# How does monetary policy affect welfare? Some new estimates using data on life evaluation and emotional well-being

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**Abstract**

Models on the optimal design of monetary policy typically rely on a welfare loss function defined over unemployment and inflation. Our estimates of such a function use measures of two dimensions of well-being that have been distinguished by researchers. The first evaluates how close one is to *'the best possible life'*. The second captures the emotional quality of everyday experiences. Our Gallup World Poll sample covers 1.5 million people living in 141 nations from 2005 to 2019. Unemployment and inflation reduce well-being across all measures. The ratio of the unemployment-to-inflation effect is 6.2 for the 'ladder-of-life'. However it is lower for positive day-to-day experiences and higher for negative ones.

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# I. INTRODUCTION

Many Central Banks have enacted legislation that ties their ultimate purpose to promoting the welfare or well-being of their countries.[1] For example, the Reserve Bank of Australia Act (1959) states that *"it is the duty of the Reserve Bank Board ... to ensure that the monetary and banking policy of the Bank is directed to … the economic prosperity and welfare of the people of Australia"*.[2] In addition, whilst the primary objective of the European Central Bank is to maintain price stability, its broader aim is to support *"the achievement of the objectives of the European Union"* which includes promoting *"the well-being of its peoples"*.[3] In another context, the Central Bank of the Russian Federation links its conduct of monetary policy to the purpose of achieving *"stable well-being of Russian people"*.[4] Furthermore, the Reserve Bank of New Zealand Monetary Policy Amendment Act (2018) gives it a (new) aim of promoting *"the prosperity and well-being of New Zealanders …"* via the implementation of monetary policy directed at *"achieving and maintaining stability in the general level of prices … and supporting maximum sustainable employment"*.

The present paper addresses the question of how to estimate a social welfare function defined over inflation and unemployment that can help inform the policy decisions of central banks by providing a way to measure the well-being costs arising from macroeconomic fluctuations. Consider the case of a central bank seeking to achieve price stability in an economy which currently has a high inflation rate. It faces a decision regarding how much to increase interest rates. The more it increases rates, the more unemployment may be pushed up and the quicker inflation may be reduced, at least in the short-run, according to the Phillip's curve trade-off.

[1] See Mishkin (2007).
[2] See Section 10(2).
[3] For the ECB's enacting legislation, see https://www.ecb.europa.eu/ecb/legal/pdf/oj_c_2016_202_full_en_txt.pdf.
[4] See https://www.cbr.ru/eng/DKP/about_monetary_policy/main-objective-and-principles/.

Consequently it is desirable to try to derive the welfare losses that stem from changes in unemployment compared to inflation. One way to do so is by obtaining direct measurements of individual subjective well-being from survey questions. These data can subsequently be correlated with unemployment and inflation rates in order to estimate the relative costs of these variables.

An example of a direct measure of well-being is the "Cantril Ladder-of-Life" question which asks each respondent to evaluate their life on a scale in which 0 is *"the worst possible life"* and 10 is *"the best possible life"*. This question is regarded as capturing the thoughts that people have about their life as a whole when they think about it. A related survey question with a similar type of broad focus asks individuals to evaluate whether, *"on the whole"*, they are *"satisfied with the life they lead"*, which was used by Blanchflower et al (2014).

On the other hand, there is another dimension of well-being that relates more to the emotional quality of an individual's everyday experience that has been distinguished by recent research. Deaton and Kahneman (2010) find that life evaluation rises steadily with log income whereas there is no further progress in emotional well-being beyond an annual income of US $75,000. The emotions include the frequency and intensity of a person's experiences of joy and anger that make one's day-to-day life either pleasant or unpleasant.[5] This dimension is regarded as being associated with one's instantaneous, or momentary, level of well-being and has a short term focus. By contrast, the evaluation-of-life questions referred to above are regarded as being more associated with a longer time horizon. Consequently, we raise the question of whether inflation and unemployment affect well-being differently across these different dimensions of well-being.

[5] These pleasant and unpleasant emotions are sometimes also referred to as "positive" and "negative" affect when constructing measures of well-being (see, for example, Myers and Diener, 1994).

The paper is organized as follows. In the next section we show how the literature on the costs of macroeconomic fluctuations can be used to estimate a welfare function defined over inflation and unemployment. In section III survey data on well-being from the Gallup World Poll is correlated with these variables. The coefficients can be used to determine the welfare costs of unemployment compared to inflation. This exercise yields a different set of estimates to those often used by economists who analyze monetary policy. Section IV explains how our results may affect the design of an optimal disinflationary path and discusses the question of which measure of well-being should be used. Section V concludes.

## II. THE COSTS OF INFLATION AND UNEMPLOYMENT: SOME THEORY

Central banks often emphasize many different types of costs of inflation in their publications. First, inflation may induce people to spend additional time and mental energy on reducing their holdings of cash, rather than on more productive activities. Second, it can cause firms to incur greater 'menu costs'. Third, since tax laws are mostly not indexed, inflation may raise effective tax rates and reduce economic growth. Fourth, it can make economic calculations harder since the currency becomes less reliable as a yardstick for measuring value. Fifth, because unexpected changes in prices redistribute real wealth between debtors and creditors, volatile inflation may create risks, making the use of long-term contracts using money as the unit of account less tenable. Sixth, when price adjustments are staggered, inflation can introduce spurious volatility in some prices relative to others, reducing a market system's ability to allocate resources efficiently.[6] These different channels vary in terms of importance. For example, since holdings of cash are

[6] Fischer and Modigliani (1978) was one of the first papers to outline the different costs of inflation.

usually quite small, they are unlikely to justify the observed focus on keeping inflation low.[7] Instead, attempts to derive high costs of inflation have been more influential when focusing on the extent to which inflation reduces the price system's ability to allocate resources efficiently.[8]

In addition to the above "standard costs" of inflation, other types of costs stemming from the psychological processes of individuals have also been described by behavioural economics. As an example, Shiller (1997) shows that when asked direct questions about inflation, people report 'unconventional' problems, like exploitation, lower national prestige and a loss of morale. One reason may be that the fairness of the existing income distribution becomes harder to justify when there is confusion over prices due to high inflation. For example, if speculation is more common when relative price changes occur more frequently, then one may find it harder to claim that the economy is rewarding effort more than luck. People may also experience regret that they didn't buy when prices were lower.[9]

With respect to the costs of unemployment, in spite of a long tradition studying macro-economic fluctuations, there remains disagreement among economists about the seriousness of their effects. The welfare costs of recessions in classical economics arise from the lost output that occurs when actual output falls below potential. This approach is sometimes adopted by real-business-cycle theorists, who assume that individuals are optimizing and recessions are desirable adjustments to productivity shocks. This means that the costs of business cycles are small - perhaps only 0.1 percent of total consumption in the US.[10]

[7] See Friedman (1969).
[8] This is the approach taken by Rotemberg and Woodford (1997).
[9] See Rotemberg (2005, 2009).
[10] See, for example, Lucas (2003).

