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Working Paper

# The DSTI Gap

A Novel Risk Monitoring Tool and Reverse Stress-Test  
to Assess Borrower Resilience to Inflationary Shocks  
in European Economies

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# The DSTI Gap: A Novel Risk Monitoring Tool and Reverse Stress-Test to Assess Borrower Resilience to Inflationary Shocks in European Economies

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**Abstract** — After the 2008 global financial crisis, the development of macroprudential instruments capable of reducing systemic risk was placed at the forefront of the Basel III implementation agenda. Central Banks worldwide sought to enhance their capabilities to monitor and prevent the accumulation of risk within the financial system. Borrower-based measures such as the DSTI were one of the latest novelties adopted by policy-makers in a bid to enhance the ability of households to repay their loans and prevent the risk of default. Following a prolonged Covid pandemic in which consecutive rounds of lockdowns and infections distorted global supply chains, many economies were confronted with a sharp rise in inflationary pressures. Within the financial stability community, this led to a series of questions on the impact of such shocks on the capacity of borrowers to repay their debt. This paper presents an indicator called the DSTI Gap, which measures the excess (or deficit) of financial resources of a debtor after having covered current expenses plus debt servicing costs. The DSTI Gap can be used to assess the excess resources that borrowers hold to absorb potential shocks and the extent to which they must resort to defaulting on their loans when reducing consumption to mitigate the shock is not possible. When coupled with a reverse stress-test, the indicator can be used to determine the maximum inflationary shock that borrowers can tolerate before defaulting on their loans.

**Index Terms** — Borrower-based measures, debt service, income, DSTI, gap, inflation, shock, reverse, stress-test, financial stability, risk, EU economies, macroprudential instruments.

## I. INTRODUCTION

Recently, within the global financial stability and supervisory community a lot of attention has been focused on the introduction of borrower-based measures to complement existing macroprudential instruments and further enhance the resilience of both the financial sector and individual borrowers. The Debt-Service-to-Income ratio is a prominent tool used by regulators to limit the exposure to the risk of default. The aim is to prevent borrowers from becoming over-indebted and thereby defaulting on their loans as a result of insufficient revenues to cover debt servicing costs alongside current expenses. The instrument acts by limiting the ability of banks to lend to borrowers with DSTI ratios above a certain threshold. As a result of implementing the DSTI ratio, regulators achieve a shift of the loan portfolio distribution towards lower values. However, while the DSTI ratio is a

useful indicator for both regulators and banks to monitor the current situation of a client, it is also important to consider that, when faced with a shock affecting the expenditures of a borrower such as an inflationary event, the DSTI ratio of the debtor is bound to worsen. In this paper, I construct an indicator called the DSTI Gap which reflects the excess (or deficit) of financial resources of a debtor after having covered current expenses plus debt servicing costs. The indicator can be used to determine the amount of slack that a borrower has until being faced with default, as well as the maximum inflationary shock that can be tolerated.

## II. LITERATURE REVIEW

O'Brien and Ryan (2017) [1] provide a detailed motivation on the usage of macro-prudential instruments and the integration of both capital buffers and borrower-based instruments into the policy mix. In particular, they highlight how borrower-based instruments can be used to strengthen the resilience of households and influence the flow of mortgage lending. Fiala and Teplý (2021) [2] give an overview of the adoption of borrower-based measures at the EU level and provide evidence on the usage of tools as a function of household debt growth and housing prices. Barasinska et al. (2021) [3] show, in a simulation based on microdata, performed of the German Bundesbank, that the introduction of the loan-to-value ratio can improve household vulnerability indicators. When broadening the range of borrower-based indicators used in the analysis, Gross and Población (2017) [4] determine that DSTI caps are even more efficient in limiting the default risk of households, in their investigation of the efficiency of borrower-based instruments using a micro-macro model on European data. Following this line of thought, the DSTI is selected as the macroprudential instrument of choice for this paper. To this effect, the ESRB (2022) [5] provides an overview of current DSTI thresholds adopted by countries in the EU in the form of a description of the main regulatory threshold and any possible exceptions from the rule.

