The Response of Happiness to Election Outcomes: Testing Dynamic Theories of Expectations-Dependent Happiness

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May 20, 2014

Abstract

We look at the dynamic response of happiness to outcomes of the 2008 and 2012 U.S. Presidential elections. We use our data to test dynamic theories of happiness. We find that consistent with expectations-dependent models where happiness reflects innovations in lifetime utility levels that the direction of political preference (Democratic or Republican), the strength of political preferences, and prior expectations about the election outcomes determine the size of the change in happiness from before the election to after the election. Moreover, a structural estimation finds that the only the interaction of these three variables affect the size of the change, again consistent with expectations-dependent models. We also find that individuals hedonically adapt quickly to changes. Finally we find no support that changes in happiness mirror either absolute levels of utility nor changes in utility level from a status-quo.

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1 Introduction

A recent, but growing, literature in economics has tried to examine how happiness can relate to traditional economic concepts of utility and choice. However, understanding the linkage between happiness and utility can be difficult. Thus, several theories have been proposed to try to link happiness and utility over outcomes.

Models such as Kimball and Willis (XXXX) have built on notions of reference dependence to develop a model of happiness to capture the fact that happiness seems to be related to hedonically adapted changed in total lifetime utility and is mean reverting. Kimball and Willis relate happiness to utility in two ways. First, happiness is an input into the utility function. Second, happiness is a function of innovations in lifetime utility. Numerous other papers (XXXX) have examined the first aspect of the theory. We are primarily concerned with the second. There is a large amount of evidence relating happiness to small innovations in lifetime utility in experimental settings. Moreover, Kimball and Silverman (XXXX) look at innovations to lifetime utility and happiness in the context of negative shocks spousal death. Our goal is test whether innovations in lifetime utility are related to measures of happiness in the field where innovations can be both positive or negative election outcomes.

In our setting the model of Kimball and Willis (XXXX) can equivalent predictions to models of expectations-dependent reference dependence, such as Koszegi and Rabin (2007, 2009). In particular, if we assume happiness measures the elation or disappointment experienced by an agent, where the comparisons are expected present discounted lifetime utility to realized discounted utility, then our data also allows us to test these models as well. There have been several recent papers, e.g. Card and Dahl (XXXX) which link expectations and realized outcomes of lifetime utility innovations to measures which are proxies for emotions, e.g. spousal abuse. However, these papers are not able to directly measure the emotional reaction to events which serves as the mediating mechanism. In contrast, we directly measure the emotional reaction of individuals to events. Moreover, these papers typically can only measure the comparative effect of a positive outcome relative to a negative outcomes, and rather than the absolute effect of each type of outcome. With our data we can measure both disappointment and elation separately.

In Section 2 we sketch out the formal model of happiness we intend to test. In the Kimball-Willis framework, happiness is equal to baseline mood (which varies by individual) as well as hedonically adapted news utility. News utility is the changes between yesterdays expectation of todays lifetime utility (started at today) and todays expectation of total

lifetime utility. Hedonic adaptation implies that individuals gradually adjust to changes in their utility level, so that happiness changes immediately upon the the realization of news utility and then slowly adjusts back to baseline level.

We test the predictions of the Kimball-Willis model using field data, described in detail in Section 3. We use panel data around the 2008 and 2012 U.S presidential elections. We ask individuals their preferences for different political outcomes and also their beliefs about how likely those outcomes are to occur. We also ask for subjects happiness levels both before and after the election.

In Section 4 we report our results. We find evidence for the fact that prior beliefs and strength of preference matter for changes in happiness, just as predicted by the Kimball-Willis model (or other models of endogenous reference formation supplemented with our definition of happiness). We also find evidence for hedonic adaptation subjects change in happiness grows smaller after the election. We then proceed to estimate a structural model. We show that expectations and preferences are related to changes in happiness exactly as predicted by the Kimball-Willis model (or reference-dependent models in the vein of Koszegi and Rabin). We also show that other factors do not affect happiness, also as predicted by the Kimball-Willis model. Section 5 concludes.