By contrast, and along similar lines to better understanding the costs of inflation, there may also be potential for behavioural economics to improve our knowledge of the different kinds of costs associated with recessions. Substantial work in psychology and sociology indicates that there are emotional costs to those who lose their jobs that far exceed the monetary costs. For example, the unemployed may experience a loss of social status and self-esteem. They can find themselves deprived of personal relationships which they gained through their job and lose the disciplining time-structure that comes through being bound to a workplace. In addition, the unemployed may suffer a stigma due to being labelled as lazy, as well as face blame for their situation and find it hard to get back to work. Importantly, the *employed* may suffer from fear and anxiety due to the possibility that they may also incur these kinds of costs should they lose their jobs.[11]

## III. ESTIMATING A SOCIAL WELFARE FUNCTION

When it comes to formulating monetary policy, knowing the effects on the welfare of a society of both inflation and unemployment is of first order importance. However due to the potentially many different psychological costs that may occur when these variables change, as outlined above, identifying the total cost is difficult.

We remain a long way from having useful estimates that can help guide policy-makers. The direct questions about the costs of inflation that were used by Shiller (1997) are subject to some notable criticisms. Diamond and Hausman (1994), for example, argue that there can be strategic manipulation of answers in contingent valuation studies of environmental costs which use a

[11] The size of the psychic costs of unemployment are broadly comparable across nations (e.g., see Di Tella, MacCulloch and Oswald, 2003, Frey and Stutzer, 2013). A core assumption of "Keynesian economics" is that unemployment is a malady and not caused by efficient market responses to unattractive opportunities.

similar style of question. Much may also depend on the respondent's ability to understand difficult issues (such as the workings of the economy or state of the environment).

Another approach is to ask people about their own personal level of well-being and then correlate the answers with our variables of interest (i.e., inflation and unemployment). This imposes fewer informational demands, as presumably it is easier to know about one's own situation, than about how the economy works.[12] In other words, our approach is to estimate a welfare function of the following form:

$$Social\ Welfare = g(Unemployment, Inflation) \quad (1)$$

The task of theoretically deriving a function of this type was undertaken by Rotemberg and Woodford (1997) who ground their structural relations in the context of optimizing behavior of individuals and of firms that must temporarily keep their prices fixed, resulting in relative price distortions when inflation rises.[13] Their key assumptions are *a)* a summary measure of utility exists; *b)* all channels through which inflation and unemployment matter can be reduced to consumption and leisure; *c)* there is a representative agent.

The advantage of determining welfare losses arising from changes in the inflation and unemployment rates in the same model is that one can then directly compare their relative size. Obtaining such estimates is important for Central Banks when seeking to reduce inflation by

[12] Note that well-being research does not have to rely on subjective data. For an example that uses suicides as a proxy for mental distress, see Stevenson and Wolfers (2006).
[13] On the one hand, prices change more often so forfeiting a purchase decision in favor of more search becomes riskier. On the other hand, the fact that there are relative price oscillations means there are potentially more bargains out there, so search becomes more valuable.

raising interest rates since it helps to pin down the optimal adjustment path.[14] Our regressions are of the following form:

$$Self\text{-}reported\ well\text{-}being_{ntj} = \alpha\, Unemployment_{nt} + \beta\, Inflation_{nt} + \delta\, \Omega_{ntj} + \gamma_n + \eta_t + \mu_{ntj} \qquad (2)$$

for a sample of individuals, *j*, living in nation, *n*, in year, *t*, where $\Omega$ represents a set of personal characteristics, such as employment status, age, gender, income, marital status, education level and number of children. Meanwhile, $\gamma$ are country fixed effects, $\eta$ are year fixed effects and $\mu$ is the error term.[15]

III. a. Estimating a Social Welfare Function using Life Evaluation Data

Our first measure of well-being is called the "Ladder-of-Life". It comes from the Gallup World Poll survey question that asks:

> *"Please imagine a ladder / mountain with steps numbered from zero at the bottom to ten at the top. Suppose we say that the top of the ladder / mountain represents the best possible life for you and the bottom of the ladder / mountain represents the worst possible life for you. If the top step is ten and the bottom step is zero, on which step of the ladder/mountain do you feel you personally stand at the present time?"*

The response categories are shown to individuals as options from which to choose. The bottom category ("0") is labelled as being the *"Worst possible"* life whereas the top category ("10") is

[14] Even assuming that no long-run trade-off between inflation and unemployment exists, the presence of a short-run trade-off means that knowing the relative costs of these two variables is still valuable when it comes to setting interest rates. Woodford (2001) explains how the Taylor rule incorporates several features of an optimal monetary policy from the standpoint of an objective function that defines welfare in terms of inflation and the output gap.

[15] This regression, which includes both macroeconomic variables, as well as personal controls, is sometimes referred to as a "one-step estimation" method (see, for example, Di Tella, MacCulloch and Oswald, 2003). An alternative "two-step method" is also used in the next section (to test for the effect of a lagged dependent variable).

labelled the *"Best possible"* life. In addition to these survey data, *Inflation* is measured by the rate of change in the Consumer Price Index and *Unemployment* is the number of people without work but available for (and seeking) employment as a proportion of the total labor force.[16]

Our data set is comprised of repeated cross-sections of around 1,000 individuals living in 141 countries between 2005 and 2019, making up a full sample size of 1,489,290 individuals. The Appendix reports the names of these countries, as well as summary statistics. Although the Gallup World Poll has well-being data on 168 countries, this number reduces to 141 countries for which both unemployment and inflation rate data are also available.[17]

Whereas the "ladder-of-life" question has eleven response categories, the questions on daily experiences like sadness and enjoyment that we use in the next section have only two response categories. The World Poll survey mostly uses *"a simple dichotomous (yes or no) response to minimize contamination of data because of cultural differences in response styles and to facilitate cross-cultural comparisons"*.[18] We follow a similar methodology to Deaton and Kahnemann (2010) who also use these kinds of data (in their case, to determine how income affects well-being in the US). The coefficients on inflation and unemployment estimated by equation (2) provide a way to aggregate all of the costs and benefits of macro-economic fluctuations. In other words, the regression

[16] The macroeconomic data come from World Development Indicators (2021) which draws unemployment data from the International Labour Organization's ILOSTAT database. Meanwhile, their inflation data comes from the International Monetary Fund's International Financial Statistics and their GDP per capita data from the World Bank National Accounts, as well as OECD National Accounts.

[17] The 27 countries for which either unemployment or inflation data, or both, are unavailable are Gabon, Guinea, Guyana, Cuba, Lesotho, Maldives, Oman, Puerto Rico, Somalia, Eswatini, Gambia, Kazakhstan, Belize, Bosnia & Herzegoniva, Central African Republic, Comoros, Congo (Kinshasa), Djibouti, Palestinian Territories, Uzbekistan, Turkmenistan, Argentina, Taiwan, Somaliland, Northern Cyprus, Nagorno-Karabakh Region and South Sudan.

