What is the weakest link for entrepreneurial activity in Burundi? [*][†]

Rodrigo Wagner

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Abstract

Burundi, one of the poorest countries in the world, has also been in the *trough* of a growth collapse since the onset of a conflict fifteen years ago. Burundi is simply *not growing* in per capita terms; despite a reduction in violence, democratic elections and a massive increase in aid following the 2000 peace agreements. This paper explores the root causes behind Burundi's lack of growth. After iteratively elliminating alternative hypotheses, the analysis suggests that the absence of rule of law and security of physical assets is likely to be the most binding constraint for growth today. Another issue is that, given the massive amount of people in small farming, any increase in per-hectare productivity can have huge effects on total output, although it is less clear whether this improvement would foster income per capita or, conversely, induce a higher population. The paper offers a simple model to remark the margins in which security impacts growth, as well as a narrative of why these security problems are the equilibrium of a political game. Finally, we conclude with guidelines for action and further institutionalization of a growth diagnostics.

JEL Classification: O5, E66, M13
Key words: growth diagnostics, entrepreneurship, macroeconomics.

1 Introduction

In Burundi, one of the poorest countries in the world, it may seem counterintuitive to ask what's missing for economic growth. The simple answer would be *everything*. While factually correct, this answer would be of little help in guiding policy priorities. In contrast, the goal of this paper is to explore where the largest bottlenecks to economic growth in Burundi lie. To answer this question we will use the Growth Diagnostics approach proposed Hausmann, Rodrik and Velasco (2005), following the steps suggested by Hausmann, Klinger and Wagner (2008). Using the available information, both statistical and anecdotal, we will try to tell apart what pre-conditions for production appear *disproportionally* scarce. Also, we provide a narrative to rationalize why this scarcity is a self sustaining problem, which may need a policy intervention, as opposed to a scarcity that can be solved on its own by decentralized market forces.

A few recent studies have explored growth in Burundi (e.g. Nkurunziza and Ngaruko, 2002; Baghdadli, Harborne and Rajadel, 2008). While these studies offer a rich description of the economy, they do not set to identify what areas deserve a *disproportionate* effort to foster growth. They establish that Burundi is an underdeveloped country with underdeveloped institutions and underdeveloped factors of production. But we already know that nearly every social and economic indicator is low in *absolute* levels in Burundi. Our question is different: it is trying to isolate the constraint that is *relatively* more binding, in a context of severe scarcity.

To avoid confusion it is important to set expectations right and state the limitations of our endeavor. The paper recognizes that every factor of the economy is important. Nonetheless, the study seeks to identify those areas that deserve *additional* attention, because they appear disproportionally scarce. Since financial, political and organizational capital are very limited, it is important to understand in what areas interventions can have a higher payoff in terms of economic growth. We say that releasing the most binding can be useful, *though not sufficient* for growth. Another distinction is that, in contrast to traditional policy papers, here we do not propose a "menu" of project-level interventions. We just illustrate the properties that some policies should have. Our task is to identify the severest roadblock on the path to growth, which is clearly different from identifying the best policy levers to move these blocks. The value added of the document is to know where the "menu" of policy tools needs to be expanded and improved. Similarly, the paper does not advocate that all resources should be expended to remove the most binding constraint to growth, to the detriment of other possible constraints; that choice, ultimately, befalls policy-makers and aid partners. In sum, the study hopes to trigger an evidence-based conversation around economic growth, not promoting a ready-made "roadmap".

A final important clarification when analyzing Burundi, unlike other less underdeveloped economies, is that we are unsure whether a potential productivity increase is going to end up in a higher population or in a higher income per capita. In the Appendix we offer a first approximation to these two

views with very mixed findings. Considering that (i) we wanted to avoid any value judgement on the trade off between the number of people and their income and, (ii) our comparative advantage is not close to the effective implementation of population control policies; we decided to narrow down our quest for contraints to growth and focus only in what is holding back investment and entrepreneurial activity, keeping us agnostic on the final impact of this growth on population.

The main conclusion of our exercise is that the largest bottleneck to growth in Burundi seems to be the lack of asset security. According to our narrative, this prevents entrepreneurs to approrpiate the fruits of their effort, makes afraid bankers which require huge collaterals and limits overall invesment.

The rest of the paper is as follows. Section 2 provides an overall context and stylized facts on the (lack of) economic growth in Burundi. Section 3 looks for signals of scarcity to understand what are the most binding constraints to economic activity: those which, if relaxed, will give the biggest growth payoff. Section 4 proposes a narrative to understand why most binding constraint is not automatically solved by individual incentives to tackle scarcity. Section 5 concludes by suggesting guidelines for action and further research.

Late XIX German Colonization.

1924 Rwanda-Urundi becomes a Belgian colony following a decision of the League of Nations after WWI. Some production of coffee appear as the main economic activity. Belgians allowed the continuation of the royal dynasty governing Rwanda-Urundi

1962 Independence and separation from Rwanda. Country names Burundi.

1965 Police controlled by Hutu forces attempted a coup; but was defeated by the Tutsi controlled Army. Tutsi get control over all security forces since then

1972 Hutu attack to a military town and massive retaliation by the (Tutsi-controlled) Army. Some hundred thousand people were killed, mostly Hutus.

1987 Major Pierre Buyoya overthhrows the President (both Tutsi).

1993 First democratic elections and assasination of the first Hutu President, Melchior Ndadaye.

1994 Both Burundian President, also a Hutu elected by Parliament, and the President of Rwanda are assassinated when their airplane was shot down before landing in Kigali (Rwanda, April 6). This was the beginning of the Rwandan genocide. In Burundi a large wave of enthic violence began.

1996 Second coup d etat by Pierre Buyoya. International embargo until 1999.

2000 Peace agreements in Arusha (Tanzania). Still some rebel groups did not sign.

2003 Provisional Government of signd agreement with leaders of a main Hutu rebel group (CNDD-FDD).

2005 Pierre Nkurunziza, former leader of CNDD-FDD, was elected president.

2008 Last Hutu rebel group (FLN) defeated by the Army after their rebel attack to Bujumbura (April-May)

2009 (Ongoing) demobilization of FLN

2010 Elections forthcoming.

2 Describing the growth collapse in Burundi

Burundi is one of the poorest countries in the world. According to the World Development Indicators, GDP per capita PPP was $ 321 in 2007, [1] with only the Democratic Republic of Congo scoring lower. Even after accounting for the downward bias in output, due to that household production and the informal sector, Burundi remains one of the poorest countries in the world. More

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[1] Purchasing Power Parity for 2007 measured in constant (international) US Dollars of 2005

importantly, Figure 1 shows that Burundi is on average poorer than it was in 1992, classifying it as *growth collapse*.[2] One arithmetic reason for a collapse is the high population growth. According to the most recent census, the population count in 2008 was 8 million people; *twice* that of 1980. Over this period population grew at an average rate of 2.3% per year[3], while GDP only grew at 1.5%

Beyond the disproportionate growth in population with respect to output, income per capita shows a massive collapse in 1993, with no subsequent recovery. Furthermore, in 1996, following a second coup, neighboring countries imposed an economic embargo that lasted over three years. After the end of the embargo, total GDP went up but not enough as to have a positive impact on income per capita. According to Figure 1 , the GDP *level* post 1997 looks roughly parallel to population, which is consistent with a flat to decreasing income per capita since then. Importantly, the collapse was not only in per capita terms; Burundi produced less *total* output in 2007 than in 1992, despite the increase in population and a global shift in technology.
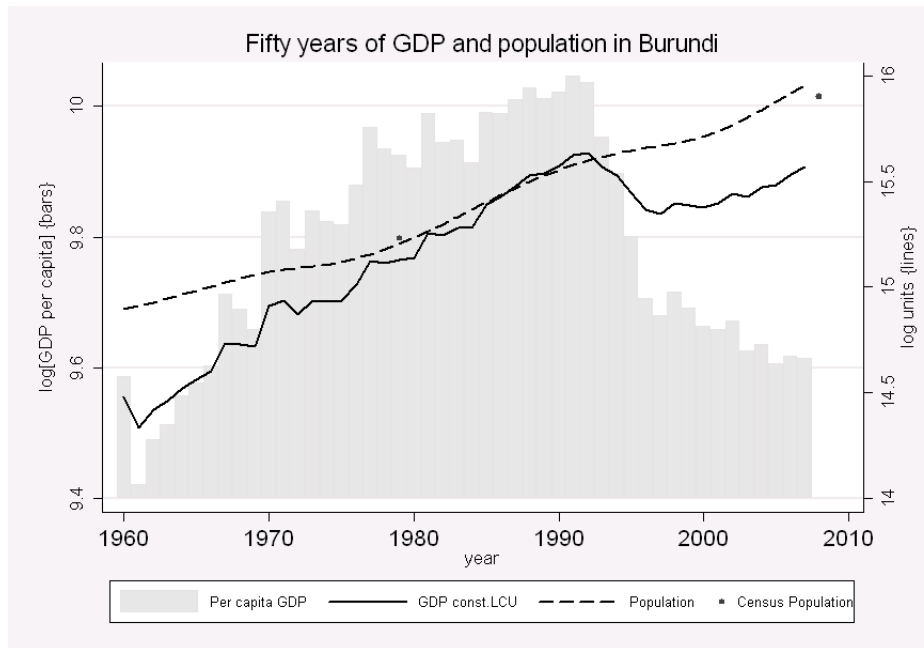

Figure 1: Gross domestic product, population and GDP per capita in Burundi from 1960 to 2007 (logarithmic units). Source: World Development Indicators 2008 except Census population in 1979 and 2008 marked with a dot. Units of GDP were adjusted to match the population series circa 1992, to allow for comparisons and remark the collapse. The GDP measure used are always in constant local currency, to avoid measurement problems with exchange rate and PPP factors. Only potential measurement error in inflation and nominal GDP figures may bias this comparison.

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[2]See Hausmann, Rodriguez and Wagner (2008) for an analysis of growth collapses in the world

[3]The estimates of population shown in the World Development Indicators are slightly away from the recent census results (WDI population estimates from United Nations roughly overestimated by roughly half a million people the 2008, a 6% bias). But since Burundi had censuses in August 1979 (4,114,000 people) and August 2008 (8,038,000 people) we can calculate a very precise, average growth rate of 2.3%.

Figure 1 and 2 show two historical ages of economic activity. At independence Burundi suffered a 17% reduction in income per capita[4], due to the collapse of colonial relations with preferential exports from Bujumbura to Rwanda. But since then, and until 1990, economic activity rose faster than population, at a *per capita* growth rate of roughly 2%. These three decades of circa 4.2% GDP growth was in the ballpark of growth across Africa over that period. Nonetheless, Burundi was never able to converge towards the world frontier of income; it never grew beyond the US trend, as shown in the slopes of Figure 2. A quick comparison with growth in Rwanda shows a sharp contrast. While Rwanda, had a V shaped recovery, Burundi's income per capita follows the form of an L, without recovery.
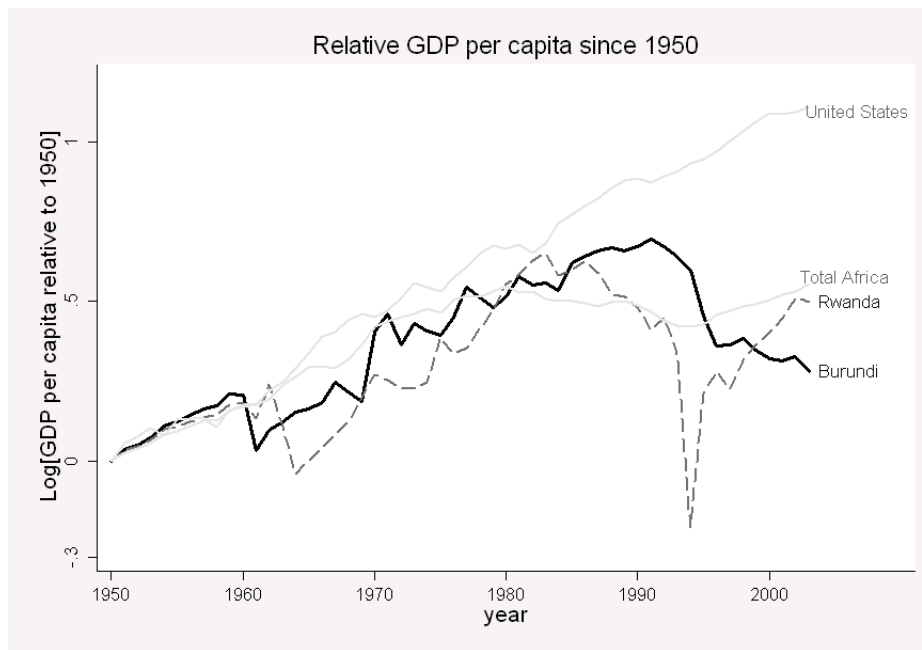

Figure 2: GDP per capita relative to 1950 (1950 − 2003) in logarithmic scale for Burundi and Rwanda, as benchmark we included Total Africa and the United States. US per capita growth rate was roughly constant at 2 %, which coincides with more or less what all the series in the chart grew between the 1960s and the 1980s. After the 1980s the series start diverging, with Africa lagging behind the world frontier and Burundi lagging vis-à-vis Africa. Source: Authors' calculations based on Angus Maddison Dataset. (1990 International Geary-Khamis dollars).

In the 1980s Burundi was growing faster than Rwanda. But, as mentioned, this trend was not mimicked after the collapse in the 1990s. One may argue something structural regarding the economy changed between these two countries during the last crisis. Prima facie we can discard the hypothesis that the destruction of human lives accounts for the difference, since the Rwandan massacre was larger in absolute terms. This does not mean that the genocides are not part of the story; our point is that to generate a difference the genocides need to interact with something else beyond demographic head counts. A similar situation emerges with aid. Although aid per capita

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[4]Angus Maddison's database

in Rwanda is roughly 20% higher than in Burundi[5], in Burundi it is *twice* as large as a fraction of GNI and grew faster after 2000. Moreover, aid in Burundi is now higher as a share of GDP than before the civil war. Thus, the pure arithmetic of aid seems to deepen rather than to solve the puzzle of growth collapse in Burundi.

2.1   Accounting for non-growth. [6]

Growth in the period 1960 to 1990 was driven by aid, although exports[7] and a global technological change may have played a role. According to the World Bank, aid per capita[8] increased massively during the period, moving from circa 5% of GNI in the late 1960s to a ballpark of 15-25% in the late 1980 and early 1990[9]). Strikingly, income per capita in Burundi has been roughly constant since the 1960s if one discounts aid. In particular,

$$[GDP/capita] - [Aid/capita] \approx constant \approx 100\, USD\, per\, capita$$

, which is a counterfactual accounting *assuming* aid has no multiplier effect and translates into GDP on a one-to-one ratio. Notably, this simple accounting explains most (78%) of the variation of income per capita in the period 1960 to 2000[10], suggesting two main conclusions. First, any non-aid based growth in Burundi represents only 22% of the variation in GDP per capita during the last 40 years of the XX century[11]. The biggest jump in income between 1970 and 1980 can clearly be accounted by an increase in aid. Similarly, the large drop in output coincides with the drop in aid during the embargo, although it is less clear what would have happened had aid continued. The fact that this aid corrected GDP *per capita* has been roughly constant over the years does not mean that there was no growth in total GDP. Indeed, some forces in the economy, like agriculture, played an important role there. The point we remark is that, whatever these forces, they were slower than population growth. A second point, very important to make the argument of structural collapse, is that after the conflict we do not see per capita income growing, despite a massive increase in aid. Figure **3** shows that the income per capita in the last four years of the sample are at least two standard deviations below what one would expect, given the level of

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[5]Authors' calculation according to the World development Indicators (2009)

[6]In Figure 16 (Appendix) we present a more standard growth accounting.

[7]Exports, even if somehow volatile, were very stable as a share of GDP, being circa 12% until 1990. They decreased during the conflict but are now recovering.