Our approach also allows us insights into additional issues related to happiness and election. We can ask if unhappy people drive election outcomes. We can also ask about the monetary value of changing of election outcomes. We can also try to understand whether the elicited beliefs are true in the sense that they are related to the changes in happiness.

2 Model

In order to motivate our study of happiness and how individual's emotions react to electoral outcomes, we develop a simplified model Kimball and Willis (XXXX). We have a finite number of individuals indexed by i. Time $t = -\infty, 0, 1, \infty$ is discrete. In any given period individual i receives flow utility $u_{i,t}$ from consumption, and they discount the future exponentially at rate β. Individuals have a filtration $F_{i,t}$ over possible sequences of flow utilities. Denote the current period as τ. Given any particular sequence of flow utilities $\hat{u}_i = \{u_{i,t}\}_{t=\tau}^{\infty}$ an individual has a present discounted lifetime utility of $V_{i,\tau}(\hat{u}) = \sum_{t=\tau}^{\infty} \beta_i^{t-\tau} u_{i,t}$. Since $F_{i,\tau}$ denotes the beliefs of i over expected future sequences $\hat{u}_i$ then at $t = \tau$, an individual's expected present discounted lifetime utility is $E_{i,F_\tau}[V_{i,\tau}]$. Individuals know their consumption in any given period so that at time τ $u_{i,\tau}$ is known.

Moreover, we denote $H_{i,t}$ as the happiness of i at time t. Happiness is a function of baseline mood B_i, a rate of hedonic adaptation, δ_i, and a mapping function e from changes in expected presented discounted lifetime utility to the reals. More specifically, happiness at time t is:

$$H_{i,\tau} = B_i + \sum_{t=-\infty}^{\tau} \delta^{\tau-t} e(E_{i,F_{t-1}}[V_{i,t}] - E_{i,F_t}[V_{i,t}]).$$

Thus, current happiness is the sum of baseline mood and the discounted sum of a function of the difference in expected present discounted lifetime utilities. We can rewrite the previous equation as;

$$H_{i,\tau} = B_i + \delta(H_{i,\tau-1} - B) + e(E_{i,F_{t-1}}[V_{i,t}] - E_{i,F_t}[V_{i,t}])$$

In this representation happiness at any given time is the sum of baseline happinesss, the discounted difference between yesterday's happiness and baseline mood, and a function of the difference between yesterday's expectation of today's discounted lifetime utility and today's expectation of today's discounted lifetime utility.

We make some mild assumption on e. First it seems natural happiness is continuous and increasing in the change in expectated discounted lifetime utility.

Ae1: $e(x)$ is continuous and strictly increasing in x.

We will also typically make the assumption that e exhibits a 'kink' at 0.

Ae2: $e(x)$ is differentiable everywhere except $x = 0$.

Last, we assume that e experiences disappointment more strongly than elation.

Ae3: $0 < \lim_{x\to 0^+} e'(x) < \lim_{x\to 0^-} e'(x)$

Ae4: $-e(-x) > e(x)$ for all x.

In this model, happiness is only an index of changes in expected discounted lifetime utility. A simple extension, which is in line both with Kimball and Willis (XXX), as well as a large literature on endogenous reference dependence and loss aversion (e.g. Kőszegi and Rabin (2006, 2007, 2009), Gul (1991), Bell (1985), Loomes and Sugden (1985)), would in turn make lifetime expected utility depend on happiness. First, we redefine per period flow utility, allowing it to depend both on utility of goods consumed $u_{i,t}$ but also on happiness. Define this composite flow utility as $\mu_{i,t} = u_{i,t} + H_{i,t}$. Everything else is as defined above, including the assumptions on e. Because baseline mood shifts per period utility by a constant it will

not effect behavior. However, now an individual experiences changes in flow utility due to changes in expected lifetime utility. Because expected lifetime utility is defined recursively, our formulation is very similar to a dynamic extension of Gul (1991), but has a similar flavor to the dynamic model of Kőszegi and Rabin (2009). Our primary difference is that gain-loss utility is experienced not only in the period that beliefs change, but also in a (discounted) form in future periods as well.