[18] See the Gallup Worldwide Research Methodology and Codebook at https://data-services.hosting.nyu.edu/wp-content/uploads/2017/10/World_Poll_Methodology_102717.pdf. A dichotomous dependent variable also avoids issues associated with using ordered probit regressions that are run on well-being response data with three or more categories (see Bond and Lang, 2019).

patterns map out a welfare function, unbeknown to the respondents completing their well-being survey score sheets.[19]

Table I presents simple Ordinary Least Squares results when the 11 point *Ladder of Life* scale is regressed on inflation and unemployment. Column (1) controls for country and year fixed effects. The coefficients on the unemployment and inflation rates are both negative and significant at the 1 percent level. In order to see the size of the effects, a 10 percentage point increase in the unemployment rate implies ticking down one's well-being score by 0.59 points on the 0 to 10 scale (=5.86*0.10).[20] Meanwhile, an increase in the inflation rate of 10 percentage points reduces one's well-being score by 0.11 points (=1.10*0.10). The size of the ratio of the effect of unemployment to inflation is 5.3 (=0.586/0.110).[21]

**<Insert Table I here>**

It could be argued that the above calculation underestimates the cost of unemployment since there are two unpleasant consequences of a rise in unemployment: some people lose their jobs while at the same time everyone in the economy becomes more fearful. Consequently, in column (2) a set of personal controls is added that includes one's employment status, gender, age, income

[19] To validate well-being data, researchers have established a connection between them and objectively measured variables that are associated with 'true utility'. For example, studies reveal that unemployed individuals report low levels of well-being, even after controlling for the income drop associated with job loss. This association is important since objective factors like addiction, depression and violence (that may negatively affect well-being) are often linked to unemployment. There is also a positive connection between well-being survey scores and (observed) good health outcomes (e.g., Stutzer and LaLive, 2004, Blanchflower and Oswald, 2008). Furthermore, well-being responses are correlated with left frontal brain activity, which is connected to positive emotional states.

[20] For cross-sectional evidence on the relation between the "ladder-of-life" and economic fluctuations, see Gandelman and Hernández-Murillo (2009).

[21] Svensson (2002) converts these estimates into a trade-off between the output gap and inflation using Okun's Law. He states *"a simple version of Okun's Law is that a change of the unemployment rate of one percentage point corresponds to a change of the output gap of 2 to 2.5 percentage points"*. Hence a one percentage point reduction in the output gap causes between 2.1 (=5.3/2.5) and 2.6 (=5.3/2) times as much of a reduction in well-being as an additional percentage point of inflation.

quintile, marital status, education level and number of children. Once these variables are included the sample size drops to 1,156,198 since this set of personal controls is not available for five countries (Mauritania, Sierra Leone, Haiti, Libya and Trinidad & Tobago) and only available from 2009 to 2019 for the rest of the sample. The effect of these background variables on one's *Ladder of Life* score is shown in the first column of Table B in the Appendix. A person who is unemployed, for example, reports a lower ladder-of-life score of 0.54 units (on the 0-10 scale).[22]

Using the coefficient on the unemployment rate in column (2) we can calculate that an increase in the unemployment rate of one percentage point has a cost in well-being units equal to 0.0646 for the average citizen (=6.46*0.01). This number may be viewed as capturing the "fear of unemployment" effect that occurs across all workers. Meanwhile, an individual who actually falls unemployed experiences a much larger personal cost, equal to 0.54 units. Consequently the overall well-being cost to society of a 1 percentage point increase in the unemployment rate is the sum of these two components, or 0.070 (=0.0646+0.01*0.54). The second component is the 0.54 unit cost to an individual of being unemployed multiplied by the 1 percent of the population who have been unlucky enough to actually lose their job. Taking both components into account, the ratio of the effect of unemployment to inflation rises to 6.2 (=0.070/(0.01*1.12)).

As a check on robustness, columns (3-4) estimate the same regressions but instead using ordered probit. They again find that high rates of both unemployment and inflation reduce the likelihood of feeling close to the *"best possible life"*, at the one per cent level of significance. The ratio of the

[22] By contrast, as one goes up the income quintiles there is a monotonically increasing effect. A rise from the bottom to top quintile increases the ladder-of-life by 1.1 units. See, for example, Di Tella *et al* (2003) who find that well-being regressions, where the explanatory variables are demographic characteristics, have similar structures across nations.

size of these effects is not significantly different to the ones previously calculated.[23]

III. b. Estimating a Social Welfare Function using Data on Day-to-Day Feelings

Whilst the "ladder-of-life" question refers to the judgments people make when they think about their overall life, psychologists often distinguish these evaluations from the day-to-day feelings that they encounter as they live it.[24] The latter refer to the emotional quality of an individual's everyday experience - such as the joy or sadness that make one's life either pleasant or unpleasant.[25] A natural question, given such a multiplicity of emotions, is whether measures appropriate for empirical analyses are available to produce more comprehensive tests. The World Poll, which was designed with the assistance of psychologists, does indeed collect data on this second aspect of well-being. Consequently, it allows us to investigate whether macro-economic fluctuations influence people's day-to-day feelings (in addition to their life evaluations).[26]

Specifically, we use two measures of both "negative affect" and "positive affect" to capture self-reported well-being under this shorter time horizon. With respect to negative affect, our first measure is the answer to the question, *"Did you experience the following feelings during a lot of the day yesterday? How about sadness?"*, and the second is the answer to *"Did you experience the following feelings during a lot of the day yesterday? How about physical pain?"* In each of these cases we define a

[23] A related measure of well-being is captured by the question: *"On the whole, are you satisfied with the life you lead?"* Most surveys provide four possible answers, such as *'not at all satisfied'*, *'not very satisfied'*, *'fairly satisfied'* and *'very satisfied'*. One study that used this question on European data is Blanchflower et al (2014) who find that a one percentage point rise in the unemployment rate lowers life satisfaction by five times as much as a one percentage point rise in the inflation rate. Their data come from the Euro-barometer Survey Series (see also Di Tella et al, 2001, 2003, Di Tella and MacCulloch, 2009, and Wolfers, 2003). By contrast, the World Values Survey, which asks the same life satisfaction question but for a larger sample of countries, uses ten categories of possible responses.

[24] Kahneman and Krueger (2006) argue that life evaluation measures are best viewed as *"a global retrospective judgment, which in most cases is constructed only when asked and is determined in part by the respondent's current mood and memory, and by the immediate context."* They recount the dime experiment of Schwarz (1987), whereby subjects "accidentally" find a dime before filling out a questionnaire. The lucky half of the sample reports higher levels of life satisfaction.

[25] See, for example, Hager and Ekman (1983).

[26] An alternative possibility is to measure the proportion of time people spend in different emotional states which allows us to construct an index at the episode level (see Kahneman and Krueger, 2006).

dichotomous dependent variable based on the either *"yes"* or *"no"* response of each individual.

Columns (1-2) of Table II present the "sadness" results. We run probit regressions and report marginal probabilities. Higher unemployment and inflation rates both increase the chances of feeling this negative emotion, at the 1 percent level of significance. In column (2) which controls for personal characteristics, as well as country and year effects, a rise in the unemployment rate of has 9.0 times as large an effect on sadness as the same increase in the inflation rate (=(0.65+ 0.099)/0.083). Meanwhile, columns (3-4) show how macroeconomic fluctuations affect the extent to which people experience "pain". The impacts of unemployment and inflation are again both positive and significant at the one percent level, across both specifications. The ratio of the size of the effects in column (4), taking into account both the personal costs of unemployment as well as the fear effect experienced by everyone, is equal to 13.0 (=(0.39+0.001)/0.030).

**<Insert Table II here>**

With respect to "positive affect" we also use two measures. The first is the answer to the question, *"Did you experience the following feelings during a lot of the day yesterday? How about enjoyment?"*, and the second to *"Now, please think about yesterday, from the morning until the end of the day. Think about where you were, what you were doing, who you were with, and how you felt … Did you smile or laugh a lot yesterday?"* Columns (1-2) of Table III present the "enjoyment" results. Higher unemployment and inflation rates both reduce the chances of experiencing this feeling, at the 1 percent level of significance, controlling for country and year effects, as well as personal characteristics. Using the coefficients in column (2), the relative size of the total effect to society of unemployment compared to inflation on enjoyment is equal to 5.0 times (=(0.35+0.065)/0.083).