[8]Aid per capita in constant dollars is calculated by dividing aid in current dollars by the CPI of the United States. According to the World development Indicators, version 2009 "*aid per capita includes both official development assistance (ODA) and official aid, and is calculated by dividing total aid by the midyear population estimate. Source: Development Assistance Committee of the Organisation for Economic Co-operation and Development, and World Bank population estimates.*"

[9]This financed a large increase in the trade deficit (**Figure 23**

[10]If one runs a regression for that period, the coefficient for aid is almost one (0.98 ; t-stat: 11)

[11]This, unless one assumes that the share of aid that ends up in GDP changes very importantly over time.

aid (as depicted by the grey region on the graph). This further supports the idea that aid quantity cannot fully explain the lack of post genocide recovery. Even within a general context of poverty and aid dependence, something structural appears to have broken down.
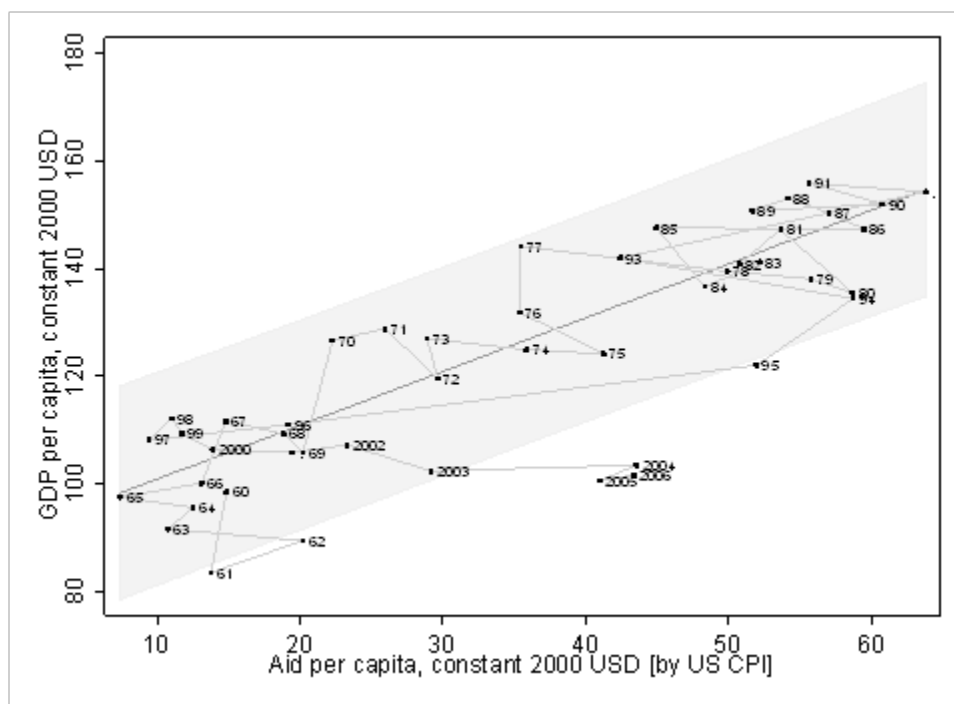

Figure 3: GDP per capita and aid per capita in Burundi (1965-2006). The line shows a 45 degree line to account for a mechanical effect aid may have on growth assuming an effect one for one. The intercept was estimated (98.7 USD per capita) from a regression with pre 2000 data. Interestingly, the estimated slope is very close to one (estimated slope = 0.98; t-stat=11) yielding an R^2 of 0.78. The shaded area is simply the 95% interval assuming a slope of one and the variance of the residual from the regression just described. Source: Author's calculations based on the World development indicators (2009)

A suspect for this structural breakdown would be the inability to deliver law and order. Although we will discuss this point further, the demographic history of Bujumbura could be a first piece of supporting evidence. In the 1950s and 1960s Bujumbura was a city susceptible to attract people, since it was growing faster than the population in the country. It was also relatively cosmopolitan. In 1979, 15% of the population in Bujumbura was born in a foreign country. Among them were Europeans, notably a Greek colony that managed a large fraction of the retail economy, and other Africans. Looking at the spatial equilibrium, the city, though small, had relatively good amenities and conditions that could appeal to an expatriate community as well as local entrepreneurs. By the time of the 1990 census, roughly the same number of foreigners (25,000 people) lived in Bujumbura, though they represented then only 10% of the population. Thus, the population of expatriates

stopped growing but did not decrease that much[12]. At first sight, this trend would not be that strange because the bulk of economic activity was rural. But during the crisis amenities in the city decayed sharply. Evidence of significant outward migration can be gathered from the many anecdotes about the "vanishing" of the entrepreneurial class (both Burundian and expatriate); the massive flow of refugees to neighboring countries, notably Tanzania[13] In addition, the deterioration in the living conditions and security resulted in hundreds of thousands of internally displaced populations, fleeing the conflict areas to the relative safety of Bujumbura and other safes villages. After 1993 Burundi became a "country to escape from", It lost the monopoly of violence[14]. Although Burundi has recently scored less negatively on the Index of Failed States[15] , there are still many challenges to recover the security levels to re-ignite entrepreneurial activity.

Between 1992 and 1997 GDP dropped 25% , though the (estimated) population still grew making average income per capita go down even more[16]. In Burundi, the prolongued slump in output appears to mimick the nature of the conflict, as a prolongued "low-intensity" – where no clear winner emerged and no post-war turnaround could be observed for many years, in contrast to Rwanda. Indeed, as late as in May 2008 one of the rebel groups, the FNL continued to shell missile rockets over Bujumbura.

Baghdadi, Harborne and Rajadel (2008) point out that Burundi did not experience growth following the signature of the Arusha peace agreement in 2000; that a "peace dividend" failed to materialize (see Figure 4). We believe there has been no "dividend" because peace has been lacking, in spite of the formal signing of peace accords. Even beyond demobilization efforts, the decentralization of criminal activities will continue to pose serious challenges to restoring law and order.

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[12]Siriba, Phillipe. 2002. In Ndayirukiye, S. (Ed) 2002. Bujumbura centenaire, 1897-1997 : croissance et défis. Harmattan, Paris.

[13]Interviews by the authors. Bujumbura. 2009. See also UNHCR: Number of persons of concern to UNHCR per 1000 sq.km. Top 20. Accessed at http://www.unhcr.org/statistics/STATISTICS/3cea2f014.pdf http://www.unhcr.org/statistics/STATISTICS/3cea2f014.pdf ; also, UNHCR Number of persons of concern to UNHCR per 1mln GDP (USD) – Top 20; also, UNHCR Refugees Statistics Overview. 2000. Accessed at http://www.unhcr.org/statistics/STATISTICS/3d4e7bec5.pdf http://www.unhcr.org/statistics/STATISTICS/3d4e7bec5.pdf

[14]Rotberg, Robert defines failure as follows: "Failed states have two defining criteria: They deliver very low quantities and qualities of political goods to their citizens, and they have lost their monopoly on violence." Robert Bates (2008) in his definitios puts more wigth on the monopoly of violence, but points towards the same basic idea: the lack of State.

[15]Foreign Policy. 2009. Index of Failed States. Accessed at http://www.foreignpolicy.com/articles/2009/06/22/the2009failedsta

[16]Unfortunately we lack detailed data on the population changes immediately after the beginning of the conflict in 1993. We suspect that actual population in the country was much lower between 1993-1999. First, of course, because of the homicide of many more than 300,000 people, and second because of the displacement. Since the displaced people come back the GDP per capita figures may stay constant while people come back.
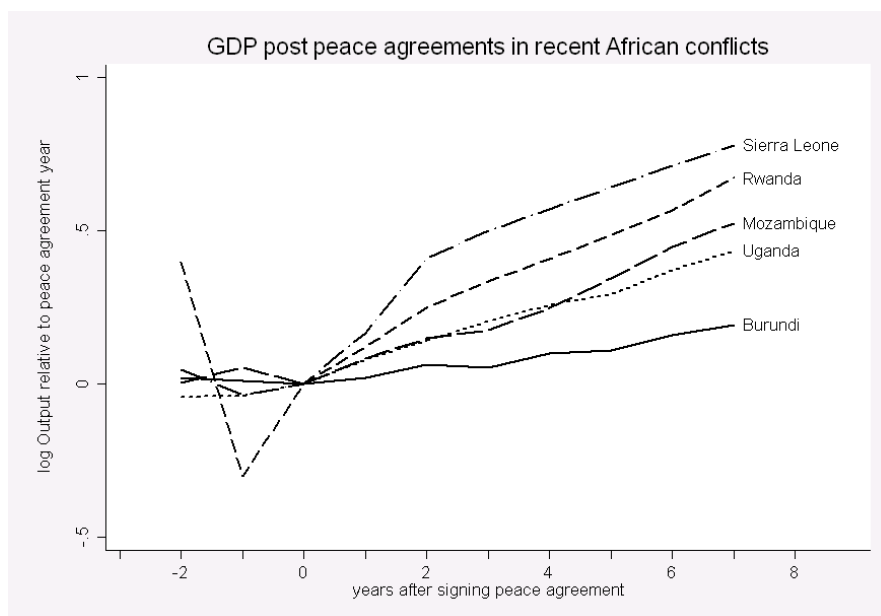
Figure 4: Total GDP evolution after the signature of peace agreements in recent African conflicts. Source: Authors' calculations based on WDI 2008 and using the following years as peace agreements: Burundi (Arusha , 2000), Rwanda (1995), Uganda (1987), Sierra Leone (2000), Mozambique (1992).

Turning to exports, coffee represents over 80% of GDP, leading tea and cotton; with coffee representing over 80% of exports. Some years it was even more important, like in 1970, when the price of coffee peaked, generating a large spike in GDP. Since then, however, the total value of exports has been decreasing, as shown in Figure 5. Moreover, in 2008 Burundi produced even fewer bags of coffee than in 1979, although with some increase in the average quality, due to the switch towards the better paid fully-washed coffee in the 1980s. (Figure 19)
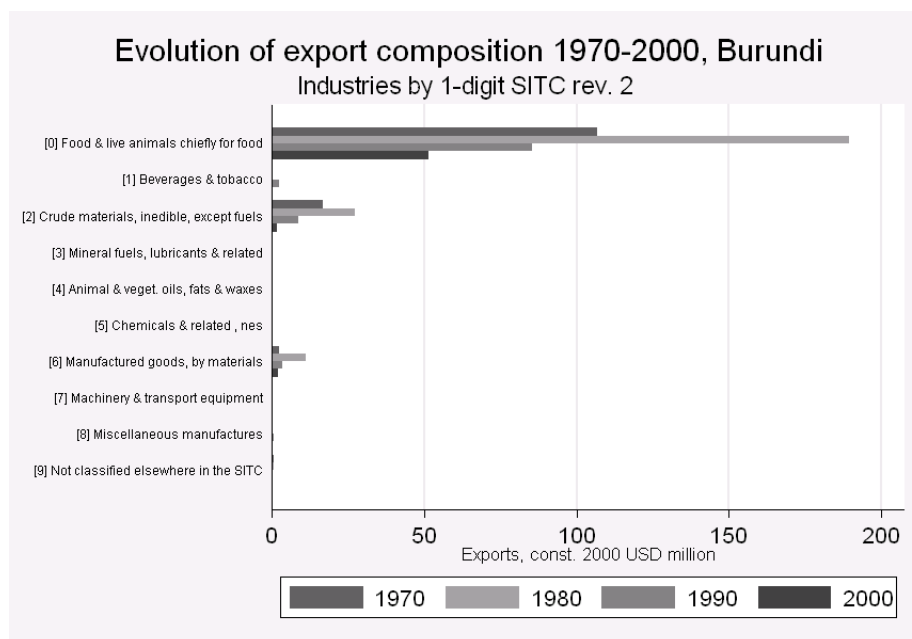
Figure 5: Evolution of the value of exports (price x quantity) in different industrial sectors in Burundi. Source: Authors' calculation from UN/NBER Database of Trade (R. Feenstra).

Interestingly, Burundi would offer the dream case to planners seeking to connect smallholders to the global market. According to official statistics, about 600 thousand households in Burundi produce coffee, out of 1.2 million. Unfortunately, these small firms seem to lack some efficient complements for production. In spite of rising prices in the last four years, the total production does not seem to take off.

Burundi is a very rural country, with circa 90% of the population working in agriculture[17]. Cities are also small-sized. Partially because of distance and partially because of conflict, the value of the marginal product of labor is lower, preventing a wage differential that may attract people into the city. Indeed, the urban population dynamics support this view. In the 1950s Bujumbura had some manufacturing, growing at a faster rate than the country[18] , but without it, in the subsequent periods Bujumbura did not grow at all as a share of the country's population [19]

Turning to geography as a possible constraint, Burundi is indeed far from the sea. Thus, it is not surprising that Burundi cannot exploit the benefits of trade in products that require imported inputs, as exporting processing zones in China or Mauritius did. Also, this location can explain why Burundi is poor and has not been converging towards the world frontier, as distance is a potent barrier to economic expansion[20]. Burundi nonetheless has revealed comparative advantage

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[17]Plots are small, with an average size of one-half a hectare per household

[18]See Figure 15 in the appendix

[19]See Figure 14 in the Appendix

[20]One difference with landlocked states in the United States is that in America people from less competitive places has the option to move, while in Burundi this is harder since they are not citizens of the same jurisdiction than in the coast (Tanzania).

on products with higher value per kilogram, like coffee, tea and an emerging floricultural (horticultural) export. Unlike in 1960, when Bujumbura was the capital of the Rwanda-Urundi and exported regionally, today there are very few products Burundi can competitively sell to its direct neighbors. The main destinations for exports are Europe (73%), with only 12% of exports going to African countries.

Having mentioned the geographical challenges, the recent trends in FDI between Rwanda and Burundi show that the location in the map cannot be the whole story. In recent years Rwanda, with roughly the same grography, faced a tenfold increase in FDI, while Burundi remained at very low levels (Figure 6). Clearly something in the investment climate is different between these two countries.
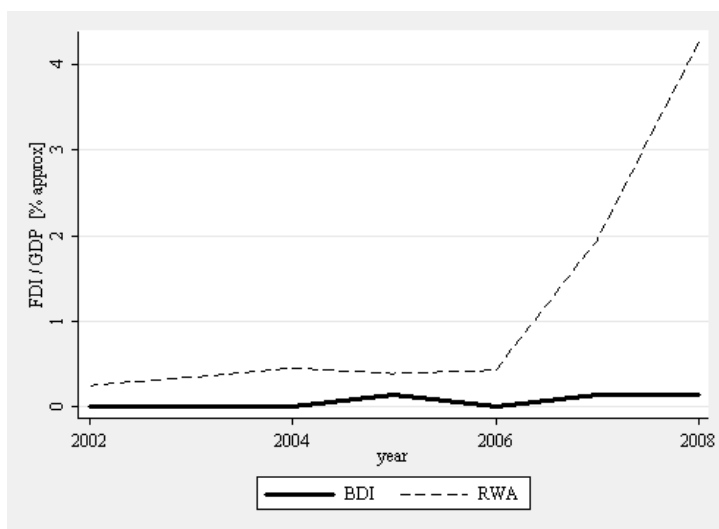

Figure 6: Foreign Direct Investment as percentage of GDP in Burundi and Rwanda; 2002-2008. Source: Adapted from Rusuhuzwa and Baricako (2009)

2.2   Is the standard macroeconomics a big problem ?

Inflation and fiscal deficits do not seem the main bottlenecks for growth today. For inflation one can argue that people in this rural and largely informal economy can easily find substitutes for domestic money, which naturally puts a disciplining ceiling to inflation-tax. Inflation was high during the embargo in the late 1990s, although, as shown in Figure 17, it may have been caused by more than a mere monetary supply phenomenon, because prices grew more than money did. In contrast, the 2008 inflation rate of 24% is not only caused by the global spike in oil and commodity prices, because it is it is also correlated with high money growth. Despite this signal, neither a survey of firms in Bujumbura nor our interviews with entrepreneurs seem to point to inflation as a main concern.