In our second formulation happiness can now serve as a measurement of experienced gain-loss utility. Complicating matters is that in any given period happiness reflects not just gains and losses experienced due to changes in beliefs this period, but also previous periods and baseline mood.

Extending our analysis even further, we can reinterpret the meaning of the discounted sum of the elation function $\sum_{t=-\infty}^{\tau} \delta^{\tau-t} e(E_{i,F_{t-1}}[V_{i,t}] - E_{i,F_t}[V_{i,t}])$. An equivalent model (in terms of predictions for our data) could) would be if individual's happiness in period t depended only on baseline mood and changes in beliefs in any given period $e(E_{i,F_{t-1}}[V_{i,t}] - E_{i,F_t}[V_{i,t}])$, but individual's expectations were slow-moving — they did not fully respond to information all at once, but rather upon the reception of news, beliefs converged in an to those consistent with the new information. We focus on the instant-adjustment equilibrium interpretation as a baseline.

Our interest in studying the reaction of happiness to news about an event which affects individuals' expected present discounted lifetime utilities. Other papers have looked at these effects. For example, Card and Dahl look at outcomes associated with emotions — spousal abuse. Our contribution is to consider a single event that effects many individuals all at once, over which people's beliefs and payoffs will differ — national elections. We look at election outcomes in the 2008 and 2012 national elections.

We denote the election as happening at time $t = 0$, and the results are announced also at time $t = 0$. In order to simplify our analysis we will assume that individuals have uncertainty about only one object – the winner of the election. There is no uncertainty about flow utility before the election and, conditional on a particular winner, there is no uncertainty about flow utility after the election.

We focus on U.S. national elections, where there are two viable candidates. Candidate D (the Democratic candidate, Barack Obama in both cases) or candidate R (the Republican candidate and so either John McCain or Mitt Romney). Thus the total flow utility starting at $t = 0$ takes on one of two values, $V_{D,i}$ or $V_{R,i}$. We denote the probability at time $t = -1$ of candidate D winning (at $t = 0$) as p_i. At $t = -1$, individual i's expected present discounted

lifetime utility starting at $t = 0$ is $\beta_i(p_i V_D + (1 - p_i)V_R)$. Because ex-post, candidate D won, the change in lifetime utility at time 0 is $V_D - p_i V_D + (1 - p_i)V_R$, or in other words, $(1 - p_i)(V_D - V_R)$. Thus the direction of change is governed by the extent of partisanship of i and the size is governed both by the partisanship and the size of $(1 - p_i)$.

In our survey data we attempt to elicit measures of the parameters of our model. We elicit various measures of 'partisanship', which we will define in the following section. Moreover, we elicit measures of individuals probability of candidates winning.

Ad1: $V_{D,i} - V_{R,i}$ is positive if and only if i supports the Democratic candidate.

Ad2: More partisan individuals have stronger preferences: $|V_{D,i} - V_{R,i}|$ is increasing in the partisanship of i.

Ad3: Individuals only apply positive weight to either the Democratic candidate winning or the Republican candidate winning.

We can leverage our simple model (plus our assumptions linking our parameters to the data) to make testable predictions of the model. We first present four static predictions of the model, relating happiness at $t = 0$ to preferences and beliefs.

Hypothesis 1: Obama supporters should exhibit a gain in happiness at time $t = 0$, while Republican supporters should exhibit a decline.

Proof: $H_0 = (1 - p_i)(V_D - V_R)$. This is positive if and only if $V_D \geq V_R$. □

Hypothesis 2: Conditional on beliefs, individuals with stronger preferences about who will win should exhibit greater changes in happiness.

Proof: $|H_0| = |(1 - p_i)(V_D - V_R)|$ is increasing in $|(V_D - V_R)|$, or the partisanship of i. □

Hypothesis 3: Conditional on preferences, individuals who are less certain that Obama will win should exhibit greater changes in happiness.

Proof: $|H_0| = |(1 - p_i)(V_D - V_R)|$ is increasing in $(1 - p_i)$. □

Hypothesis 4: Conditional on beliefs and preferences losses have a stronger (in absolute value) effect on happiness than gains.

Proof: This is by A0. □

Our model also allows us to make a simple dynamic prediction, relating changes in happiness to time since the election.