**<Insert Table III here>**

Finally, columns (3-4) show how the unemployment and inflation rates affect the extent to which people *"smile or laugh a lot"*. Column (3) shows that both of these variables reduce this measure of well-being at the 1 percent level. In column (4) the ratio of the total effect of unemployment compared to the inflation is equal to 3.8 times (=(0.18+0.055 )/0.062).

III. c. Further Tests

*Lagged Dependent Variable*

In this section, we begin by including a lagged dependent variable in our regressions. Column (1) in Panel A of Table IV is our base-line regression using the full sample with a total of 1,068 country-by-year observations and includes both country and year fixed effects. The lagged dependent variable is positive and significant. Unemployment and inflation retain their negative effects on the ladder-of-life, both at the 1 percent level.

**<Insert Table IV here>**

Column (2) controls for personal characteristics by averaging the residuals for each country and year from first stage regressions of the form reported in Table B in the Appendix. These country-by-year unexplained well-being components then become the dependent variable in the "second-stage" regressions reported in Table IV. Once personal controls are included, the number of country-by-year observations equals 852. The regression finds that there is relatively little auto-regression, with a lagged dependent variable coefficient of 0.33, but that our well-being data

continue to be strongly correlated with macroeconomic variables. The ratio of the coefficient on unemployment to inflation is not significantly different from our previous estimates without the lagged dependent variable.[27] Columns (3-6) repeat the exercise for our set of negative feelings. Across all specifications higher unemployment and inflation both increase sadness, at the one per cent level, and the sizes of the ratios remain similar to before. Panel B completes the exercise for our set of positive feelings.

*Differences Depending on Country Characteristics*

Much variation exists across the countries in the Gallup World Poll in terms of their macro-economic characteristics. For example, inflation hit rates of over 50% in Belarus, Venezuela and South Sudan over the sample period. At the other extreme, Chad experienced deflation of 9% per annum. Consequently we check whether our macroeconomic variables have differing effects on well-being depending on whether the country is experiencing high or low inflation.

**<Insert Table V here>**

Panels A (and B) in Table V show the results for the high (and low) inflation countries in the sample, defined as those places with rates higher (and lower) than the mean inflation rate. The "high" sample has a mean inflation rate of 12% whereas the "low" sample has a mean rate of 2%. The most striking feature when comparing these panels is that inflation has a negative and significant adverse effect across every measure of well-being for the high inflation countries (i.e., it decreases the "ladder-of-life" in column (1), increases negative feelings like sadness and pain in columns (2-3) and lowers positive feelings like enjoyment and smiles in columns (4-5)) whereas it

[27] For use of this "two-step" methodology see, for example, Di Tella, MacCulloch and Oswald (2001).

has no significant effect across any of these measures for low-inflation countries. Furthermore, the difference between the size of the effects for the high and low inflation countries on the "ladder-of-life", for example, is significant at the 5 per cent level.

We also divided the sample according to the level of development. Our low (high) development sample is defined as those countries with GDP per capita below (above) the sample mean of $18,841 (as measured in constant 2010 US dollars). This time it is the effect of higher rates of unemployment that differ between the two sub-samples. Across every measure of well-being, unemployment has a significantly more adverse effect on well-being in low development, compared to the high development, countries (at the 5 per cent level for pain and smiles; 10 per cent level for 'ladder-of-life', sadness and enjoyment). A possible reason is that the welfare state, which mitigates against the effects of job-loss through, for example, unemployment insurance programs, tends to be more comprehensive in the wealthier countries.

Finally, we look at whether there are regional differences. These may arise due, for example, to differing institutions, macro-economic experiences or cultural factors. Panel A of Table VI focuses on South America and Panel B on Europe. The countries which make up these regions in the world are listed in the Appendix.

**<Insert Table VI here>**

Columns (1-5) of Panel A show that both unemployment and inflation adversely affect well-being in South America across every dimension, at the one per cent level of significance (with the only exception being unemployment on 'smile'). However, the results are less strong for Europe

where, for example, there are no detectable effects of either of these macro-economic variables on pain. Not only does unemployment cause more pain in South America than Europe, it does so also in Africa and Asia. The strongest consistent negative effects of inflation across each of our measures of well-being occurs in South America.

## IV. WELL-BEING DATA and CENTRAL BANKS: A DISCUSSION

One interpretation of the above results is that individuals find both inflation and unemployment costly. The bigger the adverse effect of unemployment, compared to inflation, across all of our measures of well-being, has implications for the optimal disinflationary path followed by a Central Bank. For example, if inflation is high and needs to be cut over the medium to long term, then a smaller increase in interest rates may be justified in order to minimize the well-being costs coming from a slow-down in the economy and rise in unemployment in the short-run.

However, without direct measurements of well-being, there is little to guide Central Banks as to the welfare costs of inflation and unemployment. Instead the implementation of monetary policy has traditionally relied on measuring actual and potential output in order to calculate the "output gap", as well as the actual and "non-accelerating inflation rate" of unemployment. Deciding how much to adjust interest rates to maximize welfare, subject to a short-run Phillip's curve trade-off between unemployment and inflation, has typically been left to the discretion of Central Bank officials.[28] Ambiguity over the costs of inflation and unemployment has led to strident debates regarding the wisdom of events like the "Volcker disinflation" in the US, during which inflation fell from a peak of 11% in early 1980 to 4% by the end of 1983. At the same time, however, a

[28] However some monetary economists have argued in favor of using transparent (Taylor) rules.

decline of employment and output on a scale not witnessed before in the post-World War II period also occurred, leading commentators to query whether the "*Volcker experiment"* was due to a *"new, greater weight on the Federal Reserve's objective of price stability vis-a-vis its objective of output growth and high employment"* (see Friedman, 2005).

Articles by monetary economists on whether the costs of such disinflations are justified mostly provide little guidance on the adverse mental health effects of unemployment compared to inflation. For example, while Goodfriend and King (2005) note how the output losses of Volcker's disinflation *"had great effect on the lives of many individuals during the period, as we recall from discussions with friends, relatives, and neighbors"*, these kinds of costs have typically not been formally quantified, at least at an aggregate level. By contrast, psychologists have long detailed the nature of distress suffered by the unemployed, which includes feelings of stress, anxiety and depression. These kinds of day-to-day emotional costs do not solely arise from the loss of income but appear to stem more from the sense of worth that a job gives to many people.[29] Regards the mental well-being effects of inflation, one survey shows that 86% of people report themselves as feeling angry when they see prices rise.[30] In Venezuela in 2015, worries about inflation became the number one concern in that country, ahead of violent crime, which was surging at the time.[31]

As reported in the previous section, unemployment and inflation have sizeable and significant adverse effects across all of our measures of day-to-day feelings, as well as on life evaluation. Although unemployment has a more negative effect than inflation, the size of the ratio varies substantially across the positive and negative affect variables. The reason may simply stem from

[29] See, for example, Achdut and Refaeli (2020) and Clark and Oswald (1994).
[30] See Shiller (1997).
[31] The survey was done by Caracus pollster, Datanalisis. See www.bbc.com/news/world-latin-america-32703081. In 2015 in Venezuela, inflation reached 181% per annum.

there being a multiplicity of different emotions relevant to human experience that are not all the same.[32] Moreover, positive and negative affect appear to be processed by different neural systems in which 'good' and 'bad' are independent dimensions (see Cacioppo, Gardner and Berntson, 1999). In this sense, there is no a-priori reason why variables like unemployment and inflation should have the same sized effects across our different measures.

