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Indexation of Personal Income Tax in Rwanda

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Indexation of personal income tax in Rwanda

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ABSTRACT

The purpose of this report is to evaluate the need for and effect of personal income tax indexation in Rwanda, including an assessment of the effect of changing the number of tax brackets. The report focuses on the effect on total tax return in addition to changes in the net income distribution. This evaluation was conducted using data from social security register and a simple Excel-based tax simulator.

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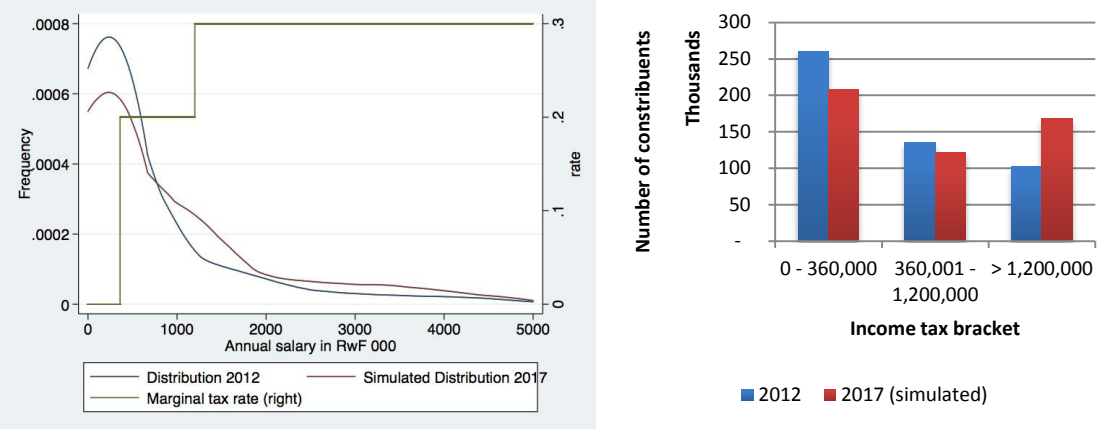
Introduction

Most personal income tax systems are characterized by a progressive piece-wise linear tax profile. The brackets or limits where different tax rates apply are given in nominal terms. It is well established that under inflation or real growth such a system results in a higher tax pressure as more individuals are passed into a higher bracket and are taxed at a higher rate. This is often referred to as "bracket creep". Figure 1 below provides a simple illustration of the issue. Assuming 10% inflation and 5% real growth[1] on the 2012 income distribution in Rwanda, in 5 years time a sizable number of contributors would be pushed into the higher tax bracket. In order to avoid this, tax brackets have to be adjusted (indexed). In principle many different methods can be applied for this indexation.

Figure 1: Illustration of "bracket creep"



Source: Author's calculation from 2012 Social Security records

If other limits or levels of the tax/benefit system have to be indexed then complications arise: A tax/benefit system can consist of a large number of parameters, such as tax brackets, tax rates, level of exemptions and deductions, level of social security and caps and floors in these contributions. Whenever there is inflation, indexation has to be considered in order not to erode individuals' purchasing power. In this context the treatment of indexation can be complex, and effects on governmental tax revenues as well as distributional and incentive effects have to be considered. This paper is limited to the discussion of indexation of tax brackets.

[1] The figures are purely illustrative and meant to cause a visible shift in the distribution

In addition to the "no indexation" option, two methods of indexation are possible: discretionary and automatic. Under discretionary indexation, adjustments are done based on a political decision. This process can be partly automatic, for instance by determining that tax brackets should be adjusted regularly after a predetermined time period. As this paper will illustrate, this is the case for South Africa, where tax brackets are adjusted on a yearly basis. Automatic indexation, on the other hand, implies a rule stating how tax brackets are adjusted automatically, typically on a yearly basis. This is usually based on price indexation with adjustment only for inflation, but it is certainly possible (or even recommendable) to use income indexation adjusting for inflation and real growth.

The choice of an appropriate index measure requires that the purpose of indexation be more precisely specified. For example, if the goal were to maintain governmental tax revenues as a proportion of national income, the correct indexation factor would be based on an income indexation. If instead the goal were to hold constant the real purchasing power of federal revenues, the indexation factor would normally be based on price indexation, normally measured by consumer price index (CPI). For an interesting discussion of an appropriate index see Tanzi (1980).