Fiscal policy is often a cause for worry[21], although its relation to growth is less evident in current Burundi. Departing from historical fiscal restraint, government expenditures have expanded[22] both because in a democracy the pressures for more expenditure are higher and because GDP has been falling. The massive amounts of Official Development Assistance (ODA) received[23] go to finance the fiscal deficit, reducing taxation distortions for a given level of public expenditures. If aid continues to finance the deficits, it seems unlikely that fiscal policies can be a binding constraint for growth.

However, given the concern of the development community in the country, will discuss more about the revenue side of the fiscal accounts in the Final Conclusions.

Regarding the exchange rate, there is a long run trend positively relating Coffee prices to the Real Effective Exchange Rate (Figure 22 in the Appendix) However, despite the recent increase in Coffee prices and the massive inflow of aid, we fail to observe relevant signals of appreciations that can negatively impact international competitiveness.

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[21]To put it simply, in these very poor countries government do not tax what they should, but what they can. That is why the burden is disproportional on tariffs (50%), liquors (note that the Beer Company alone makes 7% of the tax revenues of the country) and tobacco.

[22]With the conflict in 1993, fiscal revenues collapsed in different dimensions. With the subsequent embargo and the reduction in trade, the tariff revenue also collapsed. As a result the government attempted to inflate (Nkurunziza, 2004), but the fact that agents have some many substitutes is a device that in itself disciplines the government.

[23]As mentioned before circa one half of GDP in 2007, according to the WDI (2008)

Box # 2: Concerns about mismeasurement of output

Before finishing the description of the growth process, we should raise a series of concerns over output measurement. As confirmed in interviews with the statistical office (ISTEEBU), there is no *direct measure* of aggregate production, consumption and investment, which are the most relevant fraction of GDP. In fact, the figures available are only estimations made by the Ministry of Planning, using data on import, export and fiscal expenditures. The only exception to the lack of direct measurement is the availability of real national account data for the year 2005. As an illustration of the potential distortion, the estimated GDP figures for 2005 show that investment reached 10% of GDP, while the national accounts measurement yielded 17%. A second concern is that many standard macroeconomic ratios that use GDP in the denominator seem "too high to be true". For example credit to GDP is well above the average for African countries and investment over GDP is at Kenyan levels. A third concern is that during the period 2004-2008 many standard indicators of economic activity were growing faster than the average 3.5% rate of reported GDP. During that period, oil consumption [in barrels] increased three times faster, at an average of 10% per year, with the biggest jump in 2005 (23%). Electricity[a] consumption grew at a yearly rate of 6%[b]. Beer, what we consider an especially interesting indicator for economic activity in informal economies, grew at 9 % per year.[cd] In sum, it may be that aid flows are distorting some of these ratios and that there is no actual mismeasurement but, to be cautious, in the next sections we will avoid over-interpreting small movements in GDP series for Burundi.

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[a]See Johnson, Kaufman & Shleifer (1997) and Lacko (1999).

[b]while electricity production did it at 5 %

[c]However, eliminating the year 2005 we get a growth yearly growth of 4.4%. The quantity of Arabica coffee exported, according to the Coffee Office (OCIBU) sharply decreased during the period 2004-2008, −10% per year, however, with a growth in prices of 13% in terms of dollars per pound

[d]However, according to the International Coffee Organization, Burundi's total coffee production (Arabica and Robusta) fell only by −1.5% per year during the period. The difference between a 10% fall and this 1.5% fall can be rationalized not because of the varieties (since Burundi produces very little robusta) but by the differential accounting for the agricultural seasons. The ICO uses the crop year April to March while the Central Bank of Burundi seems reports data from OCIBU on a calendar year basis. This is relevant because the 207 season was particularly bad for Burundi according to the ICO Burundian production fell by 55%, but the good news is that the fall in production was aggregate (from 127 to 117 million bags, 8% fall), so the overall revenue from coffe did not fall little. Global supply for coffee grew at a rate of 2.5% per year during 2004-2008.)

2.3 Taking stock of the growth description

The economic activity in Burundi can be described as a growth collapse in a country with high population growth. The collapse was triggered by the conflict in 1993, but there have been no signals of recovery in per capita terms ever since 1993. Furthermore, if *we discount aid flows*, the GDP per capita of Burundi does not show major changes since the 1960s, with the exception of the last decade, where it is going down in what seems a structural problem. In the Appendix we

explore whether the problem of Burundian non growth is due to a Malthusian trap, where any change in productivity translated into population growth rather than a higher income per capita. The mentioned analysis is inconclusive, suggesting a non trivial likelihood that the country is indeed in that kind of fertility trap. To be pragmatic, however, the rest of the paper will focus on the constraints to entrepreneurial activity and productivity growth; no matter whether this additional output would be allocated to have more income or to have more people.

3 Exploring signals of scarcity

To explore the relative scarcity of different factors we will examine the potential constraints to the marginal project – defined as the one which would be executed if the most binding constraint is removed. In a very general setting, an entrepreneur e has incentives to pursue an investment project j if the privately appropriable return is higher than the opportunity cost of funds:

$$(1 - \tau_{ej})\rho_{ej} \geq r_{ej}$$

where ρ is the social return of the project, which would be a measure of how good is the project at creating value, no matter who internalizes that value; the symbol τ represents, in contrast, the proportion of the social value in the project that cannot be appropriated by an entrepreneur, either because someone is taxing or stealing , or because of limited coordination with other entrepreneurs; finally r is the real interest rate, meant as a proxy for the opportunity cost of funds[24]. As overview of this section, Figure 7 illustrates the nested steps to explore where the most binding constraint lies.

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[24]. The sub-indices e and j remark that all these parameters can be potentially different for various entrepreneurs and projects
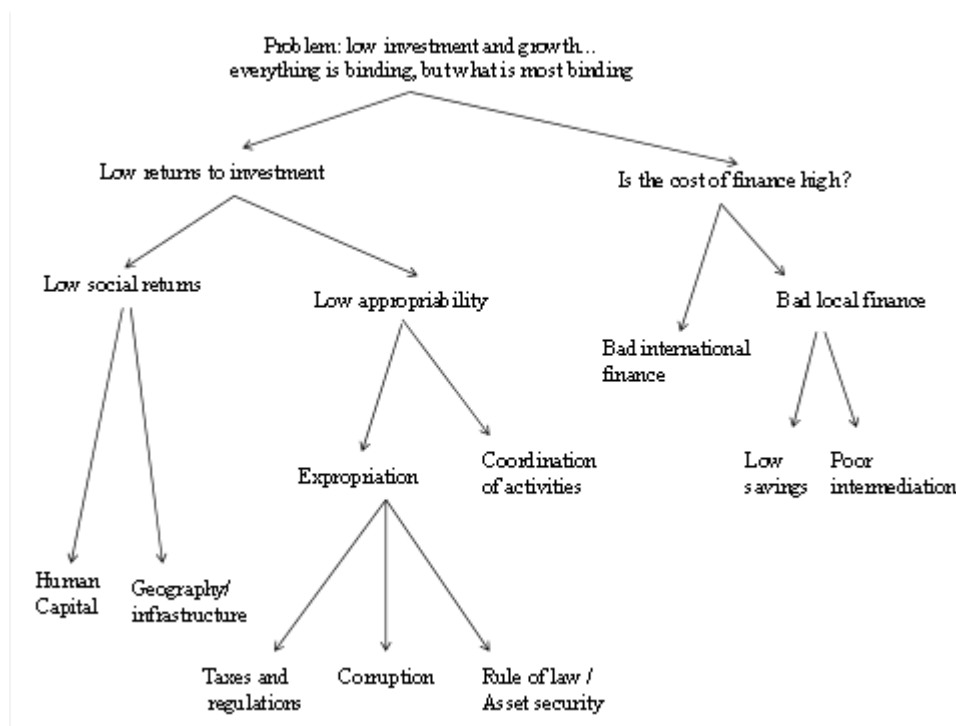
Figure 7: Illustration of the nested quest for the most binding constraint. Source: adapted from Hausmann, Rodrik and Velasco (2005)

As suggested in Hausmann, Klinger and Wagner (2008), we would look for four families of symptoms. First, after movements in the most binding constraint we expect to see movements in economic activity (impulse-response). Second, a very scarce factor may have a very high price or implicit valuation by firms. Thus, when looking at market signals, the most binding constraint should not only be in low quantity, but also have a high (hedonic) price.[25][26] Third, the firms and activities that are less intensive in the most binding constraint are more likely to succeed and/or survive, like a cactus in the desert. Fourth, since agents in the economy may observe these constraints, they would develop institutions or adaptations to bypass the most binding constraint.

Unfortunately most of these prices, quantities and institutions are either measured with important problems or not measured at all. Thus, we will rely on imperfect data and anecdotal information to try to back up these theoretical quantities. This process may be controversial and dependant of the analyst, that is why at the end of the paper we call for further study. A final remark is that we will usually work with data of existing projects (infra-marginal). Since we do not have real time experiments on this, we need to continuously manage this unavoidable tension between the available data (telling us about average project) and the nature of our question (focused in the marginal project on various margins).

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[25]This helps to tell apart if the low quantity is because of low supply or simply because of low demand, indicating that other constraints might be more binding.

[26]This is not the most general case. When two or more complementary factors are both binding we may fail to get an increase in the price of the most binding constraint.

The rest of the section explores whether the most binding constraint lies on the finance for potentially good projects or, in contrast, on the scarcity of profitable projects to trigger investment by entrepreneurs

3.1   Is it lack of Finance? (r_{ej} as a binding constraint)

There are many financial constraints in Burundi[27], but various reasons suggest that the most binding constraint does not lie on finance.

Probably the most important reason is that the real lending interest rate does not look high by African standards. As shown in Figure 8 , the real interest rate for the period 2003-2005 was around 10%. More recently, the ex post real interest rate fell, even below zero[28]. In the same figure, domestic credit to GDP seems above many other African countries[29] Thus, the cost of finance in absolute terms does not appear to be the major rock constraining growth.
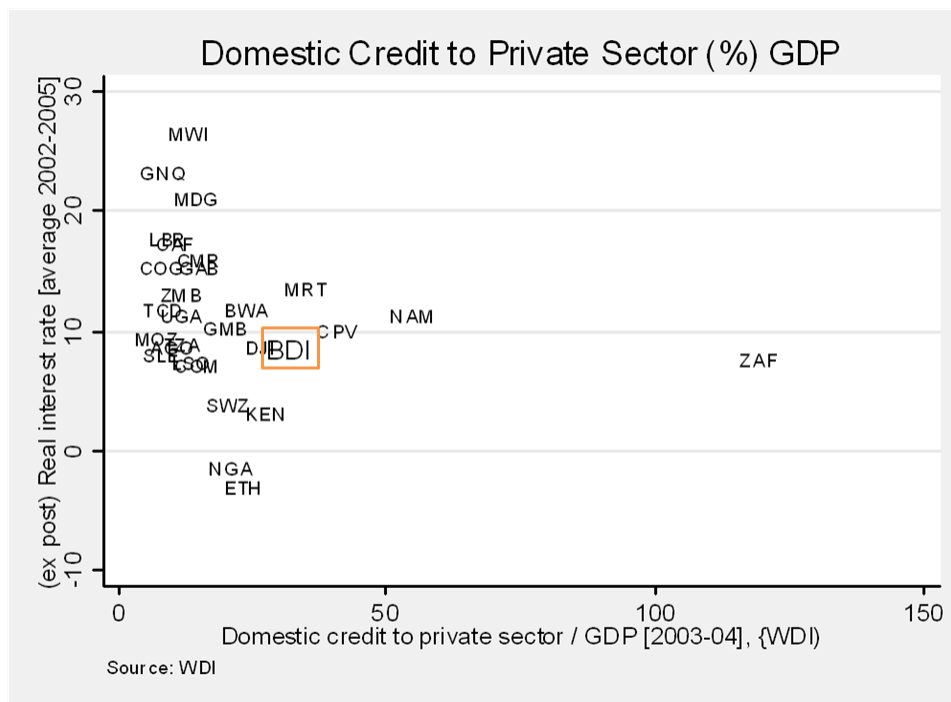

Figure 8: Lending interest rate and Domestic Credit to private sector in various African countries, average 2002-2005. Source: Economist Intelligence Unit.

Notably, the period of peak GDP per capita in Burundi had important measures of financial repression: exchange rates fees, little market competition in Banking, capital controls for exports

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[27]See the chapter on Finance in the 2009 Country Economic Memorandum of the World Bank

[28]Of course an ex post negative interest rate is not a relevant equilibrium price ex ante, but a surprise for lenders.

[29]Even if we distrust the figures for GDP and, say, presume that GDP is twice as big, the ratio of credit to GDP does not look surprising for the region.

and imports (see Nkurunziza and Ngaruko, 2002). All these things look much better today, but growth does not, which is further evidence in favor of overall finance not being a binding constraint (no impulse-response).

A second issue to be considered is that new banks, especially banks with foreign ownership and better access to markets, are entering the country, such as Access Bank and other banks from South and Eastern Africa. Furthermore, the entry of Burundi into the East African Community (EAC) is expected to bring the country access to new potential capital flows; thus, helping to protect the local banking system against idiosyncratic shocks.

What is more striking from the findings of the study is the very high collateral requirement, as shown in Table 1.[30] An average firm in Bujumbura has to offer guarantees or collateral assets for up to 220-260% of the loan value. In contrast, collateral rates stand at 130-140% on average for African countries and low income countries, respectively. In Rwanda, for example, average collaterals are in the range 140-150% for firms. One hypothesis might be that the legal procedures for the bank to appropriate the guarantee in case of default are too costly and slow. Although the judiciary and contract enforcement systems rank among the worst in the world, there seems to be no major difference with other similar countries with much lower collateral rates[31]. Moreover, Beko (2009) shows that more than two thirds of the *informal* firms that request credit from formal banks get it. If bankruptcy resolution were the main reason to justify collaterals, we would expect credit to be fully rationed to informal firms, but it is not. On the contrary, in our interviews with bankers, they justify their reluctance to lend for investments in rural areas for fear that assets could be destroyed or looted due to the chronic insecurity.

Country	Collateral requirement as % of the loan
Guinea Bissau	67
Guinea	74
Tanzania	123
DRC	129
Rwanda	154
Uganda	168
Gambia	179
Mauritania	195
Burundi	**267**
Average	**151**

Table 1: Collateral requirements in their last loan for firms in the Enterprise Survey made by the World Bank in different African countries circa 2006

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[30]Enterprise Surveys (2006)

[31]When firms in Bujumbura were asked, the legal problems did not rank high in relative terms. When we asked bankers they did not focus overwhelmingly in the enforcement problems.

So far, our analysis suggests that the most binding problems are *not* in finance[32]. The reason why entrepreneurs are not getting finance is that bankers do not feel comfortable lending to projects unless they can get repaid in case of (partial) asset destruction. We will explore this issue further in the subsection on problems to appropriate returns. In discarding finance as the most binding constraint, we do not imply that there are no challenges in the area. For example micro-finance as well as financial engineering are avenues that deserve their own study

3.2   Is it lack of Social returns? (ρ_{ej} as a binding constraint)

Assuming for a second that there are no problems appropriating the benefits of projects ($\tau = 0$), we will look whether there are projects with enough social return, ρ_{ej} , to compensate for the opportunity cost of funds. They may not exist when productivity is too low, due to the lack of complementary factors like human capital or infrastructure.

3.2.1   Is it low Human Capital?

A brief overview of human capital indicators locates Burundi at the bottom of world rankings. Education and health indicators are overwhelmingly low. Improving them is badly needed in Burundi, even for reasons beyond economic growth. However, our question here is rather different: we ask whether weak investment in human capital is a root cause of the stagnation in economic activity?

The findings seem to indicate otherwise. Education and some health indicators look better today than in 1990, so these variables would not explain the lack of recovery after the collapse of 1993. Indicators, however, change over time and current output depends on the stocks, which have suffered an important shock during the conflict. The rest of the section would argue that these stocks do not seem to have deteriorated so badly; it might be instead that incentives to accumulate human capital are missing or are weak.

