing on stock market valuation, new equity

³⁴ Out of the sample of 79 countries, we have growth opportunities data for 38 countries including the 25 countries that liberalized within the sample period.

issues, and net equity inflows.³⁵ Each of these indicators is associated with a firm's improved ability to invest, and as such would be expected to have a positive impact on machinery imports.

How should different stock market indicators impact imports of machinery and equipment? First, suppose the stock market valuation increases due to a fall in the cost of capital, without any additional capital flowing into the economy. If managers use the cost of capital to calculate the internal rate of return on investment projects, more projects would pass their internal hurdle rates, and the lower cost of capital would increase their investment rates. Moreover, the higher stock price also may allow listed firms to borrow more, because their higher market value allows them to borrow either more cheaply or with less collateral. Furthermore, there may be an effect on investment in other firms. Investors who have seen their portfolio values increase may sell their investments to others on the stock market. If those selling their stocks have a higher propensity to invest than those buying the stocks, then the higher valuation would result in increased investment.³⁶ Finally, the increased wealth of stock holders may affect their investment behavior. They may, for example, direct resources into productive investments such as capital goods instead of government bonds or other unproductive assets. Thus, a high stock market valuation could have an independent effect on capital goods purchases and productive investment, even if total funds into the economy do not change.

Another potential channel is through new equity issues. With an increased number of potential buyers, firms may be more likely to issue equity after stock market liberalization. New equity investments directly inject cash flow for investment into the issuing firm. Thus, we should see investment rise with new equity issues. Unless they are used to purchase new equity issues, net equity inflows do not directly increase cash flow to firms. Thus, their direct impact on the firm whose shares were sold to foreigners should only be through their impact on market valuation. However, if net purchases by foreigners are

³⁵ Increased liquidity should also be a consequence of liberalization. Indeed, liquidity is over four times higher after liberalization, and these differences are significant at the 1% level. Since increased liquidity reduces transaction costs and thus directly reduces the equity premium, the subsequent reduction in the cost of capital should also increase investment. We do not report our results due to smaller number of observations, but our results are consistent with Henry (2000b).

³⁶ This would be the case, for example, if the buyers previously kept their funds in poorly managed financial institutions or low productivity assets.

higher than new net equity issues, net equity sales by domestic residents must be positive. Those funds could then be used to increase investment in other firms. Moreover, to the extent that the increased inflows of capital allow the purchase of more imports, the increase in foreign investment should impact machine imports directly. Finally, it may be that international investors facilitate international linkages and exert pressure on firms to upgrade their technology, thus directly affecting the use of foreign machinery and equipment.

We take data for equity flows a percent of GDP from the *World Development Indicators* and new equity issues and market capitalization from the Beck, Demirguc-Kunt, and Levine (2001) *Financial Structure Database*. Out of the sample of 79 countries, market capitalization is available for 55 countries, equity inflows for 65 and new equity issues for 25. For the sample of 25 countries, we have 25, 20 and 18 countries respectively. Because our liberalization dates capture the opening of the stock market to new investors, we expect these indicators to be highly correlated with the financial liberalization indicator. Table 5 shows that there is indeed a positive correlation. Market capitalization and new equity issues as a percent of GDP are on average about 2 times higher after liberalization while equity inflows as a percent of GDP are on average more than 30 times higher, although there is high variation.³⁷ A test of means shows these differences to be significant at the 1% level.³⁸

Because all these measures reflect a lower cost of capital and an improved access to funds, they all should reflect the effect of liberalization. Hence, we do not intend to compare the measures themselves but rather demonstrate that an increase in each of these measures is indeed associated with increased machinery imports. As such, we run a regression of the (log of) machine imports on each of the stock market indicators as well as year and country dummies. Our results indicate that the share of capital goods imports to total imports and to GDP increase with market capitalization, controlling for time and country fixed effects. The coefficient is 0.15 and significant at 5% for machine imports to total imports, and 0.43

³⁷ Outliers include Indonesia and Turkey, whose stock market turnover increased over 100 times, and Pakistan, whose capital outflows were large and negative before liberalization. Equity inflows were near zero for most countries before liberalization, with an average of 0.02% of GDP.