The most common system for automatic indexation is price indexation. However, this report will argue in favour of income indexation. The next section presents a brief overview of the international experience. After this the Personal Income Tax (PIT) is explained and the tax simulator is presented, followed by some evaluations assuming different levels of income increase with and without indexation. The report is concluded by a discussion and conclusion.

International experience

Organization for Economic Cooperation and Development (OECD) countries

As a result of increasing inflation in the nineteen-seventies, indexation of tax brackets became an important issue in many developed countries. At that time the focus was naturally on price indexation and indexation for real growth was not on the agenda. Even if the importance of indexation was realized, implementation differed across countries. Tanzi (1980) presents an overview of the schemes chosen by different countries. One important difference that emerged between countries was whether inflation should be partly or fully adjusted for. In

addition, some countries chose to adjust only when inflation in a particular year exceeded a stated level. The international outlook described in Tanzi (1980) is based on experiences during the seventies and early eighties. To the best of our knowledge an update or summary of the adjustment designs used today is not available.[2]

Since 1980, OECD countries have focussed from 1980 on changing the structure of PIT rather than on indexation. One such structural change has been towards a reduction in top statutory PIT rates. There has also been a clear trend towards a reduction in the income threshold where the top statutory PIT rate applies.[3]

The East African Community (EAC) and South African experience

Indexation of personal income tax brackets is not common practice in the EAC. All countries have however changed the definition of the personal income tax brackets in recent years via changes in the tax law.

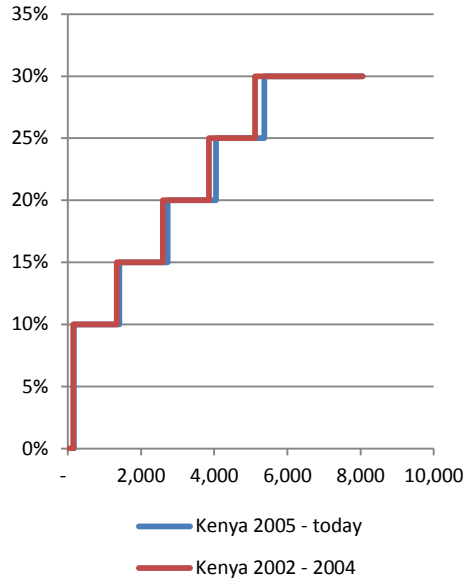
Kenya revised its tax schedule in 2005, Rwanda in 2006 and Uganda and Tanzania in 2012 (Figure 2). In Kenya, income tax schedule remained fairly stable, with a minor increase in the tax brackets. In Uganda pressure from the Private Sector Foundation[4], led to a upwards revision of the income tax schedule, the cost of which is compensated by an additional 10% charge incomes above USh120 million (approximately 47,000 USD). In Tanzania and Rwanda amendments have lead to simplification in the tax schedule by reducing the number of brackets.

In South Africa on the other hand, personal income tax brackets are declared on annual basis by the Minister of Finance in the Budget Speech. This is a political decision that takes into consideration recent developments in the economy. This results in a regular movement of the tax schedule (Figure 5).

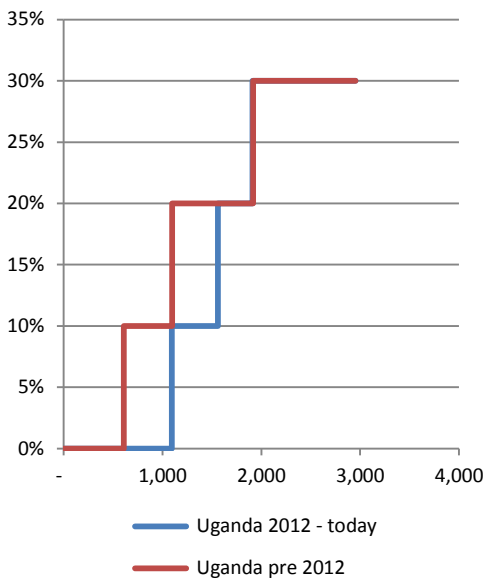
[2] We have searched the OECD website and have not been able to find any source presenting an overview of the adjustment of PIT brackets.
[3] TAXING WAGES 2011 OECD(2012)
[4] http://www.pwc.com/ug/en/pdf/changes-in-income-tax-laws-in-uganda.pdf

Figure 2: Marginal tax rates before and after latest reform in selected EAC countries