Education   The country has low literacy and school enrollment rates, but they have been rising. For example literacy is estimated at 53% [33], which is low, but today more people claim that they know how to read and write in comparison to 1990 (Table 2). Primary enrollment has some good news, with coverage growing up to 80%. However, secondary enrollment is very low; at an average

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[32]A well functioning finance system should not lend to projects that in expectation will not be repaid. Thus, the mere fact that some problems show up in financial accounts does not mean that the most binding constraint is in finance. It is just that the financial sector is a vacuum cleaner of information and that is why some of the financial indicators, like Collateral requirements, appear extreme.

[33]49% in the QUIBB 2006 survey and 53% in the MICS survey (2005). The latter with 80% in Urban Areas and 51% in Rural areas.

of 8%. For the highest quintile of wealth index secondary schooling is still 16%[34], suggesting that even those families that are less financially constrained are not investing in further education. This is hard to reconcile with the notion that education supply is a binding constraint. In that scenario, one would expect a high implicit price for educated workforce, and people struggling to accumulate that form of additional human capital.

Measurements of the private returns to one extra year of education are always problematic to calculate, but in Burundi they are even more likely to be overestimated due to self-selection of the group that got education (Nkurunziza and Ngaruko, 2002). Even taking these caveats into account, the available estimations seem not high vis-à-vis other countries. [35]

A further indicator that education may not be a binding constraint is the high rate of school dropouts. For secondary school, one may infer that kids do not continue because of credit constraints to have enough income while studying. However, the dropout rate was anecdotally reported as high also in public tertiary, where tuition is free, which is more suggestive of limited returns to education.

In the same lines, we observe brain drain. According to Clemens and Petterson (2008), over 77% of nurses and a high (>40%) percentage of physicians migrate outward to developed countries[36] – a suggestion of the lack of opportunities. Unfortunately we could not find comparable data for professions outside the health sector, but the general picture we see is that the market price of educated people is likely to be low because of low demand. Moreover, when surveyed about the quality of human capital, firms in Bujumbura did not complain disproportionally about this issue[37]. Finally many well-educated Burundians end up working in the public sector, due to the lack of alternative well-paid career tracks in business

| | | year | | |
	1979	1990	2002	2006
Literacy	26	38	46	49
males	35	48	55	55
females	16	28	37	43
Primary enrollment				
males		57	55	76
females		49	45	73

Table 2: Literacy rate in the population (%) and primary enrollment (as % of eligible age). Source: Authors' compilation from census 1979; WDI (2008) and QUIBB surveys 2002 and 2006.

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[34]ISTEEBU. 2005. MICS survey.

[35]Using earnings regression estimates from Nkurunziza and Ngaruko (2002) one gets an implicit rate of return of 8% per year. Using the estimates of Beko (2009) on the urban informal sector one can recover a rate of return of circa 3%. None of these figures seem too high when compared to international benchmarks as in Pritchett (1998). Even more if we expose

[36]While the case of doctors is close to the African average, for nurses Burundi ranks second, behind Liberia.

[37]Enterprise surveys

The quality of education is very important for both cultural and humanitarian reasons. Although we lack comparable data to test whether it is the most binding constraint for growth, there are at least two reasons to believe that is not the case. One is that, as mentioned, much more people know how to read and write than two decades ago, but GDP did not go up (no impulse-response). The other is the recent emergence of paid technical schools offering tertiary education, which suggest that at least some of the supply problems in education can be addressed by the laws of supply and demand.

Health   Low life expectancy and important health problems not only impact individual productivity directly but also can reduce the return to investment in children's education. Thus, it seems reasonable to explore health as a potential binding bottleneck. As mentioned above, undernourishment is a huge problem in Burundi, with slightly more than two thirds of the population showing some signs of undernourishment. This is worse than in 1990, when according to FAO less than one half of population was affected. Notably, FAO's rankings show that the only country that has done worse than Burundi is DRC.

Malaria prevalence is very high, at 25%. While *reported* malaria prevalence did jump significantly (Figure 9), current levels appear to be similar in Burundi and Tanzania today[38] . [39]. Based on estimates in Latin America and Southern United States, malaria can reduce productivity of labor by a ballpark of 40% (Bleakley, 2009). It is unclear, however, how Malaria prevalence impacts income in Burundi. If other factors are limiting labor productivity, the effect of removing Malaria might not be that large.
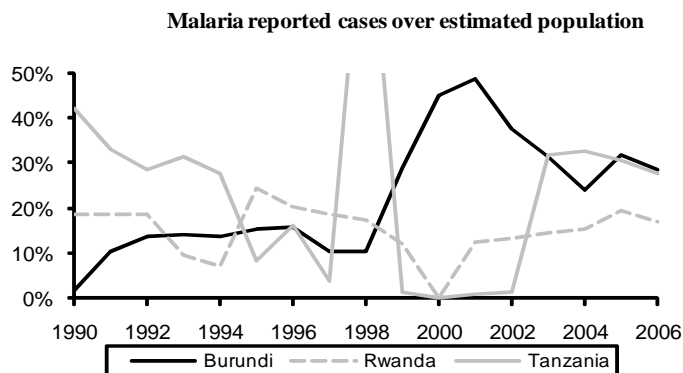

Figure 9: Malaria reported cases divided by estimated population. Source: Author's calculation using WHO 2008 Malaria Report and UN population estimates.

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[38]This well may be a reporting problem due to low quality in health services. We looked at deaths by Malaria, which may be less biased than reporting, but unfortunately we did not find figures before 1999 to compare with the jump shown in Figure 11

[39]"*The people affected in Burundi are generally non-immune highlanders with little or no background immunity. That the epidemic has not been stopped and indeed has probably been fuelled by the use of ineffective drugs is not, therefore, surprising*". (Etchegorry et al 2001)

Turning to HIV/AIDS, prevalence is officially much lower than in neighboring countries. While local surveys by the Ministry of Health suggest that cases are rising[40], UNAIDS indicate that prevalence among the adult population has been going down since the war, now affecting 100,000 people or 2% of the population from the ages of 15 to 49 years. This is more or less the rate in Tanzania, but half the rate in Rwanda. [41]

More generally, in Burundi today about 28% of kids have lost at least one parent, mainly because of the conflict. This number is much higher, though for the cohorts born in 1990 to 1995 (where rates average 40 to 45%).[42][43] We should note, however, that Rwanda was confronted with similar bleak indicators, and was since then able to grow its economy. Maybe the impact on productivity is still to be seen, as these young cohorts enter the labor force.

In contrast to education indicators, some health indicators seem to have been deteriorating in Burundi. It is not clear; however, whether this is a cause or a consequence of low economic growth or the prolonged conflict. In particular, because the worsening in reported health outcomes is hard to reconcile with the pace of population growth. There are many important reasons to invest in health, but it is not obvious from the analysis that health is the most binding constraint for growth in Burundi today[44]. In any case, even if health and education were the most binding constraint, they are very slow moving variables, which are unlikely to generate quick wins in growth.

3.2.2   Complementary factors: Infrastructure

It is a fact that the conflict has devastated infrastructure. On top of direct physical destruction, public expenditures in roads and infrastructure maintenance were stopped during the war. However, in our view, there are many reasons to believe that infrastructure is *not the most* binding constraint to economic growth in Burundi, at least today. This view coincides with the one of firms in Bujumbura, which do not complain disproportionally about infrastructure[45] [46].

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[40]Although the urban rates are higher, the rural prevalence accelerated especially among women

[41]One impact of AIDS related to the expenditures. The population with antiretroviral treatment is growing, estimated to be circa 20,000 people in 2007. Another impact of AIDS is that there are more than 100,000 orphans that lost their parents do to AIDS.

[42]The impact of Burundi's prolongued conflict on schooling deserves a special mention here – as well as further research. As Uvin (2007) has shown, the war in Burundi was fought by children. Child soldiers joined at ages 9-14. The age of those who were recruited during the war was much lower. It would be valuable to further research on long-term impact of the conflict on school enrollment and completion, which Uvin concludes has affected drop-out rates at or before 10th grade

[43]Any growth strategy should monitor what happens with this cohort, because the lost parental capital is a problem still to show its full extent, since these cohorts are the ones joining now the labor force.

[44]As noted in section 3, these worst measured health outcomes are hard to reconcile with a larger population.

[45]World bank enterprise survey 2006

[46]This is not surprising since almost none of them export and they are in a city. In fact, only 2% of the firms surveyed in Bujumbura export while in Rwanda the figure is circa 12%.

Roads and ports   In 1990 there was no other country in Sub Saharan Africa with more kilometers of roads per area of land than Burundi. That means that for a producer randomly located, it was very likely to find a road nearby. One can certainly argue this is a very populated and fertile country, making the above comparison less informative about relative road scarcity. Indeed, when one does the comparison using cropland rather than total area, as proxy of populated land, then Burundi ranks very close to the regional mean[47]. If we assume the connections are still there, although depreciated, the quantity of roads does not look disproportionally small. Moreover, Burundian trade is now using more the road network. For example, the bulk of coffee exports are now moving through roads, unlike in the past where the lake connection to Kigoma and rail to Daar Es Salaam was more relevant. In general, roads are crucial to connect people and goods, but we fail to observe places where the availability of new infrastructure creates a boom of economic activity, signaling that it is unlikely to be the most important missing factor for investment. Even if it were, the earmarked fund to upgrade roads seems a very large push in comparison to other areas.[48] Similarly, the existing plans for construction of new rail links to neighboring countries would relax even more any road constraint.

Air transport   Air freight exports from Bujumbura have increased by 75% in the period 2008-2004, though from a low base. While there might be room of improvement, especially to promote more frequent and cheaper air transport for horticultural exports to Europe, the lower air connectivity vis-à-vis two decades ago looks more like a symptom of low entrepreneurial demand than a cause. [49] In fact Burundi has a good airport and there is a relatively competitive market of airlines looking for profitable routes.[50] If there were enough demand for transportation, supply would be likely to respond.

Electricity.   Even if two out of five formal firms in Bujumbura consider power outages their largest constraint[51], various reasons suggest it is unlikely to be the most binding for growth. First, the average African country complains more about electricity than Burundi. Second, these other African countries are growing more than Burundi, despite having worst perception of electricity[52]

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[47]According to the World development Indicators, Burundi in 1990 had 1.1 km of roads per each squared kilometer of cropland 9either annual or permanent). The Average for the Sub Saharan Africa region is 1.3 and the standard deviation is 1.09 if one excludes Namibia.

[48]There has been an important investment in road maintenance and repair, since 2005, mostly financed through an earmarked road fund.

[49]Doing business between Europe and Burundi appeared easier and more frequent back in the 1980s than today. According to EXA (1992), in the early 1990s there were four weekly connecting flights between Bujumbura and Europe: two Air France and two from a Belgian airliner. Today, connectivity goes more through scales in neighboring countries, like in the flights Bujumbura -Nairobi

[50]In the last years there is an increasing number of air connections though Nairobi and some flights to Europe, like the direct flight to Brussels.

[51]2006 World bank Enterprise Survey for Burundi

[52]Given that most of the surveyed firms are not oriented to the export market, we feel that improving on their most vociferous complain may have little growth payoff and then it is unlikely to be the most binding constraint

[53]. Third, sectors with comparative advantage in Burundi are relatively less intensive in electricity consumption; making it less plausible that relaxing this constraint would have a large growth payoff via exports.

Crop water supply   According to FAO, Burundi had not seen any expansion in irrigated land since 1990, unlike Rwanda. Only 6% of crop lands are irrigated; a discouraging statistic in a country where increases in food production rest on improving the yield per ha, because the crop area cannot be expanded further[54]. This is an area where certainly more projects need to be evaluated, because it not only has the potential to increase production but it can also reduce the volatility of yields[55].

In conclusion, although irrigation needs further investigation, infrastructure in Burundi does not seem to represent the *most* binding constraint. In particular, we think that more important than the mere construction of a road are other complementary factors that enable their use. For example, racketeering from criminal groups seeking "informal tolls" may diminish the potential high returns to infrastructure. These security issues will be discussed further in the next section.

3.3   Is it the inability to appropriate the fruits of investment? (τ_{ej} as binding constraint)

Our argument now is that maybe entrepreneurs have a hard time appropriating the fruits of their effort and, in expectation of such problems, they avoid investing. This may be either because another party is extracting resources from the entrepreneur, like taxes or corruption, or because of limited coordination.

3.3.1   Government failures.

Corruption   Corruption is of course a problem, but probably not the worst for entrepreneurs today. According to Kaufman et al (2005), even if very bad, the country is roughly in the ballpark of what one can expect given its level of development – e.g. corruption levels do not look much different in countries that have **ten times** the level of per capita income of Burundi. (Figure

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[53]The mismatch between the politically-feasible tariff for electricity and the cost of production is a constant problem in Africa and in much of the developed world. Since countries with a much higher income per capita than Burundi have been unable to solve the problem in the way suggested by an economics textbook, we feel the potential (political) costs of improving on electricity can outweigh the gains from growth effect.

[54]In any case, irrigation investments need also to look at other potential constraint to growth, like Malaria. See Marimbu (1993).

[55]Similarly, weather risk insurance and other schemes may also be worth exploring, given the impact of droughts on the availability of collateralized loans.

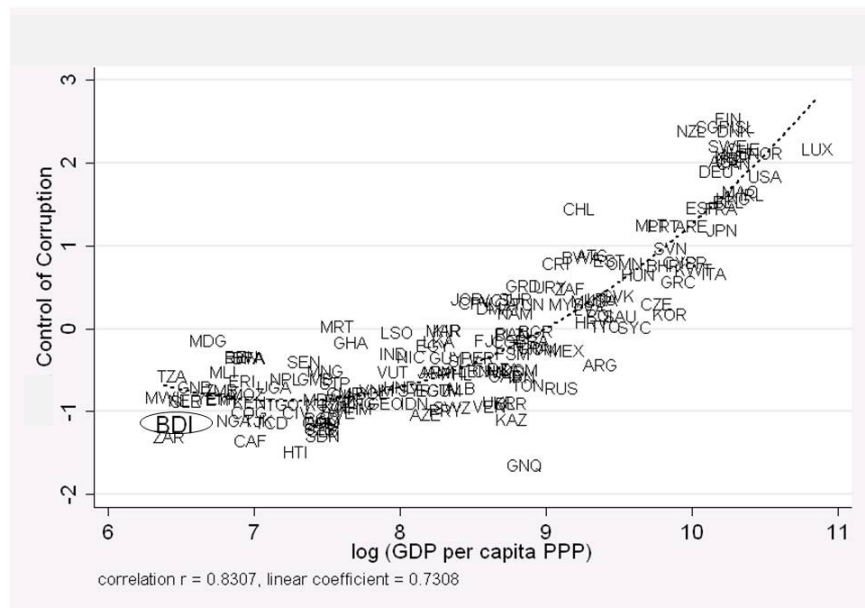10). Consistent with this idea, less than 5% of the firms in Bujumbura list corruption as their top concern.

Figure 10: Corruption control average scores in countries of different income per capita. Fitted quadratic line. Source: Author's calculation based on Kaufman, et al (2005).

A note of alert is given by the Doing Business Report, where Burundi holds a world record of irrelevant administrative procedures to clear imports; with a legal limit of 124 days.[56] In practice, however, importers take on average less than 10 days in clearing imports[57]. While customs officers may seek bribes, the overall constraint to business does not look as binding as depicted in former *de jure* figures. This is not to say that corruption is irrelevant in Burundi[58] but, overall, corruption does not rank high relative to other concerns of businessmen.[59] In short, corruption does not seem disproportionally high given the level of development.

Taxes & Labor Regulations   The study did not find evidence that the tax and labor regulations are binding for growth today. The marginal tax rate was recently reduced from 45% to 35%, though with little apparent effect on economic activity. Similarly, the economic and industrial tax-free zone ("*zone franche*") provides for very favorable tax exemptions (100% !) for labor-intensive export firms, suggesting it is unlikely that taxes are suffocating entrepreneurs. Interestingly, this tax benefit has survived for circa ten years, with different parties in power, which makes unlikely

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[56]Other *de jure* indicators of doing business look almost as unfavorable.

[57]This difference between de facto and de jure is recognized in the seminal paper by Djankov et al (2002).