³⁸ When controlling both for country and year effects, stock market capitalization increased by about 10%, new equity issues by 6%, and equity inflows by more than 5%. Differences are significant at least at 5% for all variables.

and significant at 1% for machine imports to GDP. The variable new equity issues is also positively and significantly associated with machine imports, with a coefficient of 2.6 and significant at 1% for machine imports over total imports and a coefficient of 4.1 and significant at 1% for machine imports over GDP. Similarly, equity inflows seem to have a positive impact on machine imports, with a coefficient of 1.9 and significant at 5% for machine imports over total imports and 3.3 and significant at 5% for machine imports over GDP. These results are similar when using the small sample and when including the additional control variables. Although these measures are highly correlated, we also check various regressions controlling for all three indicators. The results remain similar, although the effect of new equity inflows is now not significant at standard levels. Overall, we interpret these results as suggestive that stock market liberalization affects a firm's ability to invest through the expected channels: capital flows, market capitalization, and new equity issues.

6 Conclusions

In this paper, we find that for the period from 1980 to 1997, after controlling for trade liberalization, other reforms, and fundamentals, stock market liberalization are associated with a significant increase in imports of capital goods. Both our evidence and the literature's further suggest that this can be attributed to the consequences of financial integration which allow access to funds and lower the cost of capital in an economy.

In previous research looking closely at the drivers of low equipment investment rates, much attention has been drawn to the relative price of capital.³⁹ Given the importance of financial integration, our results suggest additional explanations for the low level of machinery and equipment imports in poor countries: either credit constraints or a high cost of capital may help explain why countries do not import more machinery and equipment. As Henry (2000a) and Bekaert and Harvey (2000) show, stock market liberalization leads to a lower cost of capital. The lower cost of capital means that some projects that were

³⁹ Empirical research suggests that the high cost paid by poor countries due to tariffs, taxes, and other restrictions on capital goods has a negative impact in growth; see DeLong and Summers (1991, 1993). See Hsieh and Klenow (2003) for an alternative explanation underlying relative price differences between consumption and capital goods.

not profitable before stock market liberalization are now profitable, encouraging firms to invest in new machines. In addition, our results suggest that access to international capital markets may have additional effects in terms of easing financing constraints. These results suggest potential growth benefits to the liberalizing country stemming from the acquisition of imported machinery. And, although the final effect on growth will depend on the incentive structure in the country, our view is that stock market liberalization tends to provide a conducive incentive environment. It is worth emphasizing that this work is silent on other welfare and efficiency improving effects of capital liberalization linked to better risk management, risk sharing, increased competition, or consumption smoothing. However, we believe this exercise provides a more focused analysis of the effects of capital account liberalization that overcomes some of the issues in the existing literature.

Appendix A. Data Description

a. Dependent Variables

Imports of Capital Goods: From Feenstra, Lipsey and Bowen (1997) *World Trade Flows, 1980-1997* database. Statistics Canada compiled the data, which recompiles UN trade data classified by Standard Industrial Trade Class (SITC) Revision 2. It includes bilateral trade flows reported in U.S. Dollars from 1980 to 1997. In order to reconcile these data with domestic production data, the 4-digit SITC codes are matched to U.S. Bureau of Economic Analysis (BEA) codes for 34 manufacturing sectors. We define equipment trade as the sum of BEA industry codes 20-27 and 33 (Farm and Garden Machinery, Construction, Mining, etc.; Computer and Office Equipment; Other Non-Electric Machinery; Appliances, Audio and Video etc.; Electronic Components; Other Electrical Machinery; and Instruments and Apparatus). In the regression analysis, we exclude the 11 major machine exporters: United States, the United Kingdom, Japan, Germany, France, Sweden, Italy, Netherlands, Switzerland, Canada, and South Korea. These 11 countries represent over 70% of machine exports in a given year. We also excluded Singapore (an entrêpot). We use as dependent variables the log of the percentage of capital goods imports to GDP and the log of percentage of capital goods imports to total imports. Total imports were taken from

World Trade Flows. GDP data were taken from *World Bank Development Indicators*. Both are measured in current U.S. Dollars. GDP data for Iran are missing for the years 1991 and 1992.