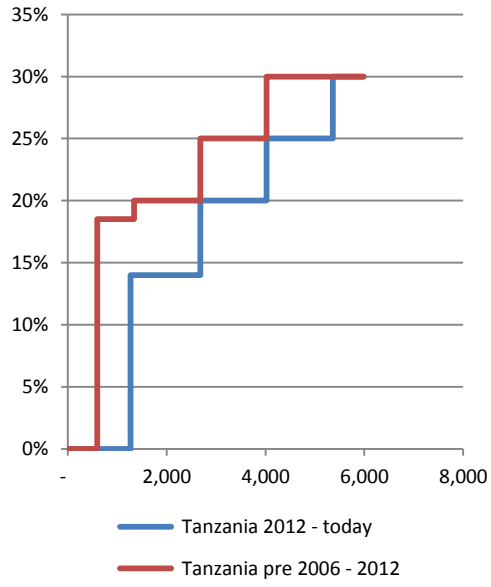
(a) Kenya



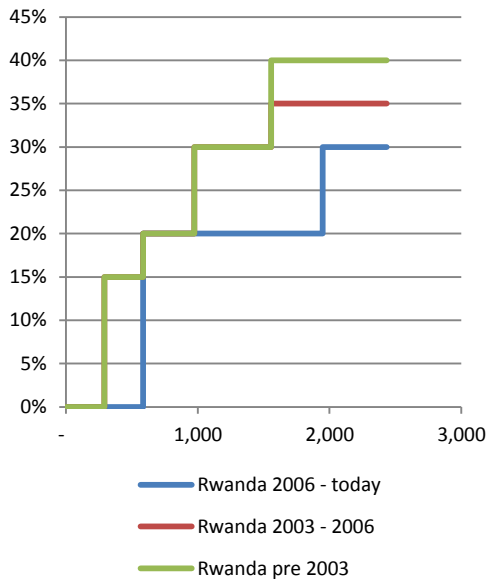
(b) Uganda



(c) Tanzania



(d) Rwanda

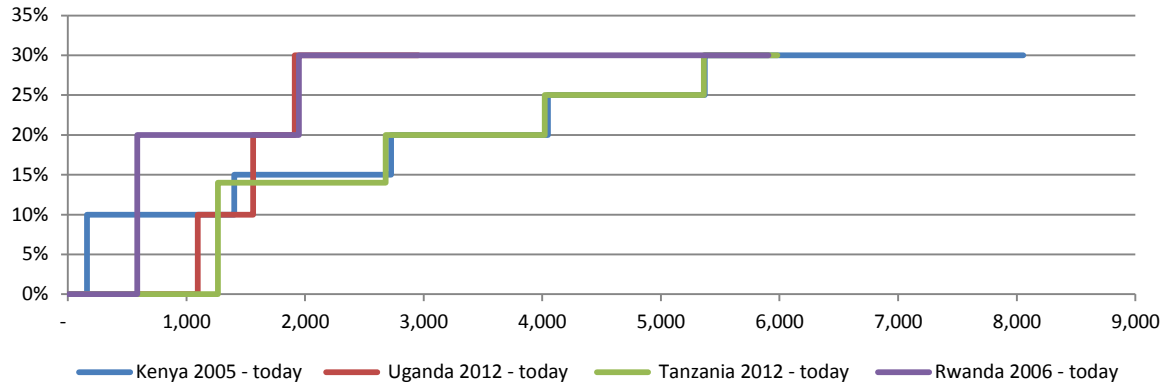


Note: all figures are in USD converted at the average interbank rate over the two-year period staring on the 30th Jul 2011

Compared to tax schedules across selected EAC countries (Figure 3), Rwanda's tax schedule appears rather less progressive: it applies higher tax rates to lower incomes than its neighbours. To see this, consider that Rwanda applies a 20 percent tax rate on incomes

starting from approximately USD 580 USD/year. In Uganda, the same rate would start to apply to incomes 2.6 times higher, in Kenya and Tanzania, to incomes 4.6 times higher.

Figure 3: Marginal tax rates in selected EAC countries



Note: Uganda has an additional tax bracket, charging 10% on incomes above USD46.7k pa, which is excluded from the graph.

In comparison with South Africa (Figure 4), EAC countries appear to have a less progressive tax schedule applying higher rates to lower income brackets and not going past the 30% mark on higher incomes.