[58]For example more firms answer that it is hard to get an operating permit without bribing than for African countries (40% versus 20%

[59]Enterprise survey 2006.

that political instability enters the investment decision through this particular tax channel.[60] An open question, deserving of further sectoral analysis, is the distortive *implicit* taxation of coffee producers. Indeed, various reports suggest that small farmers would prefer to move away from coffee because the profits they get are lower than with other crops, despite rising international prices[61].

On the labor front, existing firms in Burundi do not disproportionally complain about restrictive labor regulations. Small firms tend to classify labor laws as a *non-major* constraint (95%), while *none* of the large firms (with more than 50 employees) surveyed[62] consider labor regulations as their top obstacle. Our view is that, given the situation in the country, workers simply do not have relevant bargaining power.

Crime, theft & asset insecurity   There are many reasons to think that security is the most binding constraint to economic growth in Burundi. In particular we observe most of the signals for a binding constraint, as described below[63].

First, even if it has improved, security levels are still low in absolute terms. The last hold-out rebel forces are still being demobilized as of April 2009, and ex-combatants are being integrated into the security forces. More importantly, homicides rates are the highest of all East Africa. According to WHO / UNODC (2004), 35.4 Burundians are killed yearly for each 100,000; a figure that is almost 50% higher than in Tanzania, Rwanda or Uganda; though roughly the same as in DRC. Moreover, according to the UN Integrated Office in Burundi (BINUB), there are at least 100,000 fire arms circulating in the country, which are likely to be used for criminal activities. Absolute levels of violent crime remain high and are decentralized among many groups. Furthermore, non-essential travel outside Bujumbura is discouraged by both American and British governments[64].

Second, security of assets carries a high shadow price in terms of access to finance. Bankers cite risks to assets destruction as a major constraint to new investment projects. In general there are no loans for potential investment projects in rural areas (with the exception of cash crops with very liquid and important collateral). Most loans are concentrated in the city and collaterals on credit finance are enormous, well above 200 %, as shown in Table 1

Third, movements in security yielded important movements in growth. On the downside, the Burundian economy collapsed because of the conflict in 1993, and it has not recovered since then. In contrast, the rationale for why an increase in security did not create an immediate growth payoff might be because security is still well below the 1990 levels and, by any measure, below

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[60]One current worry is the potential reduction in tax exceptions to cover for the tariff revenues that will be lost due to customs union with the East African Community.

[61]See Baghdadli et al (2008).

[62]Enteprise survey (2006)

[63]See Hausmann, Klinger and Wagner (2008).

[64]US State Department and UK's FCO.

levels that would attract foreign investors (see Figure 6). Moreover, the "decentralization" of criminal activities will continue to pose serious challenges to restoring law and order. According to the 2006 Governance Survey, only a fraction of citizens perceive that crime and insecurity was due to FLN rebels, now demobilizing (19%). The majority of those polled were more worried about other sources of criminality, coming from bandits (22%), demobilized soldiers (13%) and the even the Police (14%).

Fourth, investment projects have stayed out of areas where insecurity is high, concentrating instead on areas more insulated from theft and destruction. At the household level there was a large decrease in livestock, which is easier to steal[65]. When surveyed, firms disproportionately[66] mention "*political instability*" and "*crime, theft and disorder*". "*Access to finance*" comes in the fourth rank and, as mentioned in Section 3.1, it relates to the hefty collateral requirements to guarantee against the risks of asset destruction. [67]

Finally, we find that entrepreneurs have adapted their activities to the insecurity challenge. One export firm, for instance, has been able to protect its assets by hiring the wives of rebel forces; a creative way of coping with the security problem. Another example is that highlands, fertile for horticulture, are under-exploited because investors are worried about risks of destruction and looting. In fact, investment and loans are disproportionally located in the safer Bujumbura.

In short, there are reasons to believe security is a binding constraint. In our view, insecurity has impacted the profitability of businesses and , probably, also the ability of the business ecosystem to continue to develop.

3.3.2 Are coordination failures for production holding Burundi back?

A final family of constraints has also to do with a wedge between private and social returns, but now caused by coordination problems rather than by someone expropriating the output . For example, an entrepreneur may be ready to export roses to Amsterdam twice weekly via air freight, so that the flowers would arrive fresher and be sold at a higher price. In reality, however, there are no direct flights to Amsterdam; so the entrepreneur must pay higher transport and transit costs via Nairobi, selling a product with lower quality.[68]

Solving such a market-failure arising from *increasing returns to scale* would require a big push to increase the number of firms, so the *potential* comparative advantage can be exploited. In this case a big push would mean getting 15 or 20 firms to produce enough as to get a private freight to the market. Similar situations may emerge with an irrigation project for a valley or

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[65]While in the last three years the official statistics are showing a recovery in farm animals.

[66]By disproportionally we mean a complain of firms relative to the complains in other low income African countries

[67]Note that these complains are high, but not extreme. This is maybe due to sample selection: firms were only surveyed in Bujumbura, which is the most secure area in the country.

[68]This case is motivated by an interview we had in Bujumbura.

the experimentation in a new export product. In general, the presence of industry specific public goods is a barrier for the development of new industries in Burundi and, certainly, there is a role for coordination. A different problem, though, is the kind of instrument to address these failures and who would be able to effective manage such an institution for coordination.

This is a very obscure area for an analyst without detailed experience on each industry, so we do not feel comfortable digging deeper here. However, we can remark say that there has been little response to experimentation in new areas. Indeed, the a favorable tax and duties exemptions to labor-intensive exports firms[69], such as floriculture and horticulture, have resulted in few entrants but not a relevant industry. This is suggestive that some general constraints of the business environment might be even more binding than the lack of experimentation in new export sectors

3.4   A model to fix ideas and take stock

To fix ideas and remark the main channels, in this section we present a very stylized model where entrepreneurs are constrained in three ways by the lack of security. In the model there is a continuum of entrepreneurs that live for two periods facing an investment opportunity that costs one unit of consumption. Each one of them has both a productive opportunity with rate of return $R \in \left[0, \bar{R}\right]$, and personal wealth $w \in [0, \bar{w}]$. For simplicity, we assume that $\bar{w} \leq 1$, so nobody has enough money to start the project on her own. The economy is small and open, so it takes the opportunity cost of funds r as given, which is seems a resonable first order approximation given the facts about bancking and *cost* of finance depicted in Section 3.1. However, *access* to finance is determined by a standard collateral requirement, where entrepreneurs are given credit up to a fraction of their wealth, as in a standard financial economics model.

In a first best, the entrepreneurs will pursue all the projects where the return exceeds the opportunity cost of funds. $R \geq r$, as defined by the background rectangle in Figure 11. In a constrained optimum, considering the minimum collateral requirements $\underline{c}$, only those with $w \geq \underline{c}$ can invest.

Now we make explicit the three channels in which asset security, $s \in [0, 1]$, impacts the aggregate entrepreneurial activity.

1. **Collateral effect**. *collateral* $\equiv c$ needs to be increased when asset security decreases, in order to mantain incentive compatibility for repayment. Thus, $c'(s) < 0$ and $c(1) = \underline{c}$ This prevents investments on the left hand size of Figure 11

2. **Expropriation effect**. Given security concerns, now only the projects with *after destruction* rate of return $Rs \geq r$ are developed. Since $s < 1$, this shrinks investment in the economy, as shown by the horizontal constraint in Figure 11

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[69]The current administration has its origins in a former rebel group of Hutus, while

3. **Entrepreneurial migration effect**. Entrepreneurs can effectively leave the country for investment purposes because of violence. Alternatively, they may fail to make FDI because they fear they will not be able to monitor their investments. For simplicity we model that as $\bar{R}(s)$, with $\bar{R}'(s) > 0$.[70] The relevance of this third channel is that, unlike the previous two, it might be more damaging because it can block high return projects.

The equilibrium investment, I , in this economy is simply equal to the set of project such that entrepreneurs in the country are willing to enter and the financial system is willing to lend them given a collateral guarantee. Thus, $I = \int_{c(s)}^{\bar{w}} \int_{\frac{r}{s}}^{\bar{R}(s)} 1 dR dw$, as shown by the shaded area in Figure 11
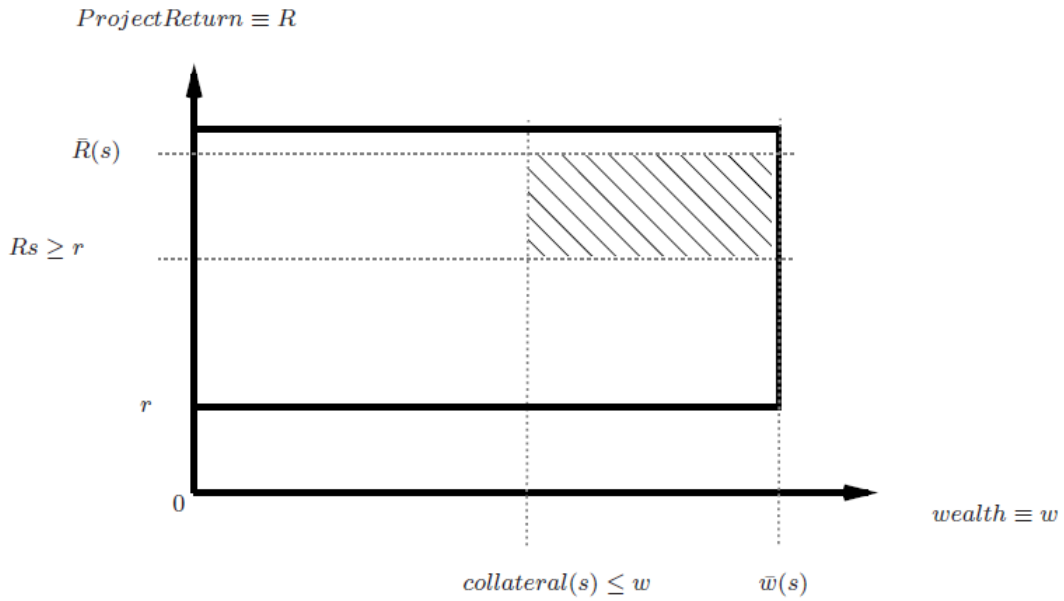
Figure 11: Graphical representation of the equilibrium investment in the economy.

This very simple model allow us to get an equilibrium where there is low investment, high collateral and "normal" interest rates, pretty much what we see in Burundi. Defining output as $Y = \int_{c(s)}^{\bar{w}} \int_{\frac{r}{s}}^{\bar{R}(s)} R \, dR dw$ we get our two main corollaries:

Corollary 1. *Output growth depends positively on security.* $\frac{\partial Y}{\partial s} \geq 0$. *Proof: Apply Leibnitz's rule.*

Regarding fiscal balance, fiscal income is $\tau Y(s) = \tau \int_{c(s)}^{\bar{w}} \int_{\frac{r}{s}}^{\bar{R}(s)} R \, dR dw$; and fiscal expenditures are the sum of an exogenous component E and the cost of providing security, $cost(s)$.

Corollary 2. *The optimal fiscal policy balances the cost of providing security with the benefits of security on aggregate tax revenue. Proof: Maximization of fiscal balance entails* $\max_s \tau Y(s)\text{-}cost(s)$.

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[70]In an alternative model it can also be viewed as the exit of entrepreneurs with very high w.

In conclusion, output growth is constrained by three factors. First, asset security makes even tougher the collateral requirements to meet the incentive compatibility constraint in a standard credit contract. Second, even for individuals with enough internal funds to make a productive project, the rate of return of the project depends positively on asset security. Finally, lack of security can also reduce the extensive margin of the number of entrepreneurs. Given these three channels, GDP in a country depends positively on the rule of law and asset safety. In that context, the correct fiscal calculation of any public project that intends to increase the rule of law (like the size of the Army or the Police), should consider that output and fiscal income are not exogenous parameters, but depend on the sucess of the fiscal effort to promote rule of law.

Now that we have a basic framework consistent with the qualitative patterns of Burundian investment, the next section offers a narrative to that treats security as an endogenous outcome of a political process.

4   A narrative to rationalize why security is still the most binding constraint

The section offers a narrative to account for the relation between security and growth in Burundi, trying to understand why the binding constraint for growth has not been resolved on its own. Although very ambitious, this step of a diagnostics is important from the point of view of policy, because before intervening one would like to at least have an educated conjecture on what configuration of forces self sustain the problem.

As noted by Ngaruko and Nkurunziza (2000), until the 1990s a small elite run Burundi. While it excluded most of the country from the benefits of government, it managed to have monopoly over the use of violence. The infrequent challenges to this state capture were severely punished through an "effective" repression apparatus. But at some point the threat of a revolution became more powerful and, as suggested by Acemoglu and Robinson (2006), the elite needed to promise a real democratic election. As expected, this minority lost the formal control of the State.

In 1993, the new democratic government was boycotted and the conflict started. But, unlike in Rwanda, it lasted much longer. In fact, not even the peace agreements of 2000 produced a single winner with uncontested legitimacy. Two rebel groups rejected the cease fire and held out of the Arusha framework. Some continued hostilities until as late as mid-2008. The conflict became protracted, with continued fighting albeit at low-intensity. Unsurprisingly, since the mid 90s different groups engaged in a costly and partially irreversible transformation towards a conflict economy: investments in public goods were stopped, asset destruction led to a halt in capital accumulation, and spending in protection increased. Similarly, the conflict reduced the returns to

human capital investment while increasing the returns on illegal and criminal activities, as noted by Verwimp and Bundervoet (2008).

The aftermath of the peace process has been constrained in various ways. First, when there is no clear majority it is harder to build peace, because each rebel group has some veto power in the joint production of peace and asset security. For this reason, the country entered in a longer and more difficult bargaining process. Second, institutional building became much more difficult, because public employment needed to be used as a way to reintegrate and demobilize people, as well as a compensation to build a political majority. With this limited toolbox it is not surprising that the country has many challenges to build an effective police. Third is the self reinforcing lack of economic activity, which makes even more tempting to get a position in the public sector, because stable and well paid formal jobs outside government are very scarce. In sum, although a central government was sitting in Bujumbura, it remained constrained in its legitimacy, and failing in its ability to extend its reach over the whole territory.

As of today the demobilization is very advanced. However, a configuration of forces can help us understand why the government is still short at providing security for investments, which is likely to be the most binding constraint for entrepreneurial activity. First, like most other governments in the world, it is focused in gaining votes for the next election. The problems is that in a post conflict country clientelistic distribution of resources may be easier and more salient in the short run than the provision of more security for business. Business formation takes time, but time that is extremely scarce. In short, providing security for business is unlikely to win an election. This is also consistent with a perception gap between citizens and entrepreneurs. As a World Bank governance diagnostics on Burundi has shown, entrepreneurs seem to place a higher value than citizens on guaranteeing the safety and security of persons and assets - 95% of entrepreneurs reply that security is a top concern vs. only 55% of citizens. Why individual voters seem to be less concerned about security than entrepreneurs is not completely clear. What is evident is investors' perception that security of investments is a top constraint for entrepreneurial activity, and that the unfortunate equilibrium of weak rule of law hurts investment and production, despite the end of the civil war. A second force self sustaining this poor rule of law is the uncertainty about the political future. When a group in power is worried about of its destiny after the next election, it may decrease the effort to build strong institutions to create rule of law, especially if these institutions can be used against the incumbents in the future. As shown in Box # 1, this capture of the forces by one groups has been pervasive in Burundian history. This environment creates a bias towards promoting officers loyal to the current administration, which can complicate even more the career incentives in the Police and/or the Army. A final ingredient to sustain this lack of asset security is that private sector actors do not seem to act collectively; neither to lobby the government effectively nor to find alternative ways to provide security[71]. To rationalize this lack

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[71]Although in the last years we have seen a proliferation of private security guards, it is unlikely that these forces

of coordination we conjecture that the inward orientation of the firms makes entrepreneurs less willing to cooperate, because they are more likely to be competitors in their businesses.

Changing this self sustaining scenario of low provision of public security may require, among other things, changing the incentives discussed above. Although the specificities on how to do it need to be resolved in the local political arena, we recognize that the East African community may provide help in that task. In particular, Tanzania and Kenya can act as guarantees against the temptation of some groups in Burundi to undermine the democratic order. Despite not being invasive, they can expand the set of feasible agreements within Burundi. In economic terms, some long term political agreements now may become contractable.