b. Independent Variables

Equity Liberalization Dates: From Bekaert, Harvey, and Lundblad (2005). Dates are based on broad regulatory changes of capital markets, and often coincide with the IFC's official liberalization date. BHL have 95 countries in their sample and 27 that liberalized during our sample period; we exclude the 11 major machine exporters and Singapore. We also exclude Belgium, Lesotho, Botswana, and Swaziland that do not have comparable trade data available. Hence, in the regression analysis, of the 27 countries that liberalized during our sample period we exclude Japan and Korea (major machine exporters) for a final sample of 25 countries. Henry (2000a) defines a country's first stock market liberalization as the first month with a verifiable occurrence of liberalization policy decree, the establishment of the first country fund, or a 10% increase in the IFC Investability Index. Dates available for 12 countries.

Introduction of a Closed-End Country Fund: From Bekaert and Harvey (2000). A closed-end country fund is a fund that owns shares in securities of one country and issues shares to investors in a foreign country. From the list of 16 countries in Bekaert and Harvey (2000), Venezuela is not included in the list of countries that introduced a country fund. In the regression sample, Taiwan is excluded for lack of trade data, and South Korea is excluded because it is a major machine exporter.

IMF's Capital Account Liberalization Index: From the IMF's *Annual Report on Exchange Arrangements and Exchange Restriction (AREAER)*. The index was constructed using data on multiple exchange arrangements, payments restrictions on current transactions and on capital transactions, and repatriation requirements for export proceeds. A corresponding dummy variable takes the value of one if each of the restrictions was present in each country each year. In order for our IMF indicator to fall between 0 and 1 and increase with openness, our IMF capital control measure is the negative of the average of the four dummy variables for each country.

Trade Liberalization Dates: From Wacziarg and Welch (WW) (2003). The authors review and update the Sachs and Warner (SW) (1995) database of trade liberalization indicators. SW define a country as closed if one of the following is true: average tariff rates are 40% or more; non-tariff barriers cover 40% or more of trade; a black market exchange rate exists and is depreciated by on average 20% or more relative to the official exchange rate; the state holds a monopoly on major exports; or there is a socialist economic system. WW create a new dummy for the 1990s, as well as define a liberalization date after which all the SW criteria are continuously met. The sample includes 141 countries. By updating the SW dataset, they identified 18 countries that liberalized between 1995 and 2001, and found 25 that were closed as of 2001. In the sample, 66 countries liberalized between 1980 and 1997.

Macro-Economic Data: From the *World Development Indicators (WDI)*: Terms of trade, inflation (percent growth in the CPI), industrialized country growth (High Income country GDP growth as defined in the *WDI*), real interest rate for the U.S (lending interest rate adjusted for inflation as measured by the GDP deflator), net Foreign Direct Investment (FDI) inflows. From the Penn World Tables: GDP growth (annual percentage growth rate of GDP at market prices based on constant local currency).

Financial Market Data: From *Financial Structure Database* and the *World Development Indicators*: Stock market capitalization, new equity issues, and private credit by deposit banks and other financial institutions as a percent of GDP are taken from the Beck, Demirguc-Kunt and Levine (2001) *Financial Structure Database*. GDP, net equity inflows, and turnover as a percent of GDP are taken from WDI.

Growth Opportunities: From Bekaert, Harvey, and Lundblad (2005): This measure is constructed as follows. First, for each industry at the 3-digit SIC code level, the authors calculate the global price-to-earnings (PE) ratio for all countries. Then, they calculate a country-specific measure of these growth opportunities, measured by the average the industry PE ratios weighted by the industry's share in the local economy. They calculate the weights using both the weights of the industry in the domestic stock market and also by the fraction of value added in production for each industry and find similar results using both measures. They finally adjust this measure by dividing it by the world weighted average PE ratio. This measure captures a country's growth opportunities that are plausibly exogenous to any of the concurrent

economic policies of countries that liberalized in the 1980s and 1990s. We have growth opportunities data for 38 countries, including the 25 countries that liberalized within the sample period.