Figure 4: Marginal tax rates in selected EAC countries and South Africa

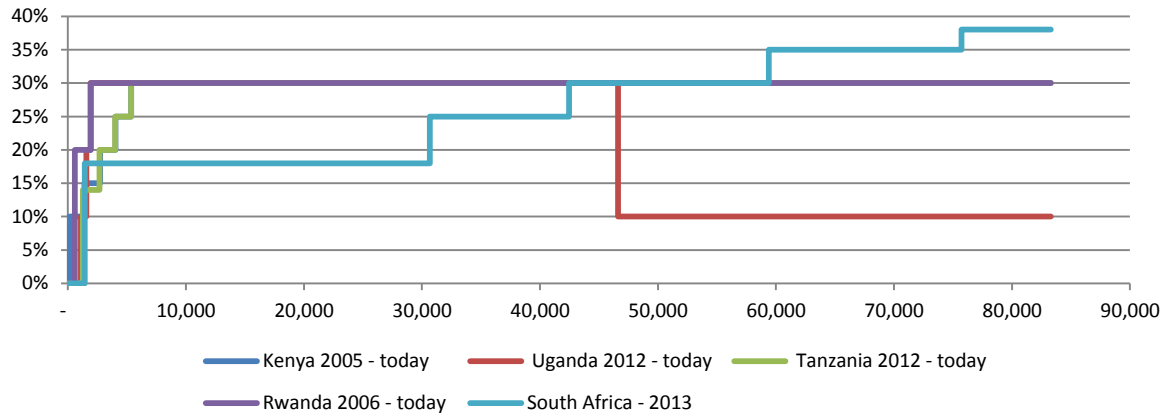
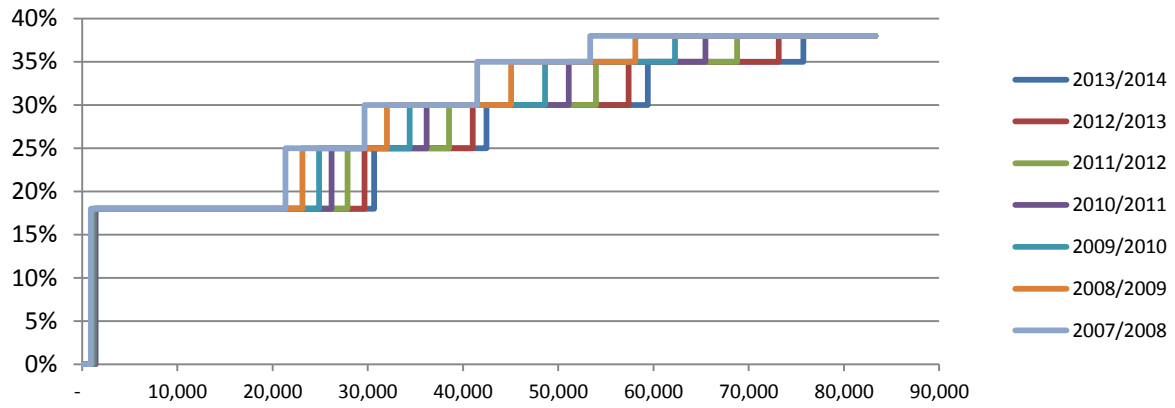