In the context of recent spikes in inflation, it becomes important to study the interactions between the newly introduced borrower-based measures, the CPI and borrower income. Samsu et al. (2016) [6] confirm, by means of a comprehensive review of the literature, that inflation is a key

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driver in determining the repayment capacity of borrowers. Bardhan and Mukherjee (2016) [7] study the bank-specific determinants of nonperforming assets of Indian banks and detail the negative impact of inflation on loan repayment capacity. Ekanayake and Azeez, A. A. (2015) [8] confirm that NPLs vary negatively with inflation in a study on Sri Lanka's commercial banking sector.

### III. THE DATA

This study uses data from five principal sources – Eurostat, ESRB, Numbeo, the National Statistics Bureau of Moldova, as well as the National Bank of Moldova. Numbeo provides data related to the structure of expenses. Eurostat and the National Statistics Bureau of Moldova provide information about the CPI. The two institutions also provide data on average income. The ESRB as well as the National Bank of Moldova provide data on the current threshold for the DSTI macro-prudential indicator. Table I below, provides an overview of the data used in the study:

TABLE I: OVERVIEW OF THE DATA USED IN THE STUDY

| Indicator              | Data source                                                                                                                                                                                          |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Average income         | Eurostat, National Statistics Bureau of Moldova<br>ilc_di03 - Mean and median income by age and sex - EU-SILC and ECHP surveys (EU)<br>Evolution of average gross monthly earnings, by quarters (MD) |
| Consumption expense    | Numbeo                                                                                                                                                                                               |
| CPI                    | Eurostat, National Statistics Bureau of Moldova<br>prc_hicp_manr - HICP - monthly data (annual rate of change) (EU)<br>Monthly rate of inflation (MD)                                                |
| Current DSTI threshold | European Systemic Risk Board, National Bank of Moldova                                                                                                                                               |

Table I provides an overview of the data used in the study and indicates the source of each variable: Eurostat, the European Systemic Risk Board, Numbeo, the National Bureau of Statistics of Moldova and the National Bank of Moldova.

Data regarding average monthly consumption expenses is calculated by constructing a minimal consumer basket using data from Numbeo – one of the most prominent websites tracking the cost of living in over 100 countries. The database is widely used to study the cost of living, quality of life and wealth effects. A recent paper by Dourado and Montini (2016) [9] makes use of Numbeo data to study the cost of living in the best livable cities worldwide. In terms of the methodological considerations used in creating the consumption basket, this paper draws from Gooding, P. (2011) [10] who describes the methodology used to create consumer price inflation baskets and provides suggestions about variables to include and Huth et al. (2013) [11] who provide information about food contributors to the average diet. When constructing the minimal basket based on data available in Numbeo, leisure expenses and rental costs are forgone. The rationale behind the exclusion of the cost of rent from the formula is that a borrower for whom the DSTI is calculated will have already taken out a mortgage loan such that the borrower will no longer be paying rent. The exclusion does not refer to the cost of utilities which continues to be borne by the borrower. A detailed description of the

components used in the basket is provided in Section IV of this paper.

### IV. CONSTRUCTING THE DSTI GAP

#### A. Building blocks and special focus on revenue

To measure the impact of an inflationary shock on the repayment capacity of a debtor, I construct a distance-to-default indicator, called the DSTI Gap, that is able to capture three phenomena:

- 1) Revenue dynamics
- 2) Expense dynamics and inflation
- 3) The macroprudential framework in place (in particular, with regard to any active DSTI thresholds)

One can refer to the constructed indicator as representing a gap, because it can be seen as the distance between the excess (or deficit) of financial resources of a debtor after having covered current expenses plus debt servicing costs, and the point at which current expenses and debt servicing costs take up the entire revenue of the debtor.

The point at which current expenses equal total revenue is important, because at this threshold, an increase in debt servicing costs or expenses force the debtor to either:

- 1) Reduce consumption – thereby leading to an unwanted contraction of GDP
- 2) Default on loan repayments – thereby increasing the NPL portfolio of the bank.

The reduction in consumption is possible only up to a certain point, denoted by the autonomous consumption minimum value.

Thus, both from an economic and financial stability perspective, it is important to avoid reaching this limit, which can lead to a degradation in macroeconomic and financial indicators, due to potential second-round effects.