Hypothesis 4: Individuals' changes in happiness due to the election should revert to baseline over time as long as there are no additional shocks.

Proof: Assume that $E_{i-1}(V_i) = E_i V_i$ for all $i \neq \tau$, but $E_{\tau-1}(V_\tau) \neq E_\tau V_\tau$. Then

$$\lim_{t\to\infty} H_t = B + \sum_{i=-\infty}^{t} \delta^{t-i}\mu(E_{i-1}(V_i) - E_i V_i) = B$$

□

Finally, our model specifies that it is only beliefs and preferences that matter for determining happiness.

Hypothesis 6: The interaction of beliefs and preferences, along with the hedonic adaptation parameter, is the sole determinant of changes in happiness.

Proof: By construction. □

2.1 Alternative Models

Our model has been framed entirely in terms of happiness reflecting changes in expected utility. However, some authors have posited alternative formulations of how happiness is related to utility.

One formulation, building on reference-dependent models of status quo bias, assumes that individuals happiness reflects changes in utility (as in our model). However, the reference utility is no longer forward-looking expectations. Instead it is the status quo. In order to formally model this, we assume that the reference point is the previous periods flow utility.

In order operationalize such an idea we could assume that individuals aggregate utility across 4 year presidential terms. Then the status quo would be the aggregate utility for the past 4 years, which would be compared to the aggregate utility for the upcoming 4 years. Of course, if utility is considered in a less aggregate fashion we need to be more careful.

We can also operationalize this model more formally by defining last periods utility as $\mu_{i,t-1}$. Denote the constant (certain) utility that, if received every period from today onwards, would give i a present discounted value of $E_{i,F_t}[V_{i,t}]$ as $\bar{u}(V)$. Happiness in period t is then a piecewise linear function of $\bar{u}(E(V_t)) - \mu_{i,t-1})$:

$$H_{i,\tau} = B_i + \sum_{t=-\infty}^{\tau} \delta^{\tau-t} e(\bar{u}(E(V_t)) - \mu_{i,t-1}).$$

The key implication that distinguishes this model from the previous model is are that expectations should not matter for changes in happiness, but rather the incumbent party.[1]

[1]Because Obama, a Democrat won in both 2008 and 2012, we can only test hypotheses that allow the

Hypothesis 1': Democrats should have a smaller larger gain in happiness if a Democrat wins and the incumbent was a Democrat compared to if they were a Republican. Similarly, Republicans should have a smaller drop in happiness if a Democrat wins and the incumbent was a Democrat compared to if they were a Republican.

Hypothesis 2': Happiness should be independent of expectations.

In other words, at $t = 0$ in 2008 individuals should have experienced a larger change in emotions compared to $t = 0$ in 2012. This allows a relatively simple test of expectations versus status quo as a reference point, because the individuals' expectations about the election in 2008 were much more in favor of Obama in 2008 compared to 2012. Thus the expectations happiness formulation would predict that individuals (on average) should have experienced larger changes in emotions in 2012 compared to 2008.

A second alternative hypothesis is that happiness is related not to changes in utility but rather to the current level of utility (either flow or total present discounted value) . This theory would predict that if it is related to flow utility is aggregated at a relative small time horizon, that happiness should not jump merely at the reception of good news, because flow utility has not yet changed (and will not change until the elected candidate implements different policies).

Hypothesis 3': If happiness is equal to flow utility then it should not change at $t = 0$.

If instead happiness is related to the total present discounted value of utility then although it can jump at $t = 0$ (since the total present discounted value of utility jumps) it should not rapidly return to baseline, as it is unlikely that within one week of the election policies have changed so drastically so as to induce a jump in the present discounted value of utility and then a (quick) subsequent reduction.

Hypothesis 4': If happiness is equal to the present discounted value of utility then it should jump at $t = 0$ but not return to pre-election baseline.