Figure 5: Indexation of marginal income tax brackets in South Africa 2008 - 2014



Data

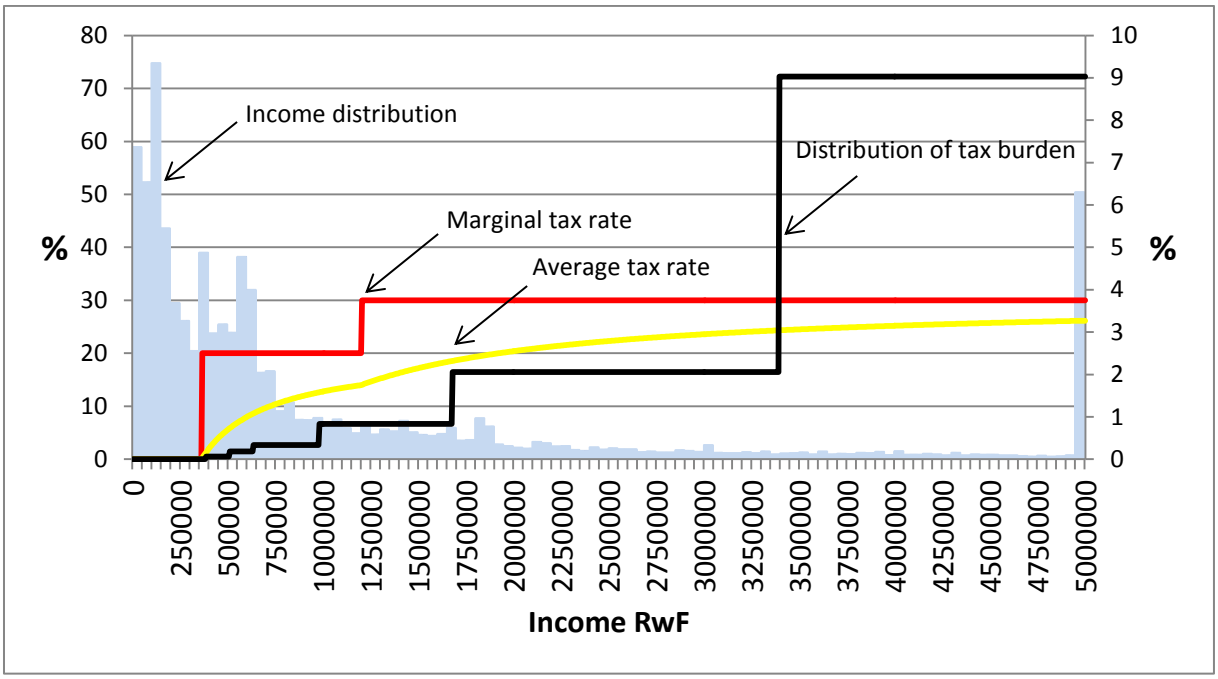
This study and the underlying Excel model rely on social security declarations lodged with the Rwanda Social Security Board (RSSB). This is Rwanda's only source of administrative data on individual level salaries. As the base for the calculation of social security contribution differs slightly from the base for the calculation of income taxes, figures produced by this model should not be expected to exactly match either personal income tax declarations or collections.

Evaluation of tax bracket indexation in Rwanda[5]

The tax base or taxable income is the sum of employment income business profits and investment income. All resident taxpayers are liable to income tax from all domestic and foreign sources. A non-resident taxpayer is only liable to income tax which has a source in Rwanda. The tax schedule is simple: it entails a basic allowance and two brackets. Personal income is taxed progressively at 20 percent for annual incomes between 360,000 and RwF 1,2 million, and at 30 percent for annual incomes above RwF 1,2 million. Annual income below RwF 360,000 is not taxed. Figure 6 below presents the current tax profile for personal income in Rwanda.

[5] Detailed information of the PIT in Rwanda is given in Flood & Savini (2011). For convenience a short presentation is repeated here.

Figure 6. Tax rates, income distribution and tax burden 2012.



Source: Tax rules and Social security data.
Note: The left-hand side scale refer to the tax rates and tax burden and the right-hand scale to the income distribution.

The figure above presents four important dimensions of the PIT system. First is the statutory tax rates as displayed by the marginal tax rate. Thus, the rates are zero below RwF 360,000, 20 percent between RwF 360,000- 1,200,000 and 30 percent above RwF 1,200,000. The tax rates are only based on formal rules and in order to evaluate the effects of an indexation of the two tax brackets at RwF 360,000 and 1,200,000 it is crucial to know how many individuals are affected by the different tax rates. For this reason the income distribution is displayed (right hand side scale). Note the large concentration of low-income earners: almost 40 percent of the individuals have an income below the RwF 360,000 threshold, thus falling in the zero-rate tax bracket. Note that the average tax for most individuals is quite low, reaching 20 percent at an income of about RwF 190,000 and above that slowly converging towards the highest marginal tax rate of 30 percent.

The high number of low-income earners and the long right hand tail in figure 6 are important characteristics driving the results of indexation. For presentational purpose the horizontal axis is cut at RwF 5 million but the higher values are allowed to pile up at this upper limit. More than 6 percent of the contributors has an income above RwF 5 million and this has important implications for the distribution of the tax burden. The large rectangle in the right hand side of

Figure 6 shows that the individuals with an income in the 10th decile (the highest 10 percent, with an income above RwF 3,393,000) pay more than 70 percent of the total income tax. Further results indicate that the 9th decile (with an income between RwF 1,677,000 – 3,393,000) pay more than 16 percent of the tax burden. Thus, the top quintile (20 percent), pay almost 90 percent of all the income tax revenue.

As such a large share of the total PIT revenue come from individuals with an income much higher than the top bracket, indexation of this bracket will not have much effect on revenue. At the bottom end of the income distribution, the indexation of the lower tax bracket has a small effect because of the large share of contributors with income below the minimum bracket. In addition, because the contribution to tax revenue at low incomes is so small, any change due to indexation for individuals with an income near the lowest bracket has a small effect on tax revenue. Therefore unless the indexation is dramatically large we do not expect indexation to have a major impact on tax revenue. These results are also confirmed by the tax simulations presented in the next section.