#### B. Expense dynamics and inflation

Expenses are comprised of consumption and debt servicing costs.

Total consumption is the sum of all consumption expense categories (for food, utilities, etc.).

$$C = \sum_{i=1}^I C_i, \text{ where } C_i \text{ is the average cost of consumption}$$

associated with consumption expense category  $i$ .

Debt servicing costs are a function of income and the DSTI. For prudential purposes, it is assumed that the debtor wishes to contract the largest possible loan amount that the bank is willing to issue. The tool is meant to be used as a stress test that determines the point of insolvency and as such, the most prudent assumptions are chosen. Debt servicing costs are, therefore, taken to be the maximum admissible value that the bank can set, given the DSTI ratio imposed by the regulatory authority. Consequently, they are equal to the DSTI value multiplied by the average income.

$$DS = DSTI * Y_d \quad (1)$$

$DSTI \in [0; DSTI^{MAX}]$  – the DSTI ratio which can take on any values ranging from 0 to the maximum admissible DSTI value

$DSTI^{MAX} = 100 - \frac{C}{Y_d}$  – the maximum admissible value of

DSTI and reflects the fact that the largest value of the DSTI threshold that the regulator can set is limited by the resources remaining available after the debtor has paid for current consumption expenses

$Y_d$  – the disposable revenue of the debtor.

Setting a DSTI threshold  $DSTI < DSTI^{MAX}$  means that the regulator wishes to impose a safety margin to ensure that the debtor has sufficient resources available to satisfy unexpected expenses or a change in consumption expenses.

Consumption expense dynamics are impacted by inflation such that an increase in the CPI is fully translated into an increase in consumption expenses. This is captured by the formula below:

$$C_t = C_{t-1} * I^a \quad (2)$$

$C_t$  – current consumption expenses

$C_{t-1}$  – consumption expenses in the previous time period

$I^a$  – anticipated inflation for the period “t”

Therefore, an increase in inflation leads to higher consumption expenses and, consequently, a lower available safety margin to protect the debtor against default.

### C. Macroprudential framework

Countries within the EU, which implemented the DSTI, report its threshold values on the website of the ESRB. Based on a study of the ESRB (2022) [5] overview of national macroprudential measures, the most common values of the DSTI indicator adopted by EU countries are 40% and 50%.

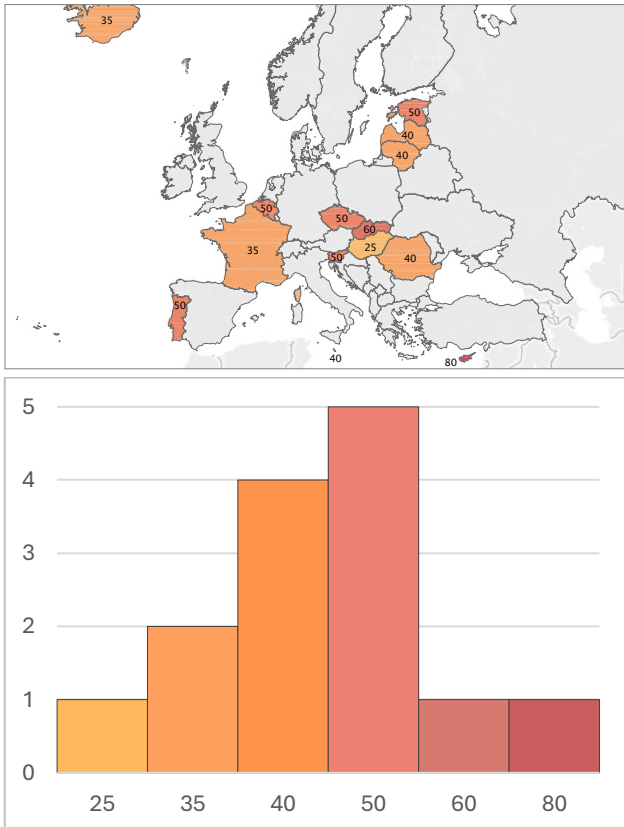


Fig. 1. DSTI Ratios adopted in EU economies and their distribution.