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incumbent to vary, but fix the type of candidate that wins. In other situations one could test additional hypotheses. For example, If the incumbent is a Republican (Democrat) and a Republican (Democrat) wins then the absolute change in emotions in smaller for voters of all types compared to if a Democrat (Republican) had won. Moreover, if the incumbent is a Republican and a Republican wins then Republicans (Democrats) should experience a smaller drop (gain) in happiness compared to if a Democrat had won. Similarly, if the incumbent is a Democrat and a Democrat wins then the Democrats (Republicans) should eperience a smaller drop (gain) in happiness compared to if a Republican had won.

3 Data

Our data is a panel data set from the ALP: American Life Panel, which is administered by the Rand Corporation. Individuals respond by filling out an online survey over time. Subjects frequently fill out surveys on a variety of topics. Our was one of many surveys. In 2012 the structure of the questions was as follows (the elicitation was similar for 2008, but with different dates). Each individual responded to three sets of questions. The first set was immediately before the election, on the dates between October 29-November 6. The election occurred on November 7. Individuals were given two post-election surveys. The first began on November 7, with most respondents surveyed within 2 weeks. There was then a second post-election follow-up.

Our questions were of three varieties. First we attempted to elicit political preferences from individuals. We asked for the their political affiliation as well as strength of political affiliation (whether they were strong or weak Democrat/Republican or leaned Democrat/Republican). We also asked with what probability they would vote for either candidate. We also asked them for their view (on a 0-100 scale) of both presidential and vice-presidential candidates. We also measure beliefs the probability that they think either candidate will be elected.

We last measure individuals self-reported happiness. There are two measures. The first is a multidimensional measure of emotion. We ask how much, in the last week, did they feel Happy, Sad, Enjoyed Life, Depressed, with each rated on a scale of 1-4. We also ask a more general measure of happiness, how happy they feel right now on a scale of 1-8.

In the pre-election survey we ask all questions. In the post election survey we repeat preference questions and emotion questions. We also ask who they vote for.

4 Analysis

Our analysis is a between person analysis. Although we have up to three observations for each individual, there is simply not enough data for a single person to estimate data, and so we drop personal identifiers across the different waves. In order to take our hypotheses to the data, we need to define some variables. $H$is measured happiness on the 8 point scale. $H_{-1,i}$ is pre-election happiness, while $H_{t,i}$ is post-election happiness on day t after election. We assume the pre-election happiness is the baseline level of happiness. $\mathbb{D}_{O,i}$ is a dummy variable indicating Obama supporter, while ψ_i = strength of political affiliaiton from 0 to

1. s_i is an individuals suprise about the election outcome, (1-belief in probability of Obama being elected).

Reduced Form Predictions

Our first test is of Hypothesis 1. In order to do so, we run the regression: $H_{t,i} - H_{-1,i} = \beta_0 + \beta_1 \mathbb{D}_{O,i}$. Hypothesis 1 is equivalent to $\beta_0 < 0$, $\beta_0 + \beta_1 > 0$.

Table 1: Regression Results: $H_{t,i} - H_{-1,i}$

β_0	-1.918806***
	(.3598132)
β_1	4.33235***
	(.4732367)

Note: Author's calculations, ***significance = 0.01, **significance = 0.05, *significance = 0.10
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Our next test is of Hypothesis 2. In order to test this we run the regression $H_{t,i} - H_{-1,i} = \beta_0 + \beta_1 \psi_i + \beta_2 \psi_i \mathbb{D}_{O,i}$, and Hypothesis 2 implies that $\beta_1 < 0$, $\beta_1 + \beta_2 > 0$.

Table 2: Regression Results: $H_{t,i} - H_{-1,i}$

β_0	.8241813
	(.6386832)
β_1	-3.837785***
	(.9126236)
β_2	5.915108 ***
	(.6128709)

Note: Author's calculations, ***significance = 0.01, **significance = 0.05, *significance = 0.10
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We next turn to testing Hypothesis 3. In order to test Hypothesis 3 we run the regression, $H_{t,i} - H_{-1,i} = \beta_0 + \beta_1 s_i + \beta_2 s_i \mathbb{D}_{O,i}$. Hypothesis 3 is equivalent to $\beta_1 < 0$, $\beta_1 + \beta_2 > 0$.