5 Concluding remarks for policy and research

Our analysis points towards physical security of investments as the largest bottleneck for economic growth in Burundi today[72]. Security is missing both as a factor that increases investment as well as fundamental amenity that can attract entrepreneurs to the area. Although Burundi is less violent than it used to be 5 years ago[73], it is still plagued by a general insecurity that chases away bankers and investors, who fear that assets could be destroyed and their investments not repaid; as well as entrepreneurs who do not invest for fear that protection of their assets is lacking.

Of course security is important per se, beyond its effect on growth. But one important bottom line of this paper is that asset security is also a crucial instrumental ingredient for economic growth.

Burundi desperately needs a professional police force to help extend the rule of law beyond Bujumbura. In that regard, the building of new defense and security institutions with a national mandate and authority to enforce the law is still missing part from the current economic equation. Ongoing demobilization and reintegration strategies are thus essential to the country's recovery. The Arusha Accords and the CCFA have rightly identified the building of the new police force that will integrate ex-combatants and former rebels as a key national priority. However, implementation still faces challenges and gaps that the Government of Burundi, in cooperation with donor partners, must continue to address. In particular, the current problems to provide rule of law seem unlikely to be solved with financing extra trucks or getting a couple of days of training

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can provide enough security to stop asset destruction

[72]We are only computing the effect of releasing constraints on growth. But the correct cost benefit analysis should also include the policies and resources used to move that constraint. Policy/resources à Constraint relaxation à Growth

[73]Burundi has, indeed, reduced violence. The demobilization of the last organized rebel groups is certainly an important milestone, reached thanks to the country, the international cooperation and the diplomatic efforts of neighboring countries.

for the Police. Successes in institutional building normally require changing many incentives at the same time, which looks impossible without a big push.[74]

In our meetings with different international organizations we were left with the idea that in Burundi there are many proposals on how to privatize firms, reduce fiscal deficits and invest in infrastructure; all things that developement agencies have some experience doing and advising. In contrast, we saw no similar comprehensive interest to build institutions that support rule of law and asset security. We hope that the evidence discussed in this paper helps the donor community to both re-weight these priorities as well as explore on innovative ways to implement effective reforms to guarantee basic property rights.

We recognize also that institutional building takes time. A policy suggestion of this paper would be that the Government could promote micro "industrial zones", where the core attribute is that assets would be protected within their perimeter. An important thing would be to locate these security hot spots in areas where other constraints are unlikely to be too close to bind. For example, these would be places with already good connectivity and, possibly, fertile land for export industries. If the study hypothesis is correct, firms would be willing to pay for locate there. Similarly, the banking system, would resume lending to entrepreneurs operating on those zones, and this may relax the scarcity of finance. One may think as such "industrial zones" as oases in the desert, on Burundi's journey to rebuild its economy after the conflict

Another suggestion for policy is that demobilization of rebels groups should not only be viewed as a way to buy out peace, but also as an *investment* to prevent former rebels to engage in criminal activities that hurt the economy. In any model, keeping insecurity away raises the marginal product of capital and investment. Our point is that fiscal sustainability calculations should consider that GDP growth is not independent of the ability of the country to provide security, because the tax base depends on the business environment, which in itself depends on security. Framed in this way, the current fiscal discussion about the *quantity* of the security forces[75] should be refocused towards the *effectiveness* of these forces to deliver rule of law.

As insecurity is dealt with over time, Burundi should also look at making aggressive corrections of market failures in exports products; since these would after all be the source of formal job creation. One such correction is to remove distortions in the coffee sector. It is not obvious to us, however, that the privatization of coffee intermediation is the reform that will yield the biggest growth pay-off for the sector. In addition, commercial horticulture requires the provision of industry-specific public goods. Discovering what these goods are and how to provide them is much more complex than the current policy of tax exceptions for exporters. One indirect possibility to discover these public goods is to promote some FDI coming from neighbor countries. These firms, which operated in similar environments, can help to improve the business ecosystem in Burundi.

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[74]These conclusions in part emerge from a series of conversations with experts in the security sector in Burundi.

[75]Currently some donors are strongly suggesting limits to the size of the Army and the police in Burundi.

Our analysis also recommends measures in the field of measurement and monitoring. First, to understand economic growth it is important is to *measure* GDP rather than estimate it from imports, exports and aid (see Box # 2). Second, we need to better understand the root causes of low growth in two crucial areas of output. One is the yield in family farms, which is normally left away from national accounts. The other is investment in the coffee sector. Most current analyses are not very practical when pointing that everything is missing in these two areas. We believe further studies should deliver *ranked* priorities. Although we must confess our ignorance on where are the root problems in coffee and family farm, the appendix of this paper proposes an example for further research.

Finally, our study was an "helicopter view' of the root causes behind Burundi's absence of growth. We compiled a sizeable amount of information into a coherent framework, but that does not guarantee we reached our goal. We hope some of the caveats we encountered can be eliminated over time in a continuous learning loop. In fact, this growth scoping should be considered as a first iteration of an *evidence-based inter-disciplinary discussion, aimed at unveiling and managing the bottlenecks to growth.* For such an effort to be possible, Burundi deserves detailed analyses and more engagement by local experts and practitioners; something well beyond our scope in this paper. Similarly, the nature of the most binding constraints may change over time, making it important to institutionalize the practice of continuous diagnostics.

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7 Appendix: Is per capita economic growth even possible in Burundi?

Unlike in developed countries, today Burundi has birth and mortality rates similar to those of the Malthusian era in Europe[76]. This adds one extra edge to our growth discussion, because it is not obvious that making Burundi more productive would increase income per capita. Productivity gains can also induce higher population growth, which would not be of much help for poverty reduction. In this section we will discuss how likely is that Burundi lies in the latter scenario, technically called a Malthusian trap.

In a Malthusian model the rate of population growth is a positive function of the resources available per person. In other terms, population grows when income per capita is above a certain threshold, while population decreases when income is below that threshold. Thus, population stabilizes in the "carrying capacity", with constant income per capita, which is not so different from the GDP measures we saw in
Figure 3 . Another signal is that population seems to be *accelerating* in Burundi. According to the United Nations the rate of growth moved from roughly 1.7%, between 1950 and 1980, to 2.3% in the period 1980-2010 [77]. Nonetheless, this increase in population growth is for arguably good reasons; while the crude birth rate went down (4.5% to 4.3), its decrease was lower than the effect of an increase in life expectancy (at birth from 43 to 45 years). Is there something special about Burundi in this acceleration? The answer suggested by Figure 7 would be no. Although in the past Burundi had a low population growth, by regional standards, it is now converging to the higher population rates prevalent in the neighborhood. As Figure 5 shows, Lesotho, Uganda and Tanzania have higher rates and yet are growing faster than Burundi; therefore, we may note that population explosion per se cannot fully account for the poor economic performance.

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[76]According to Clark and Cummins (2009) the life expectancy in rural England between 1500 and 1800 was less than 45 years; the Gross Reproduction Rate (total number of women born from a 45 years old female) in 1870 England was circa 2.5; not far from the circa 3 in Burundi.

[77]Other more conservative local estimates (Ministry of Planning , 2007)indicate that in the last period population is growing at 1.9%, but this is still acceleration
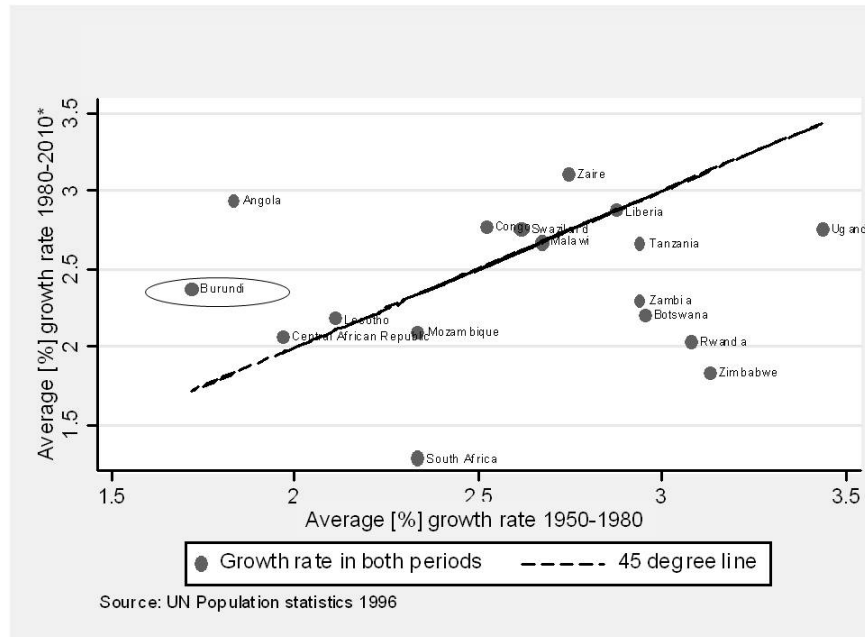
Figure 12: Population growth rate in two periods. 1950-1980 and 1980-2010 according to UN Population statistics. The line is a 45 degree line where both rates are equal. Burundi, in the lower left part of the chart, had a low population growth in the first period but a large in the second. The rate of growth for these last 5 years, reported to be circa 1.9% by the Ministry of Planning, is still above the average 1950-1980, so it would also be above the 45 degree line, although not that different from Rwanda as in the current chart.

We do not observe any symptoms of a transition into a modern population structure in Burundi. For example, there is no demographic window of opportunity (Bloom and Williamson, 1998) because the ratio of dependants per active worker[78] is relatively flat, meaning that it is not easier to accumulate capital. In the same way, urban population is very low and the average speed of urbanization has not accelerated, unlike in Rwanda (Figure 15).

Women make up for 50% of the labor force in Burundi, though such a high rate is more indicative of the labor intensive nature of family farm than it is of high levels of modernization; family agriculture remains compatible with childbearing. Several authors (see Voigtlander and Voth, 2009) have suggested that the higher value of women's time in labor markets in pre-industrial Europe was a powerful factor in reducing fertility and increasing income. Moreover, Clark (2008) noted that an increase in the age of marriage was a chief factor in reducing by one quarter to one half the birth rates in Europe. But Burundi, unlike Europe did at its time, is showing none of these signs of population modernization or delayed marriage age.[79] [80]

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[78]The dependency ratio is the ratio of working age population (15-64) to the inactive population (lower than 15 years old plus those older than 64). According to UN population statistics this ratio is moving between

[79]One radical change in Europe between1500-1700 was the delayed marriage of women, which in practice limits the number of potential births by a third or a half

[80]In Burundi still 20% of women get married before the age of 18. Although this proportion is going down in

Another property of a Malthusian scenario would be constant food per capita. But according to FAO[81] estimates (Figure 13), the availability of food calories has *decreased* at an average rate of 0.8% per year since 1980, going from 2100 to less than 1700 Kcal/capita/day. This is even more difficult to reconcile with a Malthusian model, because over the same period population did *not* decrease. *It doubled !* One explanation might be that the *quantity* of people may have increase at the expense of the nutritional *quality* of the population. Indeed, according to FAO's estimates undernourishment has moved up, from 44% before the onset of the 1993 crisis to 63% in 2003-2005, by contrast to average rates in East Africa, which decreased from 45% to 30%. Unfortunately estimates of food intake are not backed by any anthropometric measures, making it difficult to establish whether this decoupling of food intake and population growth is due to mismeasurement (of household food production) or whether population growth is occurring despite decreasing trends of caloric intake.[82] [83]
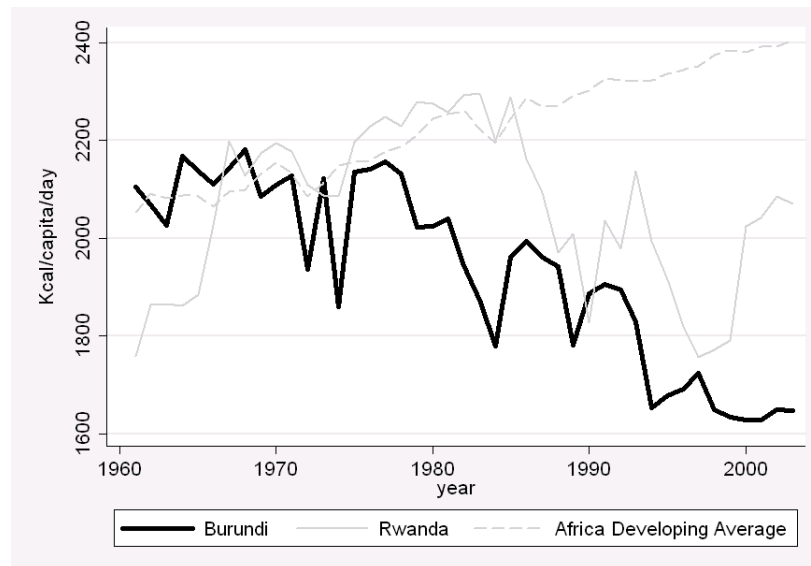
Figure 13: *Estimated* food consumption in Burundi, compared with Rwanda and an average of developing African countries (1960-2003). The estimation is made by FAO based on estimated production , imports and exports of food. Source: Author's calculations from FAOSTAT.

more recent cohorts, there is only a 2% difference with the cohort that today is 45 years old. This percentage varies with income, but it is still 20% +/- 2.

[81]*"From 1993, when civil war broke out, up to now, agricultural production grew by just one percent, [. . .] In the same period, the population rose from six to eight million people. That means a net loss in food production of almost 25 percent"*. Jean-Pierre Renson, FAO's emergency coordinator in Burundi

[82]The exploration of this difference goes beyond the scope of this paper. However, since food per capita is a crucial component of any growth model one may have in Burundi, it seem important to monitor more carefully the status of nutritional changes in the population in large. In particular, we hope that the difference of the DHS surveys 1988 and 2009-10 can illuminate this discussion.

[83]Bundervoet et al (2008) do have anthropometric measures of kids of different cohorts, showing the huge loss of half standard deviation in the height per age per every year a kid was exposed to conflict. However, the study is based on a 1998 cross section and only tackles the difference between people within Burundi, neither the average in Burundi nor the height unconditional on surviving up to 1998.

Despite the previous evidence of growing population, there are some signs of a light at the end of the demographic tunnel: two recent surveys are showing a reduction in the size of the 0-5 cohort (QUIBB, 2002 and 2006), although, results do not seem robust in other surveys (MICS 2005). Probably the 2008 demographic census, still ongoing, would shed further lessons on the matter.

In conclusion, although there are some signs of Burundi being in a Malthusian trap, we are unable to assert positively whether a productivity gain will make Burundi more populated or a country with a higher income per capita. In the next section we will explore the constraints to investment in Burundi with the hope, but not the certainty, that their relaxation can help to increase income and reduce poverty.

Box # 3: Is population density bad per se?

Although different documents point out that density can be constraining growth in Burundi, population density is not bad per se. With 8 million people living over 27 000 km^2, Burundi has roughly the density, area and population of Belgium[a] or the US State of Massachusetts. Obviously, Burundi is rural and poor, while Belgium and Massachusetts are rich, urban and fully escaped from the Malthusian trap since circa two centuries. The question is then about the type of activity rather than the mere density. Similarly, it is hard to blame population growth for the genocidal massacres suffered in the country. Adding up all the casualties from the genocides in Burundi,the figure may reach about 600,000 victims; as appalling as the loss of life has been, it is worth noting that Burundi would "recover" that same figure in just over three of four years. Burundi has less food per capita[b], more population pressure but also less ethnic violence than in 1993, making it implausible to think that density, on its own, is a leading cause for violence. It would seem on the contrary, as argued in various papers (Ngaruko and Nkurunziza, 2000; Caselli and Coleman. 2006; Glaeser, 2005), that genocidal violence seems to have been a focal point for economic exploitation rather than a brutal demographic control.