Put another way, psychologists don't view there as being a single 'correct' measure of well-being but instead argue that there are many different dimensions which cannot necessarily be aggregated into a single summary measure. By contrast, economists tend to build their models in terms of a single dimension which they call "utility". Consequently, for a Central Bank that seeks to directly estimate well-being costs to help guide its monetary policy, whether there is one best measure that most closely captures economists' concept of utility is still open to much debate.[33]

Aside from monetary policy, the well-being effects of financial crises are also becoming of increasing concern for Central Banks, particularly due to their effects on unemployment and fear of job-loss.[34] For example, in the context of its review of the level of capital which is considered prudent for banks to hold, the Reserve Bank of New Zealand states *"banking crises can have large and long-lasting impacts on an economy, beyond the initial economic downturn that may have precipitated them. In addition to the cost of lost economic output, broader societal costs of crisis events include impacts on health, mental well-being and social cohesion"* (see RBNZ, 2019).

[32] Facial analysis is used by Hager and Ekman (1983) to code different emotions.
[33] For example, to the extent asset price bubbles arise from a fear of missing out, Central Banks that use life evaluation scores for policy purposes instead of more immediate feelings of 'regret' may be criticized by those who care about these phenomena. In addition, politicians who enact legislation emphasizing long-run well-being may lose office to ones who propose policies that give people positive experiences right now, at this point in time.
[34] Montagnoli and Moro (2018) find that financial crises lead to *"major, widespread and lasting psychological losses"*, above and beyond that which can be attributed to lower output.

Many public and private organizations are now measuring national well-being. One of the earliest examples is the government of Bhutan. Its' Gross National Happiness survey asks people to self-report the frequency of experience of eleven different negative and positive emotions. Amongst developed nations, France increased measurements of subjective well-being after release of the Stiglitz, Sen and Fitoussi (2009) report, with the French Statistical Institute introducing questions such as *"on a scale of 0 (not at all satisfied) to 10 (very satisfied), rate your satisfaction with your life at the present time"*. Meanwhile in the UK, questions relating to life satisfaction, happiness and anxiety gained 'National Statistics' status in 2014. Statistics Canada has fielded a satisfaction-with-life question in its annual General Social Surveys since 2002 and NZ started in 2008. The European Commission, via its Eurobarometer series which began in 1975, and the OECD, as part of its "better life index", also collect subjective well-being data. In the US, the National Opinion Research Centre at Chicago University has measured happiness with annual surveys since 1972.

## V. CONCLUSION

This paper shows that data on self-reports of individual well-being are negatively correlated with unemployment and inflation rates. Our contribution is to use two different types of survey questions that recent research has identified as capturing distinct aspects of subjective well-being. The first focusses on overall life evaluation, as measured by Cantril's "ladder-of-life" question. The second captures the emotional quality of an individual's (either pleasant or unpleasant) day-to-day experiences, such as joy or sadness. Whereas the former has a long time horizon, the latter's focus is more short-term. Both measures can be obtained from the Gallup World Poll. Our sample includes nearly 1.5 million people surveyed across 141 countries over 15 years.

In terms of the models traditionally adopted in the design of monetary policy, our estimates can be seen as a way of obtaining the weights in a social welfare function. Consequently, they can help Central Banks to understand the trade-offs that people are willing to accept in terms of unemployment for inflation. The evidence suggests that reasonable proxies for what economists call "utility" are significantly affected by aggregate-level economic fluctuations.

Our approach yields a different set of welfare weights on unemployment and inflation rates to those often used by economists who analyze monetary policy, which typically place much less weight on the costs of unemployment. The ratio of the effect of unemployment compared to inflation equals 6.2 when Cantril's "ladder-of-life" is used as a proxy for well-being, yet rises to between 9 and 13.0 for negative day-to-day feelings and falls to between 3.8 and 5.0 in the case of positive day-to-day feelings. In summary, we believe that there is a justification for Central Banks to focus more of their research efforts on collecting and analyzing these kinds of data. At the same time, governments also face a challenge in terms of better defining precisely what aspect of well-being they would like Central Banks to promote.

**Table I**

How the "Ladder-of-Life" Varies with Inflation and Unemployment:
141 Countries, 2005 to 2019.

| **Dependent variable** | (1) *Ladder of Life OLS* | (2) *Ladder of Life OLS* | (3) *Ladder of Life Ordered Probit* | (4) *Ladder of Life Ordered Probit* |
|---|---|---|---|---|
| *Unemployment rate* | -5.86*** | -6.46*** | -2.81*** | -3.14*** |
| | (0.61) | (0.72) | (0.29) | (0.37) |
| *Inflation rate* | -1.10*** | -1.12*** | -0.54*** | -0.56*** |
| | (0.16) | (0.16) | (0.08) | (0.08) |
| *Country Dummies* | Yes | Yes | Yes | Yes |
| *Year Dummies* | Yes | Yes | Yes | Yes |
| *Personal Characteristics* | No | Yes | No | Yes |
| No. of observations | 1,489,290 | 1,156,198 | 1,489,290 | 1,156,198 |
| Country-year clusters | 1,271 | 992 | 1,271 | 992 |
| $R^2$ | 0.19 | 0.25 | 0.05 | 0.06 |

**Notes**: [1] Standard errors in parentheses, with country level clustering. *** denotes significance at the 1 percent level, ** at 5 percent level and * at the 10 percent level. [2] Dependent variable is response to Gallup World Poll question, *"Please imagine a ladder/mountain with steps numbered from zero at the bottom to ten at the top. Suppose we say that the top of the ladder/mountain represents the best possible life for you and the bottom of the ladder/mountain represents the worst possible life for you. If the top step is ten and the bottom step is zero, on which step of the ladder/mountain do you feel you personally stand at the present time?"* (An 11 point scale ranging from 0 to 10 is shown to respondents). [3] In columns (2) and (4), the number of countries drops to 136 and the years range from 2009 to 2019 (upon inclusion of personal characteristics). [4] Cut points (standard errors) for regression (3) are -3.2 (0.1), -2.9 (0.1), -2.5 (0.1), -2.1 (0.1), -1.8 (0.1), -1.1 (0.1), -0.7 (0.1), -0.2 (0.1), 0.4 (0.1) and 0.8 (0.1) and for regression (4) are -3.1 (0.1), -2.7 (0.1), -2.4 (0.1), -2.0 (0.1), -1.6 (0.1), -0.9 (0.1), -0.5 (0.1), 0 (0.1), 0.6 (0.1) and 1.0 (0.1).