Simulation of the effects of indexation

For this evaluation an Excel tax simulator was developed. An explanation of this program is provided below:

Table 1 shows the key parameters required to perform the tax simulation (bold numbers represent output calculated by the model, the other parameters are inputs that can be changed by the user). Table 1 shows tax revenue before and after a change in the PIT system. The parameters for the tax brackets are given for the existing (*before*) tax system, hence 360, 000 and 1,200,000 are used as the lower and upper limit. The same limits have also been used for the *after* tax system.

The following set of parameters are the corresponding tax rates. Since the current system only has three rates (zero, 20 and 30 percent), these values are entered in the excel sheet. Before indexation the total tax revenue based on 389,441individuals with a salary, is given as more than RwF 118 billion. 10 percent inflation and 5 percent real growth are then assumed, generating a total increase in income by 15 percent. Without tax bracket indexation, tax revenue becomes almost RwF 141 billion RwF (a 18.8 percent increase). The change in net income (income minus tax) reveals the increase in taxes and its effect on higher income. A

medium income earner reduces their net income by about 3 percent, which becomes twice as much for the highest percentile.

Table 1. The input page of the EXCEL based tax simulator.

Parameters	**Before**	**After**	**After indexation**		
L0 Lower limit	360 000	360 000	360 000	**Inflation**	0.1
L1		0	0	**Real growth**	0.05
L2		0	0	**Total increase**	**0.15**
L3		0	0		
L4 Upper limit	1 200 000	1 200 000	1 200 000	**Indexation of limits**	0

t0 (rate below lower limit))	0.00	0.00
t1 (rate between L0 - L1)	0.20	0.20
t2 (rate between L1 - L2)	0.20	0.20
t3 (rate between L2 - L3)	0.20	0.20
t4 (rate between L3 - L4)	0.20	0.20
t5 (rate above upper limit)	0.30	0.30

Results	**Before**	**After**	**Change %**
Tax revenue Million RWF	**118 594**	**140 935**	**18.84**
Income distribution net income			
Percentile 10	**71 419**	**71 419**	**0.00**
Quartile 1 (percentile 25)	**170 418**	**170 418**	**0.00**
Quartile 2 (percentile 50)	**477 830**	**462 612**	**-3.18**
Quartile 3 (percentile 75)	**1 099 200**	**1 040 880**	**-5.31**
Percentile 90	**2 567 561**	**2 414 846**	**-5.95**
Percentile 95	**4 288 372**	**4 025 034**	**-6.14**
Percentile 99	**9 680 072**	**9 070 124**	**-6.30**

The effect of indexation is then evaluated under an inflation-only indexation scenario. Indexation limits are set to 0.10, thus increasing tax revenue by 16.3 percent. The result of this kind of indexation is relatively small, causing reduction in the tax rate of about RwF 3 billion. The reason for this is related to tax design and the unequal income distribution. Individuals with earnings far above the higher limit are not affected by indexation since they pay the highest possible tax both before and after the change. As discussed earlier, these individuals also pay a large part of the tax burden. The effect of indexation at the lower limit is also relatively small since these incomes make up such a small part of total tax revenue.

If the increase in indexation is larger the effect will also be larger. Assuming 20 percent inflation, 10 percent real growth and no indexation, tax revenues would increase by almost 38 percent. With price and income indexation the corresponding increase is 32.5 and 30.0 percent respectively. The results for income indexation follow trivially: if the income is increased by the same factor as the tax brackets then the increase in tax revenues is the same as the income increase. This is an argument in favour of income indexation. If the government wants to adjust the tax revenue in such a way that the tax revenue as a share of income stays constant then this can be achieved by income indexation.

Note that apart from calculating the effects of indexation it is also possible to evaluate the effects of changing number of segments in the tax system; up to six different tax rates can be used. It is also possible to change the number of tax segments in the before tax system. Thus hypothetical before-after evaluations are possible.

One illustration is given in Table 2 below. We evaluate an alternative system with five different tax brackets. This shows a design that is phased in more gradually, using a lowest tax rate of 10 percent instead of the current 20 percent. Also the highest rate is increased from 30 to 35 percent. Without the increase from 30 to 35 the new design would be almost tax revenue neutral and as follows from Table 2 including the higher top rate increase revenues by 14 percent. Using the assumption of 10 percent inflation and 5 percent real growth implies an increase in tax revenues by 35.8 percent. Price- and income indexation reduce the increase in revenues to 32.7 and 31.2 percent respectively. Again an explanation of this seemingly small effect on indexation is the large importance of high-income earners.