Table 3: Regression Results: $H_{t,i} - H_{-1,i}$

β_0	1.631182***
	(.4974804)
β_1	-5.961858***
	(.9998674)
β_2	7.985918***
	(1.071488)

Note: Author's calculations, ***significance = 0.01, **significance = 0.05, *significance = 0.10
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We next turn to testing Hypothesis 4 using the equation $H_{t,i} - H_{-1,i} = \beta_0 + \beta_1 \mathbb{D}_{O,i} + \beta_2 t + \beta_3 t \mathbb{D}_{O,i}$. Hypothesis 4 is equivalent to $\beta_2 > 0$, $\beta_2 + \beta_3 < 0$.

Table 4: Regression Results: $H_{t,i} - H_{-1,i}$

β_0	-4.004389***
	(.4987069)
β_1	6.548956***
	(.6584849)
β_2	.3982838***
	(.0661991)
β_3	-.4226323***
	(.0867622)

Note: Author's calculations, ***significance = 0.01, **significance = 0.05, *significance = 0.10

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4.1 Structural Model

In order to test Hypotheses 5 and 6 need structural model. Such a model will also allow us to more rigorously test Hypotheses 1, 2, 3 and 4. Such a structural model will allow use to identify the exact way in which beliefs, preferences and time affect happiness. Moreover, we need to control for these variables properly in order to identify whether or not there is a 'kink' in terms of happiness around expectations.

The structural model we want to estimate is:

$$H_{t,i} - H_{-1,i} = \gamma_0 + \mathbb{D}_{O,i}\gamma_1 + (\psi_i s_i \gamma_2 + \mathbb{D}_{O,i}\psi_i s_i \gamma_3)e^{\gamma_4 t}$$

In our structural model Hypothesis 1,2, and 3 are are jointly testable. They are equivalent to $\gamma_2 < 0$, $\gamma_2+\gamma_3 > 0$. Hypothesis 4 is $\gamma_4 < 0$, $\gamma_0 = \gamma_1 = 0$ while Hypothesis 5 is $-\gamma_2 > \gamma_2+\gamma_3$.

Table 5: Regression Results: $H_{t,i} - H_{-1,i}$

γ_0	.095632
	(.4357561)
γ_1	2.000505***
	(.5575508)
γ_2	-20.07254***
	(1.845861)
γ_3	25.9081 ***
	(3.152717)
γ_4	-1.354972***
	(.4190232)

Note: Author's calculations, ***significance = 0.01, **significance = 0.05, *significance = 0.10

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4.2 Robustness

Strength of preferences could be subjective and possibly non-linear. DIfferent groups could answer the survey in different ways - for example Republicans could be more partisan than Democrats, even if they respond to the survey in using the same category. Or Republicans could think that the categories are more different than Democrats. Of course in doing so will eliminate our ability to estimate μ since we are ascribing difference in μ to differences in the respondent groups who we would otherwise use to identify μ

So we estimate actual partisanship using each partisan group. Define $\mathbb{D}_{r,i}$ = dummy variable indicating one of each of 6 partisan groups (party interacted with strength of affiliation). We then run the equation

$$H_{t,i} - H_{-1,i} = \gamma_0 \mathbb{D}_{O,i} + (\sum_{r=1}^{6} \mathbb{D}_{r,i} s_i \gamma_r) e^{\gamma_7 t}.$$

Table 6: Regression Results: $H_{t,i} - H_{-1,i}$

γ_0	2.133539***
	(.3370715)
γ_1	-21.87613***
	(1.852636)
γ_2	-3.490165
	(2.985782)
γ_3	-8.907083 ***
	(2.191221)
γ_4	.7862118
	(3.153932)
γ_5	1.923959
	(3.552183)
γ_6	6.770383 **
	(2.86569)
γ_7	-1.456862 ***
	(.4254221)

Note: Author's calculations, ***significance = 0.01, **significance = 0.05, *significance = 0.10 .

The data is supportive of the fact that more extreme individuals have more extreme preferences. But, the coefficients on moderate and lean Republicans at odds with model. Evidence mixed for either convexity or concavity of happiness in terms of partisan affiliation. The effects are not precisely estimated.

5 Conclusion