**Table II**

How Negative Experiences vary with Inflation and Unemployment:
141 Countries, 2005 to 2019.

| **Dependent variable** | (1)<br>*Sadness* | (2)<br>*Sadness* | (3)<br>*Pain* | (4)<br>*Pain* |
|---|---|---|---|---|
| *Unemployment rate* | 0.54*** | 0.65*** | 0.23*** | 0.39*** |
| | (0.08) | (0.08) | (0.09) | (0.10) |
| *Inflation rate* | 0.07*** | 0.08*** | 0.02** | 0.03*** |
| | (0.01) | (0.01) | (0.01) | (0.01) |
| *Country Dummies* | Yes | Yes | Yes | Yes |
| *Year Dummies* | Yes | Yes | Yes | Yes |
| *Personal Characteristics* | No | Yes | No | Yes |
| No. of observations | 1,438,268 | 1,114,634 | 1,442,982 | 1,117,824 |
| Country-year clusters | 1,264 | 987 | 1,264 | 987 |
| Pseudo $R^2$ | 0.03 | 0.06 | 0.02 | 0.07 |

**Notes**: [1] Probit regressions with marginal effects are reported. Standard errors in parentheses, with country level clustering. *** denotes significance at the 1 percent level, ** at 5 percent level and * at 10 percent level. [2] Dependent variable in columns (1-2) is individual response to Gallup World Poll question, *"Did you experience the following feelings during a lot of the day yesterday? How about sadness?"* We define *Sadness* to equal 1 if the response is *"yes"* and 0 if it is *"no"*. Dependent variable in columns (3-4) is the individual response to the question, *"Did you experience the following feelings during a lot of the day yesterday? How about physical pain?"* We define *Pain* to equal 1 if the response is *"yes"* and 0 if it is *"no"*. [3] In columns (2) and (4), the number of countries drops to 136 and the years range from 2009 to 2019 (upon inclusion of personal characteristics).

**Table III**

How Positive Experiences vary with Inflation and Unemployment:
141 Countries, 2005 to 2019.

| **Dependent variable** | (1)<br>*Enjoyment* | (2)<br>*Enjoyment* | (3)<br>*Smile* | (4)<br>*Smile* |
|---|---|---|---|---|
| *Unemployment rate* | -0.31*** | -0.35*** | -0.29*** | -0.18 |
| | (0.07) | (0.10) | (0.10) | (0.12) |
| *Inflation rate* | -0.09*** | -0.08*** | -0.08*** | -0.06*** |
| | (0.01) | (0.01) | (0.02) | (0.02) |
| *Country Dummies* | Yes | Yes | Yes | Yes |
| *Year Dummies* | Yes | Yes | Yes | Yes |
| *Personal Characteristics* | No | Yes | No | Yes |
| No. of observations | 1,438,226 | 1,114,509 | 1,413,789 | 1,096,404 |
| Country-year clusters | 1,267 | 989 | 1,267 | 989 |
| Pseudo $R^2$ | 0.05 | 0.07 | 0.05 | 0.07 |

**Notes**: [1] Probit regressions with marginal effects are reported. Standard errors in parentheses, with country level clustering. *** denotes significance at the 1 percent level, ** at 5 percent level and * at 10 percent level. [2] Dependent variable in columns (1-2) is the individual response to the Gallup World Poll question, *"Did you experience the following feelings during a lot of the day yesterday? How about enjoyment?"* We define *Enjoyment* to equal 1 if the response is *"yes"* and 0 if it is *"no"*. Dependent variable in columns (3-4) is the individual response to the question, *"Now, please think about yesterday, from the morning until the end of the day. Think about where you were, what you were doing, who you were with, and how you felt … Did you smile or laugh a lot yesterday?"* We define *Smile* to equal 1 if the response is *"yes"* and 0 if it is *"no"*. [3] In columns (2) and (4), the number of countries drops to 136 and the years range from 2009 to 2019 (upon inclusion of personal characteristics).

**Table IV**
**Panel A: Further Tests**

How Ladder-of-Life, as well as Negative Experiences, vary with Inflation and Unemployment: Second Stage Regressions using the "two-step method", 141 Countries, 2005 to 2019.

| **Dependent variable** | (1) *Ladder of Life* | (2) *Ladder of Life* | (3) *Sadness* | (4) *Sadness* | (5) *Pain* | (6) *Pain* |
|---|---|---|---|---|---|---|
| *Lagged dependent variable* | 0.36*** | 0.33*** | 0.37*** | 0.32*** | 0.34*** | 0.27*** |
| | (0.04) | (0.05) | (0.04) | (0.05) | (0.04) | (0.05) |
| *Unemployment rate* | -3.77*** | -4.12*** | 0.43*** | 0.50*** | 0.24*** | 0.29*** |
| | (0.52) | (0.58) | (0.07) | (0.08) | (0.07) | (0.08) |
| *Inflation rate* | -0.91*** | -0.95*** | 0.08*** | 0.09*** | 0.03*** | 0.04*** |
| | (0.14) | (0.14) | (0.01) | (0.01) | (0.01) | (0.01) |
| *Country Dummies* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Year Dummies* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Personal Characteristics* | No | Yes | No | Yes | No | Yes |
| No. of observations | 1,068 | 852 | 1,061 | 845 | 1,060 | 845 |
| $R^2$ | 0.38 | 0.38 | 0.40 | 0.40 | 0.30 | 0.30 |

**Panel B: Further Tests**

How Positive Experiences vary with Inflation and Unemployment:
Second Stage Regressions using the "two-step method", 141 Countries, 2005 to 2019.

| **Dependent variable** | (7) *Enjoyment* | (8) *Enjoyment* | (9) *Smile* | (10) *Smile* |
|---|---|---|---|---|
| *Lagged dependent variable* | 0.29*** | 0.27*** | 0.43*** | 0.39*** |
| | (0.04) | (0.05) | (0.04) | (0.05) |
| *Unemployment rate* | -0.28*** | -0.25*** | -0.17** | -0.04 |
| | (0.06) | (0.08) | (0.08) | (0.07) |
| *Inflation rate* | -0.08*** | -0.08*** | -0.05*** | -0.04*** |
| | (0.01) | (0.01) | (0.01) | (0.01) |
| *Country Dummies* | Yes | Yes | Yes | Yes |
| *Year Dummies* | Yes | Yes | Yes | Yes |
| *Personal Characteristics* | No | Yes | No | Yes |
| No. of observations | 1,065 | 848 | 1,061 | 843 |
| $R^2$ | 0.23 | 0.21 | 0.30 | 0.27 |

**Notes**: [1] Ordinary Least Squares Regressions are reported with standard errors in parentheses. *** denotes significance at the 1 percent level, ** at 5 percent level and * at 10 percent level. [2] The dependent variables in columns (2), (4), (6), (8) and (10) are the residuals from "first stage regressions" which control for personal characteristics of the kind reported in Table B in the Appendix. The dependent variables, *Ladder of Life*, *Sadness*, *Pain*, *Enjoyment* and *Smile* are also defined in the Appendix.