Table 2 Changing to a new tax design

Parameters	Before	After	After indexation		
L0 Lower limit	360 000	360 000	360 000	**Inflation**	0
L1		500 000	500 000	**Real growth**	0
L2		700 000	700 000	**Total increase**	**0**
L3		1 000 000	1 000 000		
L4 Upper limit	1 200 000	1 200 000	1 200 000	**Indexation of limits**	0

t0 (rate below lower limit))	0.00	0.00
t1 (rate between L0 - L1)	0.20	0.10
t2 (rate between L1 - L2)	0.20	0.20
t3 (rate between L2 - L3)	0.20	0.25
t4 (rate between L3 - L4)	0.20	0.30
t5 (rate above upper limit)	0.30	0.35

Results	**Before**	**After**	**Change %**
Tax revenue Million RWF	**118 594**	**135 273**	**14.06**
Income distribution net income			
Percentile 10	**71 419**	**71 419**	**0.00**
Quartile 1 (percentile 25)	**170 418**	**170 418**	**0.00**
Quartile 2 (percentile 50)	**477 830**	**491 830**	**2.93**
Quartile 1 (percentile 75)	**1 099 200**	**1 073 400**	**-2.35**
Percentile 90	**2 567 561**	**2 436 878**	**-5.09**
Percentile 95	**4 288 372**	**4 034 774**	**-5.91**
Percentile 99	**9 680 072**	**9 041 352**	**-6.60**

This model is simplistic and at least two assumptions can be questioned: (i) that the increase in income is evenly distributed across all individuals, and (ii) that changes in the tax design or indexation have no behavioural effects. For instance, increasing the progressivity does not reduce labour supply or have any other effect on the tax base such as for instance increased tax evasion.

Given the simplicity of this model, an attempt to provide an evaluation of indexation based on historical changes in real income and inflation is presented below. Using data from 2007-2012 the change in mean income have been calculated. The results are presented below in Table 3.

Box 1: Relaxing assumptions – a micro-simulation model

Removing the first assumptions would require a modelling of distributional dynamics in order to capture the distributional incidence of economic growth.

Removing the second simplification would require the design of a micro simulation model with behavioural effects and this requires estimates of labour supply elasticities. To allow for a more realistic evaluation of the distributional effect of an increase in income, a dynamic model is required. Income can be written as WH where W is hourly wage rate and H annual hours of work. For each individual W has to be known or alternatively predicted using an estimated wage equation. The change in W can be allowed to vary across individuals and this change together with a predicted change in H based on an estimated labour supply model can be used to calculate the new labour income. This allows the change in W to vary across individuals in such a way that is consistent with historical changes, for instance higher for individuals with higher education, higher in urban areas etc. The W and H of new individuals that enter the formal sector have to be included as well as the exit decision for those leaving. Thus such a model framework allows more interesting analyses but obviously requires a lot more information.

Over the time period under consideration, the mean value has fluctuated with decreases in 2008 and 2011 but this has been compensated by a strong increase in 2009 and 2012. The overall increase from 2007 to 2012 is an impressive 42 percent this increase is mostly explained by inflation (as shown in column 4). In order to calculate the change in real income, inflation is removed from the income increase (column 4 is subtracted from column 3). Thus, a strong decrease in real income has taken place from 2007 to 2008 but thereafter-real income has shown a strong increase, except for 2011. Based on historical experience, a five-year forecast can be based on an expected increase in income of 40 percent. Such a scenario using the tax simulator indicates that tax revenues increased almost 73 percent. If the indexation of tax brackets is set to 40 percent the resulting increase in tax revenues is of 60 percent.

Table 3 Change in income 2007-2012.