c. Sample of 95 Countries

Countries That Never Liberalized as of 1997: Algeria, Bangladesh, Barbados, Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Costa Rica, Cote D'Ivoire, Dominican Republic, Ecuador, El Salvador, Fiji, Gabon, Gambia, Ghana, Guatemala, Guyana, Haiti, Honduras, Iceland, Iran, Jamaica, Kenya, Kuwait, Madagascar, Malawi, Mali, Malta, Mauritius, Nepal, Nicaragua, Niger, Oman, Paraguay, Peru, Rwanda, Saudi Arabia, Senegal, Sierra Leone, Syrian Arab Republic, Togo, Trinidad And Tobago, Tunisia, Uruguay, Zambia.

Countries That Liberalized Before 1980: Australia, Austria, Denmark, Finland, Ireland, Norway.

Countries That Liberalized Between 1980-1997: Argentina, Brazil, Chile, Colombia, Egypt, Greece, India, Indonesia, Israel, Jordan, Malaysia, Mexico, Morocco, New Zealand, Nigeria, Pakistan, Philippines, Portugal, South Africa, Spain, Sri Lanka, Thailand, Turkey, Venezuela, Zimbabwe.

Appendix B. Capital Account Liberalization

The process of capital account liberalization is complex and involves different steps. We test whether our results are driven by broad capital account openness. We estimate an appended panel regression (1) and (2) and include an indicator of overall capital account liberalization proxied by a variable constructed from the IMF index described in the data section. We take the negative of the average of the four dummy variables for each country in order for our IMF indicator to fall between 0 and 1 and increase with openness. Appendix Table 1 shows the main results. As seen in the table, the effect of the stock market liberalization is significant after controlling for the IMF index. On the other hand, the effect of broad capital account liberalization proxied by the IMF index on the imports of capital goods is not robust across different samples and specifications. This result, we believe is in part due to the way the IMF index is constructed, which results in a general indicator that often distinguishes varying intensities

of capital restrictions in a very limited way. However, there is reason to believe equity liberalizations do have different effects. Recent research in the literature does suggest that stock market liberalizations have different effects on the economy (in particular on firm behavior) relative to debt market liberalization.⁴⁰ The difference is related to the payment structure associated with debt (regular payments regardless the borrower's economic circumstances) and equity (contingent payments allowing for procyclical capital flows). Our evidence is supportive of this interpretation.

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⁴⁰ BHL, for example, find that equity market liberalizations increase economic even after controlling for the IMF index (which on its own does not give rise to a robust growth effect). The authors argue that the use of homogeneous measures of international openness (equity markets) could explain the difference in results. See also Henry (2003).

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Table 1: Liberalization Dates

	BHL Regulatory	BHL Fund	Henry Regulatory	WW Trade
Argentina	1989	1991	1989	1991
Brazil	1991	1987	1988	1991
Chile	1992	1989	1987	1976
Colombia	1991	1992	1991	1986
Egypt	1997			1995
Greece	1987	1988		1959
India	1992	1986	1986	Never
Indonesia	1989	1989		1970
Israel	1996			1985
Jordan	1995			1965
Malaysia	1988	1987	1987	1963
Mexico	1989	1981	1989	1986
Morocco	1997			1984
New Zealand	1987			1986
Nigeria	1995			Never
Pakistan	1991	1991		2001
Philippines	1991	1987	1986	1988
Portugal	1986	1987		Always
South Africa	1992			1991
Spain	1985			1959
Sri Lanka	1992			1991
Thailand	1987	1985	1988	Always
Turkey	1989	1989		1989
Venezuela	1990		1988	1996
Zimbabwe	1993			Never

Notes: The BHL-regulatory financial liberalization date corresponds to the official liberalization date of the equity market presented in Bekaert, Harvey, and Lundblad (2005). BHL-fund corresponds to the first country fund from Bekaert, Harvey, and Lundblad (2005). Henry-Regulatory liberalization dates come from Henry (2000). The WW-trade liberalization date corresponds to the classification by Wacziarg and Welch (2003). *Never* corresponds to countries that have not liberalized by the end of the sample period; *Always* corresponds to countries that liberalized prior to 1980. See Appendix A for detailed description of the variables.