Source: ESRB (2022)

### D. Putting it all together

Within this paper, I am interested in determining the impact of an inflationary shock on the repayment capacity of bank debtors. To do so, I must determine the value of the DSTI Gap – the excess (or deficit) of financial resources of a debtor after having covered current consumption expenses plus debt servicing costs.

$$DSTI^{GAP} = Y_d - C - DS \quad (3)$$

Or, expressed as a percentage:

$$DSTI_{\%}^{GAP} = 1 - \frac{C}{Y_d} - DSTI \quad (4)$$

$Y_d$  – disposable income

$C$  – consumption expenses

$DS$  – debt servicing costs

$DSTI$  – DSTI threshold

If, after the inflationary shock, the value of the DSTI gap remains greater than or equal to zero – the debtor remains solvent and capable of honoring any outstanding obligations towards the bank. If the value drops below zero, a range of possibilities are open to the debtor. These options are summarized in the table 2 below:

| Scenario                                   | Reduction in:            |                                     |
|--------------------------------------------|--------------------------|-------------------------------------|
|                                            | Consumption expenses (C) | Debt servicing costs (DS) [Default] |
| $\frac{C - C^A}{Y_d} \geq DSTI_{\%}^{GAP}$ | $p * DSTI_{\%}^{GAP}$    | $(1 - p) * DSTI_{\%}^{GAP} * Y_d$   |
| $\frac{C - C^A}{Y_d} < DSTI_{\%}^{GAP}$    | $C - C^A$                | $DSTI_{\%}^{GAP} - (C - C^A)$       |

$C^A$  – the autonomous consumption

$p$  – the share of expenses in excess of the  $DSTI_{\%}^{GAP}$  that the debtor chooses to compensate by a reduction in consumption (possible only up until the point where the debtor reaches his or her autonomous consumption level)

$(1 - p)$  – share of expenses in excess of the  $DSTI_{\%}^{GAP}$  that the debtor chooses to compensate by a partial or total default on existing loans.

Table 2 shows how the debtor may choose to distribute the compensation measures, imposed by an increase in consumption costs due to inflationary shock, between a reduction in consumption and a (partial) default on existing loans. Such arbitration is only possible when the difference between the consumption expenditure and the autonomous consumption is greater than the DSTI Gap. If the level of autonomous consumption is such that consumption expenses can no longer be covered exclusively by means of reducing consumption in excess of autonomous consumption, the debtor has to resort to defaulting on a proportion of existing loans that depends on the  $DSTI_{\%}^{GAP}$  and the distance between consumption expenditures and the level of autonomous consumption ( $C - C^A$ ). In this case, there is no room for arbitration between consumption reduction and default, as the entirety of the consumption in excess of autonomous consumption will have already been attributed to the consumption reduction part of the equation. As such, the

debtor will default on the remaining deficit of resources equal to  $DSTI^{GAP} - (C - C^A)$ . In what follows, I construct a minimum, incompressible consumption basket that will be retained throughout the rest of this paper for the calculation of the DSTI Gap.

#### E. The minimal consumption basket

To construct the minimal consumption basket, data from Numbeo's database on cost of living is taken together with nutritional recommendations for a 2000-calorie diet, as proposed by the US Food and Drug Administration. According to the FDA (2022) [12], in order for a person to achieve or maintain a healthy body weight, the number of calories that are consumed must be balanced with the number of calories used by a person's body. To this effect, a consumption of 2,000 calories per day is used as a general guide for nutrition advice.

Table III presents the variables selected from the database, together with details on the assigned quantities for the basket.