Year	Number of observations with a salary >0 (1)	Mean value of salary (2)	Percentage change (3)	Inflation rate (average consumer price) (4)	Real increase in mean salary (5)
2007	180 648	982 167		9.1	
2008	245 636	940 056	-4.29	15.4	-19.69
2009	252 106	1 153 561	22.71	10.4	12.31
2010	293 673	1 255 549	8.84	2.3	6.54

2011	380 496	1 240 661	-1.19	5.7	-6.89
2012	389 441	1 398 301	12.71	6.3	6.41

Source: Salary information from social security fund.
Inflation http://databank.worldbank.org/data/views/reports/tableview.aspx

As already mentioned, a serious simplification is the assumption that all individuals obtain the same income increase. In order to evaluate this assumption the income data are used to calculate the decile income 2007 and 2012. As shown in table 4 below, income changes vary a lot across deciles. For low-income earners there has been a decrease in mean income since 2007 and for median and above there has been a strong (or even very strong) increase. Note that deciles 3-4 are close to an income at the lower tax bracket (RwF 360,000 RwF). An explanation of the decrease for low-income earners is not attempted here, but it is important to consider the dynamics in earnings as well as the earnings of these new groups of individuals that enter the formal sector. For instance, if new individuals with low education entered the formal sector, average earnings would be reduced. This decrease does not necessarily reflect a wage decrease for individuals that have been working throughout this period.

Table 4 Change in decile income 2007-2012.

Decile	Change 2007-2012 %
1	.
2	.
3	.
4	.
5	.
6	.
7	.
8	.
9	.

Source: Salary information from social register.

*Note: Decile income has been defined as the mean income for each decile. For decile 1 this is the mean income for all individuals who have an income below the 10:th percentile (90 percent have a higher income). For decile 2 this is the mean income for all individuals with an income above 10:th percentile and below 20:th percentile. The other deciles follows the same principle and for the 9:th decile the mean income is calculated for all individuals with an income above the 90:th percen*tile.

An interesting exercise that could be included in the tax simulator is to allow for different income changes across income deciles. This could have a huge impact for a scenario where a

different tax design is evaluated, for instance in case a higher degree of progressivity is envisaged. However, the current design makes the importance of different across deciles income changes are less obvious. It is still the case that the results are to a large extent driven by the income of those above the highest tax bracket and the income changes of low and medium income earners play a smaller role.

Concluding discussion

Even if price indexation is the standard approach to bracket indexation it is important to highlight the advantages of income indexation.[6] One reason for the focus on price indexation is that the issue of indexation has to a large degree been rooted in the high inflation era of the seventies and eighties. Today the focus should instead be on increase in real growth. There is no strong argument why only part of increase in income should be indexed.

A somewhat idealistic approach is to argue that the government at one point in time designed a tax system that has some optimal properties. For instance the share of income earners that pay income tax, the share that pays the highest tax, the distribution of the tax burden and total tax revenue as a share of total income were all designed to compose a perfect scenario. Under both inflation and real growth, those optimal characteristics would not stay constant without the support of indexation mechanisms. Price indexation alone would only adjust for the inflationary effect but not the real growth effect. For instance tax revenues would increase and taxes as a share of income would increase. In the past this effect was referred to as "fiscal drag". From the governmental perspective this autonomous increase in tax revenues might be welcome, but there are reasons why such an effect is not desirable. The most important effect is related to the effect on aggregate savings. During periods of economic growth tax revenues might exceed government expenditure and the public sector will generate savings that might reduce economic growth at least if the private demand is not high enough to compensate for it.

Another reason against the autonomous approach for increasing tax revenues is that it is not transparent. For the population in general it is very difficult to understand the forces of indexation (or lack thereof). If the ambition of the government is to increase tax revenues or

[6] An informative discussion is presented in Tanzi (1980)

change the distribution of the tax burden then this should be done based on economic reforms. Such a reform could be a change in the tax design, e.g. increasing brackets and level of tax rates. Thus the question of indexation or no indexation is related to simplicity and hence to the overall design of the PIT system. An example of a simple PIT where the issue of indexation has no relevance is of course the flat tax.[7]

Finally, a short remark on the importance of economic incentives. The simple mechanical before-after evaluation of the tax design is based on the assumption that individuals do not change their behaviour as a result of the tax change. Based on literature on taxation and individual responses, such an assumption is dubious.[8] It is important to remember that a large number of changes could happen in response to variation in tax rates, not limited to labour supply. These changes could include choice to enter or exit the labour force, to pay tax based on personal or business income and also the issue of tax evasion. All effects on the tax base have to be considered in analysing the effects on tax revenues. This is especially relevant for the evaluation in which the highest rate is increased. It may look tempting to increase the tax rate on high-income earners since given the unequal income distribution and the fact that distribution of the tax burden has a strong effect on tax revenues. However, the tax elasticity among the rich play a crucial role in what the likely effect on tax revenue are. Also, taxing the rich is also taxing anyone who has the ambition to become rich.

[7] See Flood and Savini (2011)

[8] For a recent review of the see Meghir et. al. (2010).

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