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[a]Belgium in 2008 has slightly more than 10 million people in 30,000 km^2 (20% more people than Burundi in 10% more area, but of we take into account the non lake surface we get circa 24,000 km^2 for Burundi, and this 20% less area, which more or less matches the density estimates for Belgium)

[b]According to FAO. Further discussion about it later

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8 Appendix: Understanding better the reasons behind limited yields in Burundi

One area that can have a huge impact on overall growth in Burundi is the increase in the yield per capita. In the simplest possible identity, economic output in the country can be decomposed as:

$$Output =$$
$$[Yield\,per\,hectare]\,x\,[Value\,of\,a\,unit\,of\,yield\,x\,Area\,under\,production] + Non\,farm\,production$$

Since non farm production is a small fraction (less than 10%) of the labor force and the area under cultivation is almost fully utilized, then the only things than can sizeable move output seem to be the yield and its unit value. Thus we approximate growth as:

$$Growth = d\,Output/d\,time \approx \varphi[yield\,per\,hectare\,x\,value]$$

,where φ would be a proportionality constant, roughly close to one according to the previous argument. In the case of the rise of an agro-export sector we would see an increase in value per hectare. In the case of family farms the only margin seems to be in the yield of food per hectare. Unfortunately, however, in all the discussions we had and the papers we read there was no prioritization in the underlying reasons that prevent agricultural output to be higher. Most analysis list plausible reasons why a given factor may rationalize a low output (no irrigation, little use of inputs, climate problems, soil type...) but there is no horserace among them to see what seems more important. Of course we know that every farm is different; but the policy relevant question when reform is costly should ask what are the most binding constraints to increase yields. We confess our ignorance on what is most important root cause for this, but we suggest doing further studies making a horserace of different hypothesis is more promising than simply listing problems. In the following picture we suggest one nested set of hypothesis to be tested by teams of experts in the industry.
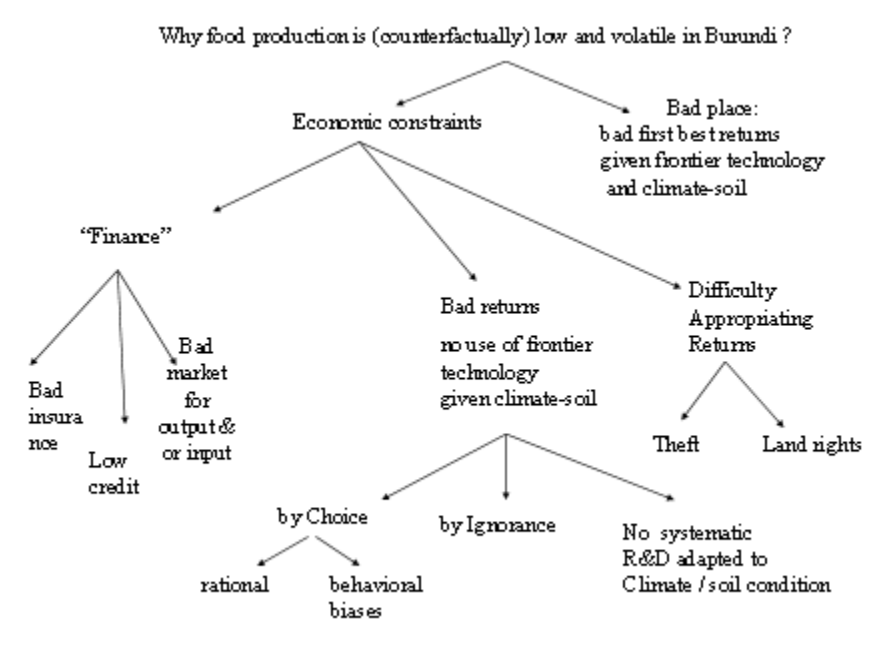
Towards an agricultural diagnostics The first step to implement it is to measure the nature of the low yield per hectare. Do we observe measures of lower nutrition and yields vis-à-vis comparable places? If yes, then the next step is to explore how much of the problem can be accounted by just

soil and climate conditions that are very costly to change, like temperature or the sand to clay ratio. Different soils and climates have different productivities, even in ideal conditions. Then, for the gap between the first best yield and the actual yield one can explore now try to answer why farmers in Burundi are not taking advantage from what seems an opportunity. Mimicking the growth diagnostics idea one may want to ask whether yields are low because of financial problems, low social returns or the inability to appropriate the fruits of the first best levels of investment. Nonetheless, since there are many missing market and market failures in family farm, the financial and real problems are harder to separate. Despite this interlinking of contracts and decisions, one can ask whether there are easy possibilities that are not exploited because of limited finance or insurance, like a no storage investment or no use of fertilizers. In contrast, one can look at farm decisions and see if people are not using some inputs because of ignorance or because of some behavioral biases, like the ones described in Duflo, Kremer and Robinson (2009).[84]

This is far from a complete blueprint on how to do the analysis, but there are two core normative messages from this illustration. The first is that that agricultural research needs to be connected to behavioral research on how people make investment decisions; otherwise the marginal impact of R&D would be low. Secondly, a nested test of hypothesis about what is constraining yields is much more promising than just listing alternatives and claiming that everything should be solved. Similar efforts to look for binding constraints can be applied to specific industries, like coffee. As suggested by Banerjee (2008), this seems to be the most effective way to link micro research with macro questions like growth.

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[84]See the following references

Banerjee, Abhijit V. 2008. Big answers for big questions: the presumption of growth policy. Manuscript for Brookings Institution Conference "What Works in Development? Thinking Big and Thinking Small", Fall 2008.
Duflo, Esther, Michael Kremer and Jonathan Robinson. 2008. Nudging Farmers to use Fertilizer: Evidence from Kenya Unpublished manuscript. <http://econ-www.mit.edu/files/3749>
Duflo, Esther, Michael Kremer and Jonathan Robinson. 2008. How High are Rates of Return to Fertilizer? Evidence from Field Experiments in Kenya. Unpublished manuscript <http://econ-www.mit.edu/files/3751>
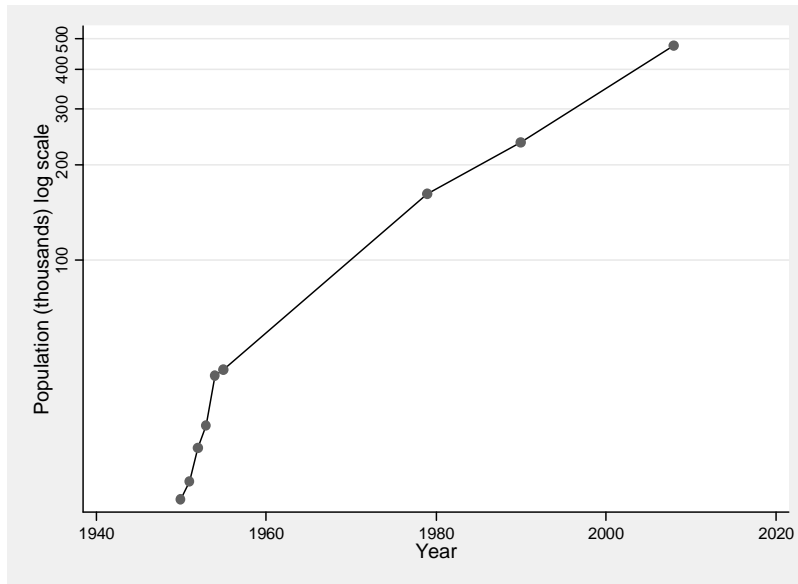
9 Appendix: Additional Figures

Figure 14: Population in Bujumbura city. Author's compilation from different sources
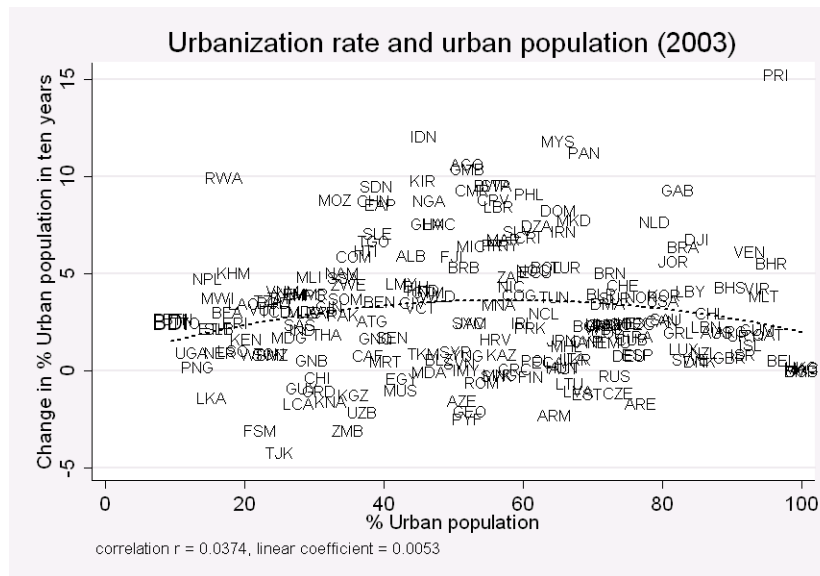

Figure 15: Urbanization speed conditional on original proportion of urban population. Burundi is one of the least urbanized countries in the world and its speed of urbanization is average, unlike in Rwanda.
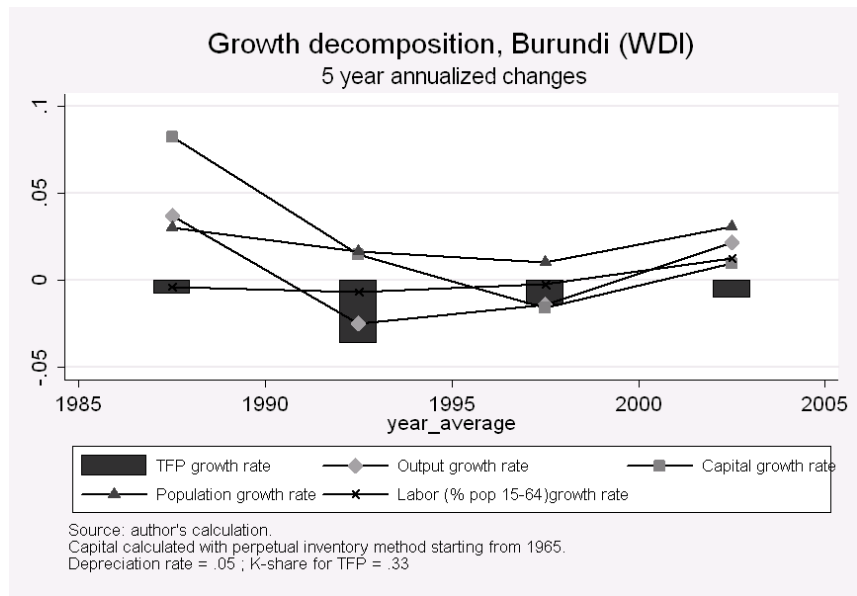
Figure 16: Growth accounting for Burundi; simulating capital stock as cumulated depreciated investment in the national accounts. While this calculation should not be of too much interest, because we have a very poor measure of capital, that excludes natural capital like soil and other things, we observe that TFP growth is negative during the whole period.
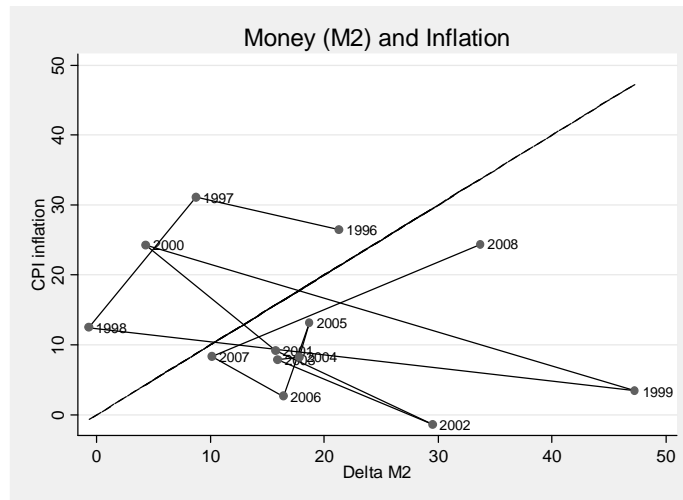
Figure 17: Percentage increase in M2 money and its co-variation with inflation in Burundi. 1996-2008. The 45 degree line benchmark is a theoretical 1:1 relationship between Money growth and Inflation (assuming no change in the demand for real balances). Source: Authors' calculation from Economist Intelligence Unit and Central Bank of Burundi.
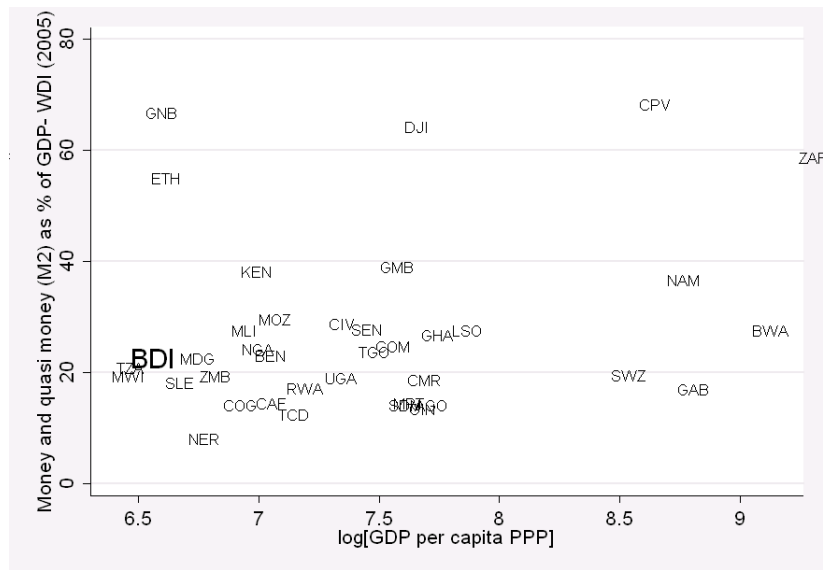
Figure 18: Monetization in the economy (M2/GDP) for different levels of output per capita in Africa
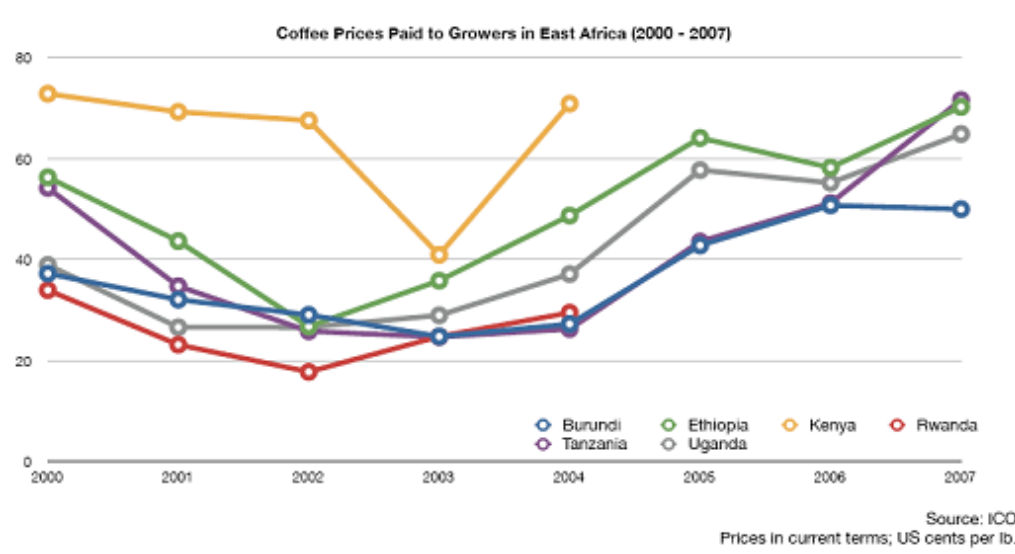
Figure 19: Coffee prices paid to growers in Burundi and other African countries. Source: International Coffee Organization.
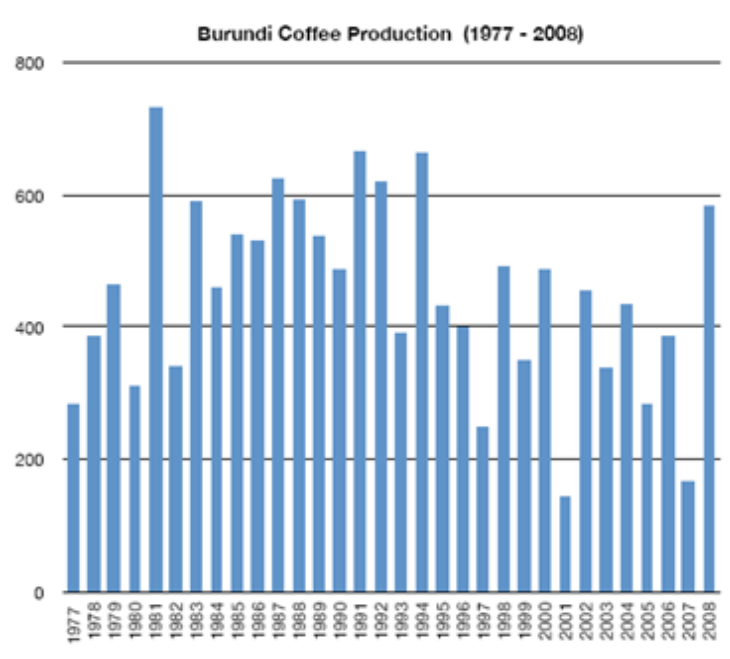
Figure 20: Coffee production in Burundi. Measured in thousands bags, 1977 to 2008. Source: International Coffee Organization. Note that in the mid 1980 a bulk of the production started to move from washed coffee to fully washed coffee, which has higher value in the market. Nonetheless, the total production does not look different today than in the 1980s. In any case, the average of the last ten years is lower.
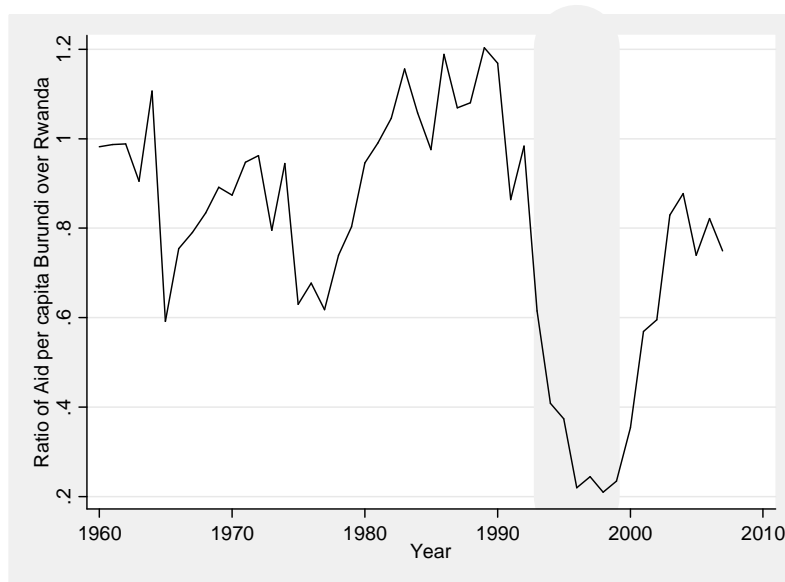
Figure 21: Ratio of aid per capita in Burundi over aid per capita in Rwanda. Source: Authors' calculation using WDI 2008. The period 1993 to 1999 is in gray color because we are uncertain about populations. The main point is to say that aid per capita was relatively higher in Burundi than in Rwanda before the large genocides in the 1990s. For circa 10% more aid per capita in the 1980s, Burundi has now more or less 20% less aid per capita than Rwanda.