TABLE III. A MINIMAL CONSUMPTION BASKET

| Product                       | Unit of measure                                           | Calories per unit of measure | Nr. of units included in basket | Calories per month, per item | Calories per day, per item |
|-------------------------------|-----------------------------------------------------------|------------------------------|---------------------------------|------------------------------|----------------------------|
| Milk                          | (regular) (1 liter)                                       | 745                          | 4.5                             | 3352.5                       | 111.75                     |
| Loaf of Fresh White Bread     | (500g)                                                    | 1320                         | 6                               | 7920                         | 264                        |
| Eggs                          | (regular) (12)                                            | 864                          | 2                               | 1728                         | 57.6                       |
| Local Cheese                  | (1kg)                                                     | 4040                         | 0.75                            | 3030                         | 101                        |
| Water                         | (1.5 liter bottle)                                        |                              | 40                              | 0                            | 0                          |
| Chicken Fillets               | (1kg)                                                     | 2480                         | 3                               | 7440                         | 248                        |
| Monthly Public Transport Pass | (Regular Price)                                           |                              | 1                               | 0                            | 0                          |
| Basic                         | (Electr., Heating, Cooling, Water, Garbage) for 85m2 Flat |                              | 1                               | 0                            | 0                          |
| Apples                        | (1kg)                                                     | 570                          | 6                               | 3420                         | 114                        |
| Oranges                       | (1kg)                                                     | 372                          | 6                               | 2232                         | 74.4                       |
| Potato                        | (1kg)                                                     | 3560                         | 4.5                             | 16020                        | 534                        |
| Lettuce                       | (1 head)                                                  | 160                          | 3                               | 480                          | 16                         |
| Rice                          | (white), (1kg)                                            | 1000                         | 4.5                             | 4500                         | 150                        |
| Tomato                        | (1kg)                                                     | 126                          | 6                               | 756                          | 25.2                       |
| Banana                        | (1kg)                                                     | 630                          | 6                               | 3780                         | 126                        |
| Onion                         | (1kg)                                                     | 160                          | 1.5                             | 240                          | 8                          |
| Beef Round                    | (1kg) (or Equivalent)                                     | 2210                         | 3                               | 6630                         | 221                        |
| Total calories per day        |                                                           |                              |                                 |                              | <b>2050.95</b>             |

Source: Numbeo and author's calculations.

The values for calories associated with each expenditure item is taken from the WebMD database on Diet and Weight Management [13]. The values from the database are brought to the same unit of measurement as the expenditure items provided in Numbeo's cost of living database. Monthly calorie values are converted to daily values by assuming a 30 day month.

## V. MULTINATIONAL SIMULATION RESULTS

### A. Scenario configuration

At first, I construct the DSTI Gap for an inflationary scenario consistent with current developments following pressures stemming from post-Covid economic developments, heightened geopolitically - induced immigration and rapidly increasing energy costs related to temporary scarcity of gas and oil resources.

The adopted inflation shocks represent the highest registered value for inflation over the previous 12 months, with the latest available data point for the entire sample of countries being March 2022:

TABLE IV. INFLATION SHOCKS, BY COUNTRY

| Inflationary shocks | Baseline |
|---------------------|----------|
| Cyprus              | 6.2      |
| Czechia             | 10.0     |
| Estonia             | 14.8     |
| France              | 5.1      |
| Hungary             | 8.4      |
| Iceland             | 4.4      |
| Latvia              | 11.2     |
| Lithuania           | 15.6     |
| Malta               | 4.6      |
| Moldova             | 18.5     |
| Portugal            | 5.5      |
| Romania             | 7.9      |
| Slovakia            | 9.5      |

Source: Eurostat, National Bureau of Statistics of Moldova, March 2022

The DSTI thresholds are taken from the most recent reported data to the ESRB, as of March 2022 and, where ranges exist for the DSTI threshold value, the more conservative value is adopted, with exceptions from the rule generally not being taken into account.

Exceptions from the DSTI threshold can generally not be taken into account because countries do not report the loan amounts that are subject to exceptions to the ESRB. Whereas some countries report the maximum loan amounts that are allowed to benefit from exceptions, there is no data about the actual amount of loans subject to exceptional treatment.

In what follows, I solve the main model and construct a reverse-stress test, which returns the maximum inflationary shock that can be absorbed at a given DSTI threshold before borrowers must default on their loans.

### B. Results for a small, open economy and the wider EU region

The results for Moldova, a very small and highly open

economy which is strongly impacted by external shocks present high didactic value, as they represent the extreme impact that a macroeconomic shock can have on a country's financial and economic systems. Guerron-Quintana (2013) [14] mentions the importance of studying small, open economies, because of the common characteristics presented by both developing economies, as well as multiple EU countries that fall in this category.