**Table V**
**Panel A: Further Tests**

How Ladder-of-Life, as well as Negative and Positive Experiences, vary with Inflation and Unemployment: High Inflation Countries, 2005 to 2019.

| **Dependent variable** | (1) *Ladder of Life* | (2) *Sadness* | (3) *Pain* | (4) *Enjoyment* | (5) *Smile* |
|---|---|---|---|---|---|
| *Unemployment rate* | -5.10*** | 0.60*** | 0.45*** | -0.71*** | -0.51** |
| | (1.59) | (0.19) | (0.14) | (0.16) | (0.24) |
| *Inflation rate* | -1.17*** | 0.09*** | 0.03*** | -0.10*** | -0.06*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.02) |
| *Country Dummies* | Yes | Yes | Yes | Yes | Yes |
| *Year Dummies* | Yes | Yes | Yes | Yes | Yes |
| *Personal Characteristics* | Yes | Yes | Yes | Yes | Yes |
| No. of observations | 284,456 | 282,495 | 283,352 | 282,927 | 275,000 |
| Country-year clusters | 236 | 238 | 238 | 238 | 238 |
| $R^2$ | 0.18 | 0.06 | 0.08 | 0.07 | 0.08 |

**Panel B: Further Tests**

How Ladder-of-Life, as well as Negative and Positive Experiences, vary with Inflation and Unemployment: Low Inflation Countries, 2005 to 2019.

| **Dependent variable** | (1) *Ladder of Life* | (2) *Sadness* | (3) *Pain* | (4) *Enjoyment* | (5) *Smile* |
|---|---|---|---|---|---|
| *Unemployment rate* | -5.65*** | 0.61*** | 0.30** | -0.15* | -0.05 |
| | (0.84) | (0.11) | (0.14) | (0.09) | (0.13) |
| *Inflation rate* | 1.99 | -0.05 | 0.003 | -0.02 | 0.04 |
| | (1.27) | (0.17) | (0.15) | (0.18) | (0.17) |
| *Country Dummies* | Yes | Yes | Yes | Yes | Yes |
| *Year Dummies* | Yes | Yes | Yes | Yes | Yes |
| *Personal Characteristics* | Yes | Yes | Yes | Yes | Yes |
| No. of observations | 871,742 | 832,139 | 834,472 | 831,582 | 821,404 |
| Country-year clusters | 756 | 749 | 749 | 751 | 751 |
| $R^2$ | 0.25 | 0.06 | 0.07 | 0.04 | 0.06 |

**Notes**: [1] The regression results are Ordinary Least Squares in column (1) of Panels A and B. Columns (2-5) are probit regressions with marginal effects reported. Standard errors are in parentheses, with country level clustering. [2] *** denotes significance at the 1 percent level, ** at 5 percent level and * at 10 percent level. [2] The dependent variables, *Ladder of Life*, *Sadness*, *Pain*, *Enjoyment* and *Smile* are defined in the Appendix. High inflation countries are defined as those with inflation rates above the sample mean and low inflation countries as those with inflation rates below the mean (where average inflation=0.05).

**Table VI**
**Panel A: Further Tests**

How the Ladder-of-Life, as well as Negative and Positive Experiences, vary with Inflation and Unemployment: South America, 2005 to 2019.

| **Dependent variable** | (1) *Ladder of Life* | (2) *Sadness* | (3) *Pain* | (4) *Enjoyment* | (5) *Smile* |
|---|---|---|---|---|---|
| *Unemployment rate* | -8.29*** | 0.45*** | 0.51*** | -0.85*** | -0.29 |
| | (3.24) | (0.18) | (0.19) | (0.35) | (0.24) |
| *Inflation rate* | -1.30*** | 0.10*** | 0.03*** | -0.08*** | -0.03*** |
| | (0.05) | (0.004) | (0.01) | (0.01) | (0.005) |
| *Country Dummies* | Yes | Yes | Yes | Yes | Yes |
| *Year Dummies* | Yes | Yes | Yes | Yes | Yes |
| *Personal Characteristics* | Yes | Yes | Yes | Yes | Yes |
| No. of observations | 171,299 | 172,775 | 173,074 | 172,078 | 172,224 |
| Country-year clusters | 174 | 174 | 174 | 174 | 174 |
| Pseudo $R^2$ | 0.11 | 0.06 | 0.04 | 0.03 | 0.03 |

**Panel B: Further Tests**

How the Ladder-of-Life, as well as Negative and Positive Experiences, vary with Inflation and Unemployment: Europe, 2005 to 2019.

| **Dependent variable** | (1) *Ladder of Life* | (2) *Sadness* | (3) *Pain* | (4) *Enjoyment* | (5) *Smile* |
|---|---|---|---|---|---|
| *Unemployment rate* | -6.55*** | 0.46*** | 0.08 | -0.16** | -0.17 |
| | (0.89) | (0.07) | (0.09) | (0.08) | (0.13) |
| *Inflation rate* | -0.74* | 0.07*** | 0.04 | -0.03 | -0.08** |
| | (0.39) | (0.03) | (0.05) | (0.03) | (0.04) |
| *Country Dummies* | Yes | Yes | Yes | Yes | Yes |
| *Year Dummies* | Yes | Yes | Yes | Yes | Yes |
| *Personal Characteristics* | Yes | Yes | Yes | Yes | Yes |
| No. of observations | 468,641 | 448,455 | 450,111 | 444,032 | 440,601 |
| Country-year clusters | 406 | 406 | 406 | 406 | 406 |
| Pseudo $R^2$ | 0.27 | 0.06 | 0.07 | 0.07 | 0.07 |

**Notes**: [1] The regression results are Ordinary Least Squares in column (1) of Panels A and B. Columns (2-5) are probit regressions with marginal effects reported. Standard errors in parentheses, with country level clustering. [2] *** denotes significance at the 1 percent level, ** at 5 percent level and * at 10 percent level. [2] The dependent variables, *Ladder of Life*, *Sadness*, *Pain*, *Enjoyment* and *Smile* are defined in the Appendix.

## Appendix

### Gallup's World Poll Methodology Overview

Gallup's World Poll continually surveys residents in 168 nations, representing more than 99% of the world's adult population, using randomly selected, nationally representative samples. Gallup typically surveys 1,000 individuals in each country, using a standard set of core questions that has been translated into the major languages of the respective country. In some regions, supplemental questions are asked in addition to core questions. Face-to-face interviews are approximately 1 hour, while telephone interviews are about 30 minutes. With some exceptions, all samples are probability based and nationally representative of the resident population aged 15 and older. The coverage area is the whole country including rural areas and the sampling frame represents the entire civilian, non-institutionalized, aged 15 and older population. Most items have a simple dichotomous (yes/no) answer to minimize contamination of data due to cultural differences in response styles and to facilitate cross-cultural comparisons.

### Our Sample of 141 Nations (for which data on all of our variables of interest are available)

*Africa:* Egypt, Morocco, Nigeria, Kenya, Tanzania, Ghana, Uganda, Benin, Madagascar, Malawi, South Africa, Angola, Botswana, Ethiopia, Mali, Mauritania, Mozambique, Niger, Rwanda, Senegal, Zambia, Burkina Faso, Cameroon, Sierra Leone, Zimbabwe, Algeria, Burundi, Chad, Congo Brazzaville, Ivory Coast, Liberia, Libya, Mauritius, Namibia, Sudan, Togo, Tunisia; *Pacific*: Australia, New Zealand; *Europe*: United Kingdom, France, Germany, Netherlands, Belgium, Spain, Italy, Poland, Hungary, Czech Republic, Romania, Sweden, Greece, Denmark, Belarus, Georgia, Moldova, Russia, Ukraine, Albania, Austria, Bulgaria, Croatia, Cyprus, Estonia, Finland, Iceland, Ireland, Latvia, Lithuania, Luxembourg, North Macedonia, Malta, Montenegro, Norway, Portugal, Serbia, Slovakia, Slovenia, Switzerland, Kosovo; *Asia*: Lebanon, Saudi Arabia, Jordan, Syria, Turkey, Pakistan, Indonesia, Bangladesh, Iran, Hong Kong, Singapore, Japan, China, India, Israel, Philippines, Sri Lanka, Vietnam, Thailand, Cambodia, Laos, Myanmar, South Korea, Afghanistan, Kyrgyzstan, Armenia, Azerbaijan, Bahrain, Bhutan, Iraq, Kuwait, Malaysia, Mongolia, Nepal, Qatar, Tajikistan, United Arab Emirates, Yemen; *South America*: Venezuela, Brazil, Mexico, Costa Rica, Bolivia, Chile, Colombia, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad & Tobago, Uruguay; *North America*: United States, Canada.