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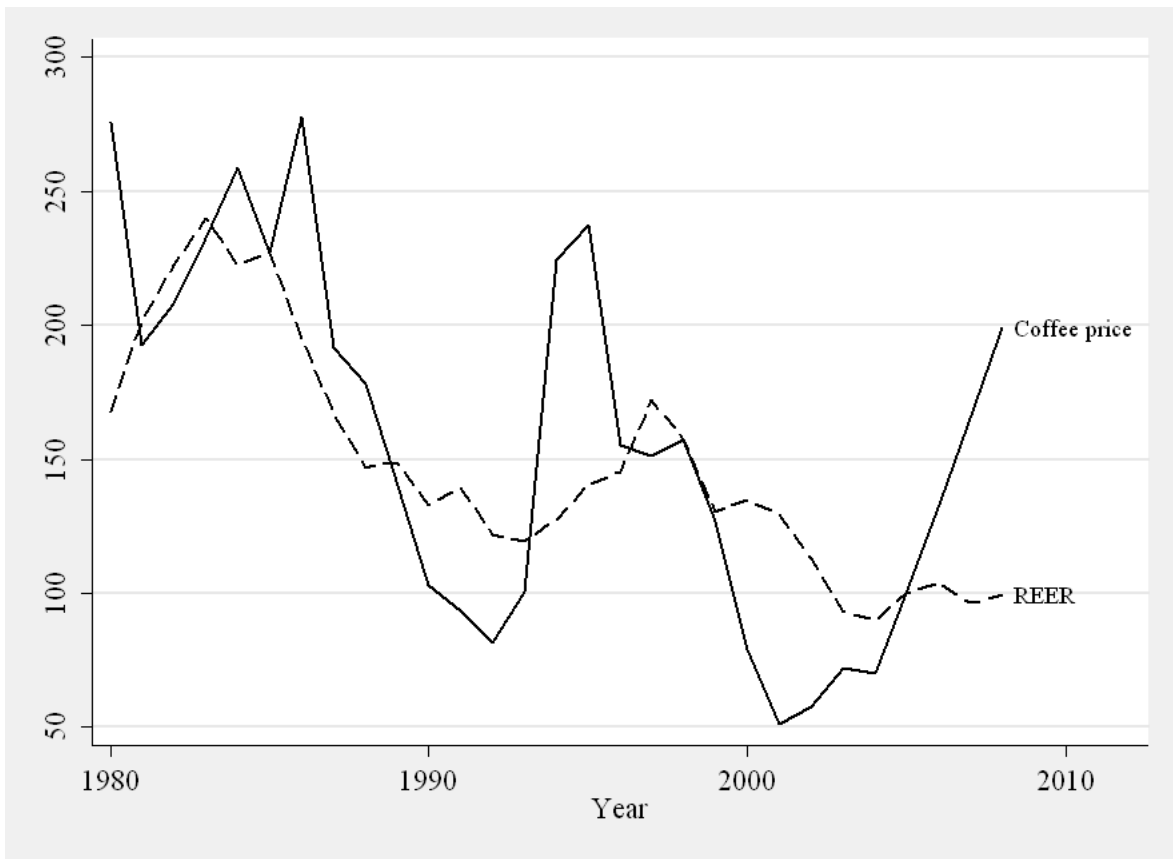
Figure 22: Coffee price index and Real Effective Exchange Rate in Burundi (Index 100 for 2005). A movement up of the REER is an appreciation. Price index for Ugandan Coffee in New York; alternative indices behave qualitatively similar. Source: International Financial Statistics, IMF.
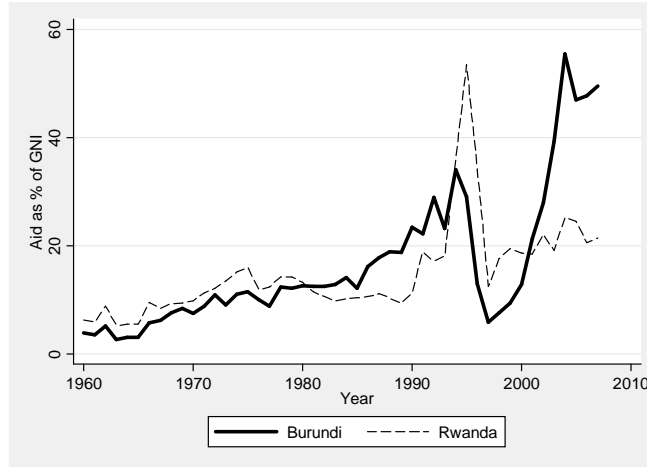
Figure 23: Aid as percentage of national income in Burundi and Rwanda (1960-2007). Source: WDI 2008 Although aid per capita is higher in Rwanda by circa 20%, aid *as a share of GNI* is more than twice as in Rwanda. One the one hand this might be simply another "ratio" that is mismeasured because of the low GDP. However, it is hard to argue that the low GDP growth in Burundi vis-à-vis Rwanda is because of the lack of aid. Aid is higher and accelerated more in the last years. One can complain about the quality of the aid, but still the differentia should be substantial to explain the difference
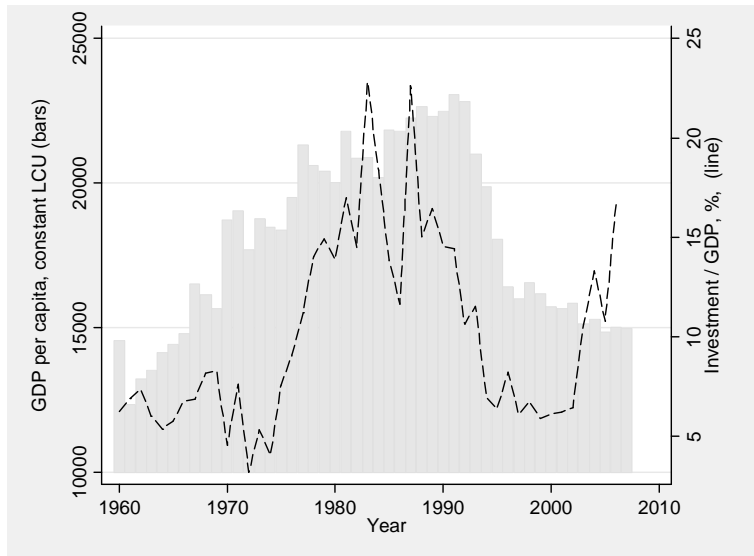
Figure 24: Estimated investment in Burundi 1960 to 2006. Source WDI (2008). Note that the figure for 2005 shows circa an investment rate of 10% of GDP. In contrast, the measured figure for the same year, computed by ISTEEBU using an input-output matrix, is 17% GDP. ISTEEBU does not have measured GDP after 2005 we cannot confirm that the recovery in investment is actually real. Another limitation is that investment is mostly classified in "other industries" which makes rather unclear where in the economy is the investment taking place.
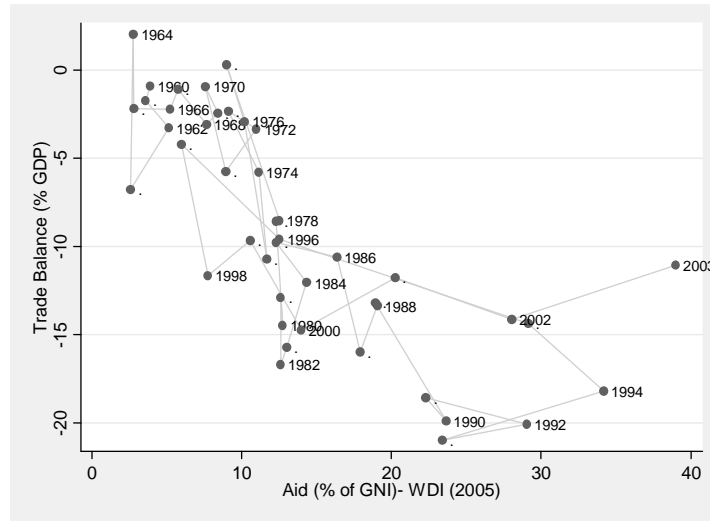
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Figure 25: Trade Balance and Aid in Burundi. Notably, the trade balance is always negative. The average slope of the regression of TB on Aid is estimated as minus 0.54 (p-value<0.0001), meaning that on average an increase in 1% aid is *correlated in the time series* with half a percentage point reduction in the trade balance.
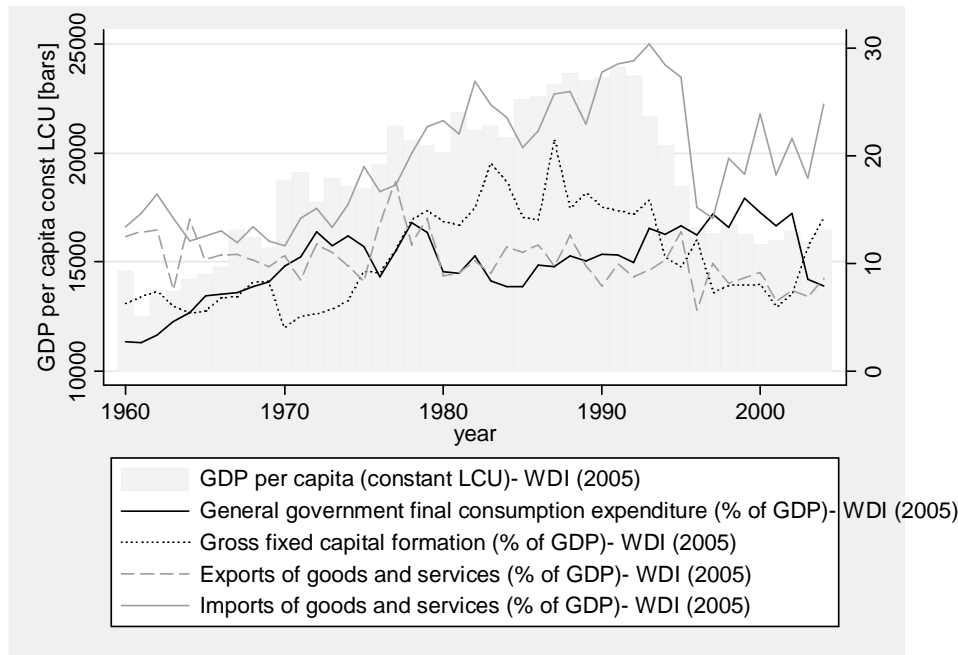

Figure 26: GDP composition in Burundi 1960 to 2004. Notably, imports grew much faster than exports when GDP was booming. As noted in the previous graph, this is in part due to the increase in aid. Government grew during the war and imports collapsed., while exports reduced smoothly as a share of GDP.
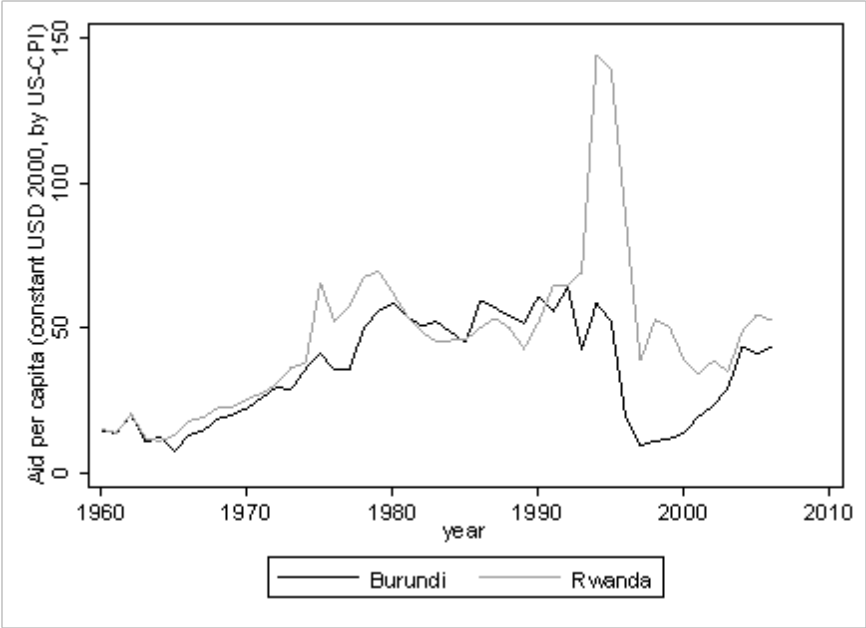
Figure 27: Aid per capita, constant USD. Source: World development indicators, 2009.