In Moldova, setting a DSTI threshold of 40%, given the domestic revenue and expense structure, as well as the inflationary projections, yields a positive result in the absence of inflationary shocks, with the DSTI Gap being just under 7% in 2021, thereby indicating that households retain roughly 7% of their disposable income in excess of expenses and debt servicing costs. In the years associated with growth and stability, the DSTI Gap grew rapidly, reaching 9.1% in 2020 - a comfortable cushion against potential revenue or expense shocks.

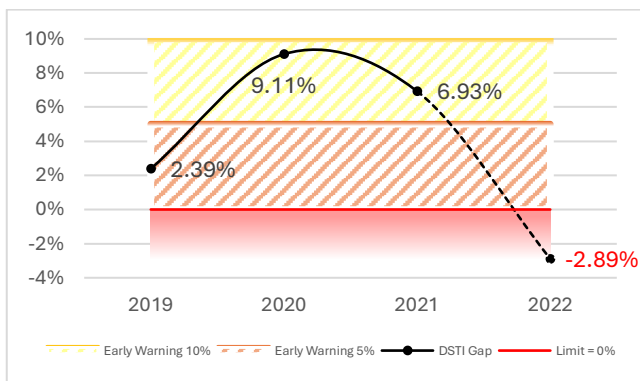


Fig. 2. The DSTI Gap for Moldova

When a significant inflationary shock calibrated at the value of annual inflation in March 2022 is applied, the available excess resources of the debtor are reduced, which in turn diminishes the DSTI Gap by the same amount. In this case, assuming no other changes to the model's variables with the exception of the inflationary shock, the DSTI gap drops to -2.9%. In this situation, due to the assigned minimal incompressible consumption basket, the debtor must default on a portion of their debt equaling 2.9% of their revenue, thereby increasing NPLs in the system (Figure 2).

I then run a reverse stress-test in which the values of inflation are varied in such a way as to produce a DSTI threshold of zero, thereby bringing the borrower to the limit at which either default or consumption reduction must be chosen. Given the economic conjuncture and financial regulatory environment of Moldova at the time of writing this article, at a DSTI threshold of 40%, an inflation rate of 13.1% is sufficient to bring borrowers operating at the limit of the DSTI threshold and consumption basket to a null DSTI gap.

Looking at the results for countries in the EU who adopted the DSTI instrument as a borrower-based regulatory measure, there are significant discrepancies between the DSTI Gap of countries before and after the inflationary shock (Table V and Figure 3). Before the shock is applied, there is a divide between north-western and south-eastern European economies, whereby countries in the west have a higher DSTI Gap than their eastern counterparts.

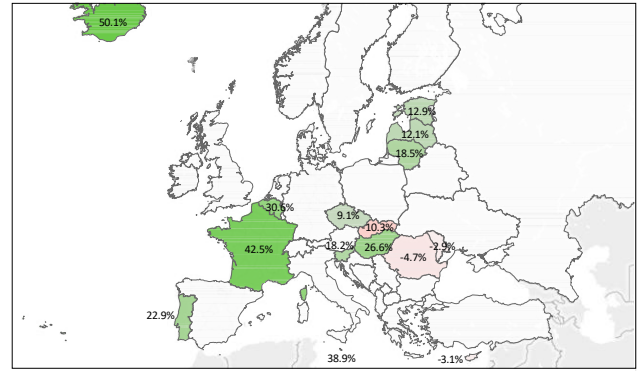


Fig. 3. The DSTI Gap after an inflationary shock.

In particular, Iceland and France have the highest buffer against potential shocks, but also some of the lowest inflationary shocks among the countries included in the study. The south-eastern countries with the lowest DSTI Gap are also confronted with the highest inflationary shocks, highlighting the fact that developing economies which are most constrained in terms of excess borrowing capacity are also among the hardest hit by inflationary pressures. These economies are more open and dependent on external factors, and therefore subject to higher fluctuations when hit with shocks.

Two economies, Cyprus and Slovenia, have a negative DSTI Gap before the shock, which is due to the large allowed regulatory DSTI threshold. The countries, however, have several exceptions listed and, most likely, the distribution of the DSTI indicator is well below the 80% mark.