### Variable Definitions

*Ladder of Life*: The individual response to the Gallup World Poll question: *"Please imagine a ladder/mountain with steps numbered from zero at the bottom to ten at the top. Suppose we say that the top of the ladder/mountain represents the best possible life for you and the bottom of the ladder/mountain represents the worst possible life for you. If the top step is ten and the bottom step is zero, on which step of the ladder/mountain do you feel you personally stand at the present time?"* An 11 point scale ranging from 0 to 10 is shown to respondents.

*Sadness*: Individual response to World Poll question, *"Did you experience the following feelings during a lot of the day yesterday? How about sadness?"* The variable, *Sadness*, equals 1 if response is *"yes"* and 0 if it is *"no"*.

*Pain*: Individual response to World Poll question, *"Did you experience the following feelings during a lot of the day yesterday? How about physical pain?"* The variable, *Pain*, equals 1 if response is *"yes"* and 0 if it is *"no"*.

*Enjoyment*: Individual response to the World Poll question, *"Did you experience the following feelings during a lot of the day yesterday? How about enjoyment?"* The variable, *Enjoyment*, equals 1 if response is *"yes"* and 0 if it is *"no"*.

*Smile*: Individual response to the World Poll question, *"Now, please think about yesterday, from the morning until the end of the day. Think about where you were, what you were doing, who you were with, and how you felt … Did you smile or laugh a lot yesterday?"* The variable, *Smile*, equals 1 if response is *"yes"* and 0 if it is *"no"*.

**Table A**

Summary Statistics: Gallup World Poll, 141 Countries, 2005 to 2019.

| **Dependent variable** | *Number of Observations* | *Mean* | *Standard deviation* | *Minimum* | *Maximum* |
|---|---|---|---|---|---|
| *Ladder of Life* | 1,489,290 | 5.78 | 2.28 | 0 | 10 |
| *Sadness* | 1,438,268 | 0.22 | 0.42 | 0 | 1 |
| *Pain* | 1,442,982 | 0.29 | 0.45 | 0 | 1 |
| *Enjoyment* | 1,438,226 | 0.72 | 0.45 | 0 | 1 |
| *Smile or Laugh* | 1,413,789 | 0.73 | 0.45 | 0 | 1 |
| *Unemployment rate* | 1,271 | 0.08 | 0.06 | 0.001 | 0.48 |
| *Inflation rate* | 1,271 | 0.05 | 0.09 | -0.05 | 2.55 |

**Table B**

How Life Evaluation, Positive and Negative Feelings vary with Personal Characteristics: 136 Countries, 2009 to 2019.

| **Dependent variable** | (1) *Ladder of Life* | (2) *Sadness* | (3) *Pain* | (4) *Enjoyment* | (5) *Smile* |
|---|---|---|---|---|---|
| *Unemployed* | -0.538*** | 0.099*** | 0.001 | -0.065*** | -0.055*** |
| | (0.025) | (0.004) | (0.003) | (0.004) | (0.004) |
| *Age* | -0.010*** | 0.002*** | 0.005*** | -0.002*** | -0.003*** |
| | (0.001) | (1.2e-4) | (2.0e-4) | (1.8e-4) | (1.8e-4) |
| *Male* | -0.172*** | -0.046*** | -0.045*** | -0.004 | -0.024*** |
| | (0.016) | (0.003) | (0.003) | (0.003) | (0.003) |
| *Income Quintile* | | | | | |
| *Second* | 0.291*** | -0.036*** | -0.026*** | 0.033*** | 0.026*** |
| | (0.018) | (0.002) | (0.004) | (0.003) | (0.002) |
| *Third* | 0.516*** | -0.056*** | -0.047*** | 0.056*** | 0.042*** |
| | (0.022) | (0.002) | (0.005) | (0.003) | (0.003) |
| *Fourth* | 0.739*** | -0.077*** | -0.067*** | 0.077*** | 0.059*** |
| | (0.026) | (0.003) | (0.005) | (0.003) | (0.003) |
| *Fifth* | 1.088*** | -0.099*** | -0.096*** | 0.106*** | 0.084*** |
| | (0.034) | (0.003) | (0.005) | (0.004) | (0.003) |
| *Marital Status* | | | | | |
| *Married* | 0.002 | -0.014*** | 0.005 | -9.2e-5 | -0.004 |
| | (0.023) | (0.003) | (0.003) | (0.004) | (0.004) |
| *Divorced* | -0.447*** | 0.062*** | 0.033*** | -0.066*** | -0.058*** |
| | (0.024) | (0.003) | (0.004) | (0.004) | (0.004) |
| *Widowed* | -0.295*** | 0.078*** | 0.057*** | -0.051*** | -0.056*** |
| | (0.025) | (0.004) | (0.005) | (0.004) | (0.006) |
| *Education level* | | | | | |
| *Secondary* | 0.351*** | -0.035*** | -0.047*** | 0.033*** | 0.017*** |
| | (0.021) | (0.003) | (0.003) | (0.003) | (0.004) |
| *Tertiary* | 0.651*** | -0.049*** | -0.089*** | 0.056*** | 0.026*** |
| | (0.025) | (0.003) | (0.004) | (0.004) | (0.004) |
| *Number of children* | | | | | |
| *One* | 0.137*** | -0.015*** | -0.015*** | 0.019*** | 0.018*** |
| | (0.012) | (0.002) | (0.002) | (0.002) | (0.002) |
| *Two* | 0.180*** | -0.021*** | -0.021*** | 0.023*** | 0.019*** |
| | (0.013) | (0.002) | (0.002) | (0.003) | (0.003) |
| *Three or more* | 0.189*** | -0.015*** | -0.017*** | 0.025*** | 0.019*** |
| | (0.019) | (0.003) | (0.003) | (0.004) | (0.003) |
| *Country Dummies* | Yes | Yes | Yes | Yes | Yes |
| *Year Dummies* | Yes | Yes | Yes | Yes | Yes |
| No. of observations | 1,156,198 | 1,114,634 | 1,117,824 | 1,114,509 | 1,096,404 |
| Country-year clusters | 992 | 987 | 987 | 989 | 989 |
| R-squared | 0.24 | 0.06 | 0.07 | 0.07 | 0.07 |

**Notes:** [1] Column (1) is an Ordinary Least Squares Regression with standard errors in parentheses. Columns (2-5) are probit regressions with marginal probabilities reported. *** denotes significance at the 1 percent level, ** at 5 percent level and * at 10 percent level. [2] The dependent variables, *Ladder of Life*, *Sadness*, *Pain*, *Enjoyment* and *Smile* are defined in the Appendix.

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