Table 2: **Descriptive Statistics and Conditional Means of Machine Imports**

Years: 1980-1997										
	Descriptive Statistics									
	Entire sample: 79 countries					25 countries that changed status				
	Obs.	Mean	St. Dev.	Min.	Max.	Obs.	Mean	St. Dev.	Min.	Max.
Machine Imports, % Total Imports	1422	23.82	7.57	2.60	57.67	450	27.09	7.95	11.76	57.67
Machine Imports, % of GDP	1420	6.16	5.10	0.43	52.35	450	6.31	5.74	0.78	52.35
	Conditional Means									
	Entire sample: 79 countries					25 countries that changed status				
	Non liberalized		Liberalized		Non liberalized		Liberalized			
Machine Imports, % Total Imports	22.36		29.60		24.97		30.30			
Machine Imports, % of GDP	5.74		7.84		5.24		7.93			
% of observations	80%		20%		60%		40%			

Notes: Machine Imports correspond to non-electrical equipment, electrical equipment and instrument industries from Feentra's World Trade Flows data base. GDP data used to calculate shares and imports data are measured in current U.S. Dollars. All measures of imports come from World Trade Flows; GDP in current U.S. dollars data and GDP in 2000 U.S. dollars are taken from the World Bank's World Development Indicators. GDP data in current U.S. dollars for Iran are missing for the years 1991 and 1992. GDP data in 2000 U.S. dollars for Kuwait are missing for five years. Liberalization dates correspond to stock market liberalization dates by Bekaert, Harvey, and Lundblad (2005). See Appendix A for detailed data description and for a list of countries included in each sample.

Table 3: **Fixed Effects Regressions of Machine Imports**
1980-1997, country and year fixed effects

Panel A. Dependent variable: ln(Machine Imports, % Total Imports)				
	(1)	(2)	(3)	(4)
<i>Sample: # of countries</i>	79	25	79	25
Financial liberalization indicator	0.088 (0.036)**	0.066 (0.029)**		
PreLib3			0.022 (0.045)	0.039 (0.037)
PreLib2			0.039 (0.042)	0.058 (0.040)
PreLib1			0.019 (0.042)	0.044 (0.052)
LibDate			0.014 (0.043)	0.052 (0.056)
PostLib1			0.098 (0.052)*	0.127 (0.060)**
PostLib2			0.113 (0.053)**	0.156 (0.066)**
PostLib3			0.109 (0.057)*	0.156 (0.066)**
After			0.153 (0.061)**	0.198 (0.084)**
Trade liberalization indicator	0.031 (0.040)	-0.035 (0.044)	0.036 (0.040)	-0.034 (0.042)
Inflation	0.001 (0.009)	0.022 (0.009)**	0.001 (0.010)	0.023 (0.009)**
Terms of trade	0.001 (0.001)	0.001 (0.000)*	0.001 (0.001)	0.001 (0.001)
Lag GDP growth	0.001 (0.001)***	0.001 (0.001)**	0.001 (0.001)***	0.001 (0.001)**
Deviation from GDP growth trend	0.298 (0.156)*	0.591 (0.234)**	0.297 (0.152)*	0.542 (0.224)**
Private credit by banks (% of GDP)	0.000 (0.001)	0.002 (0.001)	0.001 (0.001)	0.002 (0.001)
FDI inflows (% of GDP)	0.005 (0.004)	0.007 (0.007)	0.004 (0.004)	0.001 (0.008)
Observations	1006	420	1006	420
R-squared	0.79	0.85	0.79	0.86

Notes: See continuation of table for description and sources of data.