After having applied the inflationary shock, two economies – Moldova and Romania have a negative DSTI Gap, whereas the indicator was positive before. This denotes the little amount of slack that these countries have in terms of the DSTI gap and the vulnerability of debtors to cost shocks.

TABLE V. THE DSTI GAP: BEFORE AND AFTER THE SHOCK

| DSTI Gap                                        | Before | After  |
|-------------------------------------------------|--------|--------|
| Cyprus                                          | -1.7%  | -3.1%  |
| Czechia                                         | 12.8%  | 9.1%   |
| Estonia                                         | 17.6%  | 12.9%  |
| France                                          | 43.6%  | 42.5%  |
| Hungary                                         | 30.4%  | 26.6%  |
| Iceland                                         | 50.7%  | 50.1%  |
| Latvia                                          | 16.9%  | 12.1%  |
| Lithuania                                       | 24.1%  | 18.5%  |
| Malta                                           | 39.8%  | 38.9%  |
| Moldova                                         | 6.9%   | -2.9%  |
| Portugal                                        | 24.3%  | 22.9%  |
| Romania                                         | 0.1%   | -4.7%  |
| Slovakia                                        | -5.9%  | -10.3% |
| Slovenia                                        | 20.3%  | 18.2%  |
| Negative DSTI Gap                               |        |        |
| DSTI Gap is positive, but relatively low (<10%) |        |        |
| DSTI Gap is at a comfortable level (≥ 10%)      |        |        |

Running the same reverse stress-test as before on the sample of EU economies yields disparate results, as countries

such as France and Iceland are able to withstand very significant inflationary shocks before borrowers are faced with constraints to default or reduce consumption. Moldova and Romania are countries at the limit, for whom moderate inflationary shocks cause the default of typical households. Conversely, Central European economies and the Baltic States are able to withstand shocks in excess of 30%.

In the case of Cyprus and Slovakia which initially have a negative DSTI Gap, a deflationary shock of 7.96% and 12.93% are necessary bring their economies to a null DSTI Gap at their respective thresholds. In these countries, households are already vulnerable and at risk of default before the inflationary shock is applied. As such, any applied shock would only further exacerbate their already fragile situation. The results of the reverse stress-test are summarized in Figure 4 below. On the figure, one can easily notice the countries which are particularly resilient and which require inflationary shocks upwards of 100% to reach a DSTI Gap of zero.

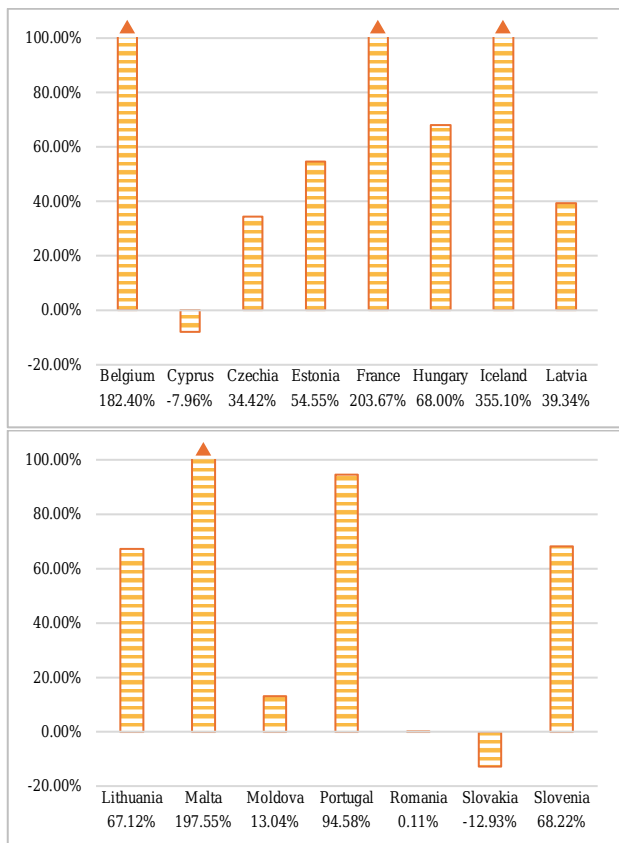


Fig. 4. Reverse Stress-Test for the DSTI Gap: Maximum tolerable inflationary shock

The results suggest that setting the correct DSTI Threshold can be paramount to ensuring the ability of debtors to withstand inflationary shocks, given the dynamics between disposable revenue and expenses driven by inflation. For small, open economies facing moderately severe inflationary shocks, the 40% level is adequate in ensuring the debt repayment capacity of debtors. Where larger or more persistent inflationary shocks are expected, the DSTI threshold should be adjusted accordingly, by taking into account the effect of inflation on the DSTI Gap.