Table 3: **Fixed Effects Regressions of Machine Imports**
1980-1997, country and year fixed effects

Panel B. Dependent variable: ln(Machine Imports, % of GDP)				
	(1)	(2)	(3)	(4)
<i>Sample: # of countries</i>	79	25	79	25
Financial liberalization indicator	0.127 (0.073)*	0.116 (0.055)**		
PreLib3			0.047 (0.070)	0.112 (0.051)**
PreLib2			0.111 (0.087)	0.207 (0.065)***
PreLib1			0.034 (0.086)	0.153 (0.072)**
LibDate			0.033 (0.084)	0.184 (0.068)**
PostLib1			0.088 (0.111)	0.243 (0.091)**
PostLib2			0.170 (0.111)	0.341 (0.097)***
PostLib3			0.207 (0.119)*	0.404 (0.112)***
After			0.261 (0.113)**	0.466 (0.147)***
Trade liberalization indicator	0.113 (0.072)	-0.080 (0.098)	0.122 (0.072)*	-0.084 (0.097)
Inflation	0.023 (0.018)	0.012 (0.035)	0.024 (0.017)	0.014 (0.033)
Terms of trade	0.001 (0.001)	0.001 (0.002)	0.001 (0.001)	0.000 (0.001)
Lag GDP growth	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Deviation from GDP growth trend	0.321 (0.316)	0.745 (0.722)	0.324 (0.308)	0.658 (0.735)
Private credit by banks (% of GDP)	0.001 (0.002)	0.004 (0.003)	0.001 (0.002)	0.003 (0.003)
FDI inflows (% of GDP)	0.020 (0.017)	0.039 (0.017)**	0.019 (0.016)	0.028 (0.015)*
Observations	1006	420	1006	420
R-squared	0.78	0.86	0.78	0.87

Notes: Dependent variable is the log of machines imports to total imports in panel A and log of machine imports to GDP in Panel B. All regressions include country and time dummies and are estimated by OLS with White's correction of heteroskedasticity and errors are clustered at the country level. Standard errors in parentheses denoting *** 1%, **5%, and *10% significance. Machine Imports correspond to non-electrical equipment, electrical equipment and instrument industries from Feentra's World Trade Flows data base. GDP and Imports are measured in current U.S. Dollars. All measures of imports come from World Trade Flows; GDP data are taken from the World Bank's World Development Indicators. GDP data for Iran are missing for the years 1991 and 1992. The financial liberalization indicator is one for the years after the official liberalization date of the equity market presented in Bekaert, Harvey, and Lundblad (2001). The trade liberalization indicator is one for the years after trade liberalization as classified by Wacziarg and Welch (2003). Macroeconomic variables are taken from the World Development Indicators. Private credit by banks is taken from Beck, Demirguc-Kunt, and Levine (2005). *PreLib_i* takes the value of one *i* years before the liberalization date, *i*=1,2,3. *LibDate* takes the value of one in the year of liberalization. *PostLib_i* takes the value of one *i* years after the liberalization, date *i*=1,2,3. *After* indicator takes the value of one after the fourth year after the liberalization date. In columns (1) and (3) the sample corresponds to the 79 countries for which we have data; in (2) and (4) the sample corresponds to the 25 countries that liberalized within the sample period. See Appendix A for the description of the data.

Table 4: **Monte Carlo Analysis of the Liberalization Effect**
79/25 Countries , 1980-1997

	Panel A: ln(Machine Imports, % Total Imports)			
	79 countries		25 countries	
	Coefficient	t-stat	Coefficient	t-stat
2.5%	-0.103	-1.675	-0.071	-2.117
5.0%	-0.089	-1.451	-0.059	-1.748
50.0%	0.004	0.085	0.000	-0.003
90.0%	0.062	1.454	0.047	1.337
95.0%	0.075	1.792	0.061	1.731
97.5%	0.086	2.131	0.072	2.075

	Panel B: ln(Machine Imports, % GDP)			
	79 countries		25 countries	
	Coefficient	t-stat	Coefficient	t-stat
2.5%	-0.186	-2.004	-0.141	-1.961
5.0%	-0.156	-1.732	-0.112	-1.526
50.0%	0.002	0.025	0.004	0.077
90.0%	0.110	1.231	0.092	1.521
95.0%	0.139	1.560	0.117	1.905
97.5%	0.162	2.009	0.132	2.221

Notes: The table reports the 2.5, 5.0, 50, 90, 95, 97.5 percentiles for the estimated coefficient and t-statistics on the liberalization results of the Monte Carlo analysis of the liberalization dates. For 1000 replications, we randomly assign one of the existing liberalization dummies to each country in each sample. We run regression (1) on capital goods imports as a percentage of total imports (panel A) and as a percentage of GDP (panel B) with the random liberalization events and the independent variables of Table 3.