## VI. THE DSTI GAP AS A TOOL FOR REGULATORY CALIBRATION AND SUSTAINABILITY ANALYSIS

Beyond its utility as a risk monitoring indicator, the DSTI Gap provides a quantitative framework for regulators to assess the feasibility of introducing or modifying Debt-Service-to-Income (DSTI) thresholds. By measuring the excess or deficit of financial resources remaining after a borrower has covered both debt servicing costs and an incompressible minimal consumption basket, the DSTI Gap serves as a "safety margin" check for macroprudential policy.

### A. Alignment check for new regulatory thresholds

For countries that have not yet adopted a formal DSTI threshold, the DSTI Gap can be used to determine if a proposed limit is aligned with the actual living standards and income levels of the population.

- **Positive DSTI Gap (DSTI Gap > 0%)**  
If a regulator proposes a threshold (e.g., 40%) and the resulting DSTI Gap is positive, it indicates that existing borrowers can adhere to this threshold while still maintaining enough disposable income to cover their essential living expenses. In this scenario, the threshold is feasible and provides a cushion against potential financial shocks.
- **Negative DSTI Gap (DSTI Gap < 0%)**  
Conversely, a negative DSTI Gap suggests that the proposed threshold is too relaxed. It implies that the allowable debt repayment costs are so high that they encroach upon the resources needed for basic survival (the minimal consumption basket). In such a case, borrowers operating at this limit risk being unable to afford both their loans and basic needs simultaneously. To prevent systemic default risk, the regulator should adopt a more stringent (lower) threshold to ensure borrowers retain sufficient resources for living costs.

### B. Sustainability analysis of threshold adjustments

For jurisdictions that have already implemented DSTI limits, the DSTI Gap serves as a critical tool for verifying whether changes to these thresholds are sustainable under current macroeconomic conditions. This is particularly vital when regulators consider relaxing or releasing the threshold to stimulate credit growth.

- **Risk of Relaxation**  
Before easing a DSTI cap, regulators can use the DSTI Gap to simulate whether such a move would leave borrowers vulnerable. If the gap is already narrow, relaxing the threshold could result in borrowers having insufficient means to cover overall expenses, thereby increasing the probability of default during periods of economic volatility.
- **Macroeconomic Alignment**  
As demonstrated by the paper's analysis of inflationary shocks, the DSTI Gap is dynamic. A threshold that was sustainable during a period of price stability may become unsustainable during an inflationary spike. By monitoring the gap, regulators can decide whether to

maintain, tighten, or loosen the threshold in response to changes in the Consumer Price Index (CPI) and average disposable income.

In summary, by linking regulatory caps to actual consumption costs via the DSTI Gap, policy-makers move from a "one-size-fits-all" percentage approach to a calibrated model that ensures borrowers remain solvent without sacrificing their basic standard of living.

## VII. CONCLUSION

The DSTI Gap is an indicator that can be used to investigate the effect of inflationary shocks on the repayment capacity of borrowers. In this paper, I studied the effect of an inflationary shock commensurate with the real-world situation experienced by 15 European economies that adopted DSTI caps. The results show the importance of correctly calibrating the DSTI threshold, as its value is a key determinant in the ability of typical borrowers to continue servicing their debt in an environment affected by shocks. Among the countries that were studied, a value of 40% is found to be adequate in covering moderately high price increases, even in small countries such as Moldova where borrowers are severely constrained by low revenues. The paper also presents a reverse stress-test capable of determining the maximum inflationary shock that the average borrower can tolerate before defaulting on existing loans, when constrained by a minimal consumption basket.

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