Table 5: Summary Statistics of Stock Market Indicators

Years: 1980-1997										
	Descriptive Statistics									
	Entire sample: 79 countries					25 countries that changed status				
	Obs.	Mean	St. Dev.	Min.	Max.	Obs.	Mean	St. Dev.	Min.	Max.
Stock Market Capitalization, % GDP	691	23.28	34.96	0.07	288.05	420	27.57	41.83	0.07	288.05
New Equity Issues, % GDP	347	1.33	2.42	0.00	14.31	268	1.47	2.62	0.00	14.31
Net Equity Inflows, % GDP	1154	0.11	0.70	-7.80	14.32	346	0.30	1.16	-7.81	14.32
	Conditional Means									
	Entire sample: 79 countries					25 countries that changed status				
	Non liberalized		Liberalized			Non liberalized		Liberalized		
Stock Market Capitalization, % GDP	15.57		36.00			17.86		41.56		
New Equity Issues, % GDP	1.11		1.70			1.18		1.90		
Net Equity Inflows, % GDP	0.02		0.78			0.03		0.78		

Notes: Liberalization dates correspond to stock market liberalization dates by Bekeart, Harvey, and Lundblad (2005). Net equity inflows comes from the World Development Indicators. Stock market capitalization and new equity issues comes from the Financial Structure database. See notes to Table 1 for description of the data. GDP data for Iran are missing for the years 1991 and 1992. See Appendix A for the description of the data.

Appendix Table 1: **Fixed Effects Regressions of Machine Imports—IMF Index**
79 countries, 1980-1995, Controlling for macroeconomic variables

	Dependent Variable: ln(Machine Imports, % of Total Imports)			Dependent Variable: ln(Machine Imports, % of GDP)		
	(1)	(2)	(3)	(4)	(5)	(6)
Financial liberalization indicator		0.081 (0.038)**			0.141 (0.077)*	
PreLib3			0.028 (0.043)			0.087 (0.065)
PreLib2			0.027 (0.040)			0.133 (0.080)*
PreLib1			0.004 (0.042)			0.090 (0.081)
LibDate			0.000 (0.044)			0.093 (0.080)
PostLib1			0.078 (0.049)			0.189 (0.109)*
PostLib2			0.103 (0.052)*			0.275 (0.106)**
PostLib3			0.111 (0.058)*			0.255 (0.106)**
After			0.147 (0.069)**			0.289 (0.118)**
IMF	0.061 (0.034)*	0.061 (0.043)	0.103 (0.054)*	0.170 (0.067)**	0.170 (0.090)*	0.170 (0.103)
Observations	898	898	1264	898	898	1262
R-squared	0.79	0.79	0.75	0.78	0.79	0.79

Note: All regressions include country and time dummies and are estimated by OLS with White's correction of heteroskedasticity and errors are clustered at the country level. Standard errors in parentheses denoting *** 1%, **5%, and *10% significance. Dependent variable is the log of machine imports to total imports in panel A and log of machine imports to GDP in Panel B. Dependent variable is the log of machine imports to total imports in columns (1)-(3) and log of machine imports to GDP in columns (4)-(5). Machine Imports correspond to non-electrical equipment, electrical equipment and instrument industries from Feentra's World Trade Flows data base. GDP and Imports are measured in current U.S. Dollars. All measures of imports come from World Trade Flows; GDP data are taken from the World Bank's World Development Indicators. GDP data for Iran are missing for the years 1991 and 1992. The IMF index is taken from the IMF's AREAER. *PreLib_i* takes the value of one *i* years before the liberalization date, *i*=1,2,3. *LibDate* takes the value of one in the year of liberalization. *PostLib_i* takes the value of one *i* years after the liberalization, date *i*=1,2,3. *After* indicator takes the value of one after the fourth year after the liberalization date. Regressions control for trade liberalization, inflation, terms of trade, lagged GDP growth, deviation from GDP growth trend, financial development, and FDI inflows. See Appendix A for the description of the data.