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Migration in times of uncertainty

On the role of economic prospects

Mathias Czaika

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- analyse migration as part of broader global change
- contribute to new theoretical approaches
- advance understanding of the multi-level forces driving migration

Abstract

Uncertainty and risk perceptions are important elements in the decision-making process about migration. This study outlines a ‘migration prospect theory’, i.e. an application and advancement of Kahneman and Tversky’s (1979; Tversky and Kahneman 1991) original prospect theory, which aims to explain short-term fluctuations of migration flows as a consequence of expectation-based adjustment about future economic prospects. I argue that individuals with migration intentions continuously assess general economic prospects, including the labour market situation, at home and abroad in order to form reference points and updates for their migration-related expectations. Consequently, deviations from reference points generate (short-term) expectation-based utility gains or losses for potential migrants, which affect the value of the migration option. This can lead to a cancellation or procrastination of the individual migration project. Based on an analysis of annual and quarterly intra-European migration inflows to Germany between 2001 and 2010, supportive empirical evidence about some key implications of this migration prospect theory is found: first, migration flows respond more strongly to negative than to equal-sized positive economic prospects, indicating loss aversion of potential migrants; second, expectation-based prospects about the future economic situation in the home and in the potential destination country can counterbalance or enforce *structural* economic incentives based on real economic aggregates; and third, migration flows show a diminishing sensitivity for larger fluctuations in expectation-based adjustments of economic prospects.

Keywords: migration prospect theory, economic prospects, intra-European migration flows

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1 Introduction

Insights from prospect theory, established by Daniel Kahneman and Amos Tversky (Kahneman and Tversky 1979; Tversky and Kahneman 1992) and since then further developed in the vibrant field of behavioural economics, have hardly been applied to the migration decision-making process. The standard economics of migration still very much refers to neoclassical models (Todaro 1969; Harris and Todaro 1970; Sjaastad 1962) and the ‘new economics’ of labour migration (Stark 1991; Mincer 1978). The fragmented insights from standard economics and other social sciences on the drivers of migration such as (expected) wage, income, and other opportunity gaps, networks and social capital, human capital investment, risk pooling and household-related income smoothing etc. are well summarised by Massey et al. (1993, 1998). The role of risk and uncertainty in the context of migration has been addressed by several authors, suggesting for example that (a) migrants are generally risk-loving (e.g. Sahota 1968), instead of being globally risk-averse as assumed in expected utility theory; (b) migrants are bounded rational, implying that human rationality is limited and bounded by the situation, incomplete information and human computational power (Simon 1983); (c) migrants consider risk and uncertainty inter-temporally, e.g. by trading medium-level risks for immediate higher risks, but subsequent lower risks (Katz and Stark 1986); or (d) migrants contribute to a risk-diversification of earnings among family members (Stark and Levhari 1982). However, all these explanations refer directly or indirectly to expected utility theory and the standard economic model with its (too) strong assumptions about the rational decision-making of agents. For instance, the related concept of revealed preferences *assumes* that migrants choose a particular destination because this destination is preferred to another destination, if migration to that other destination was both possible and affordable. However, real preferences and revealed preferences, e.g. for migration options, are not necessarily identical. ‘Behavioural anomalies’ (Kahneman et al. 1991) such as endowment effects, loss aversion, or status quo bias, none of which can be explained by expected utility theory, do not prove the standard economic (migration) model wrong, but incomplete. Therefore, an attempt to apply these insights from prospect theory to individual decisions about migration does not seek to replace the standard neoclassical migration model but to combine and enrich it with a ‘migration prospect theory’.

The following theoretical framework is an application and advancement of prospect theory by Kahneman and Tversky (1979); it assumes that an individual’s migration decision about staying, leaving or returning depends on recent changes in rational beliefs about the present and future economic situation in the origin country *and* in the destination country. Assuming that bad news about the future general economic and unemployment situation is more painful than good news is pleasant, migration flows are expected to respond accordingly. Loss aversion is more likely to result in a strong increase in migration outflows, as a consequence of a negative adjustment to expectations about the home country’s economic situation, than equal-sized positive expectations would lead to a decrease in outflows. Obviously, migration flows should respond conversely *vis-à-vis* similar expectations about the destination country’s economic situation.

In the remainder of this paper, I combine these behavioural economic insights on how individuals make their decisions based on beliefs and expectations about the future with an empirical analysis of the effects of these expectation-based prospects about the future

economic situation on migration decision-making. The next section outlines in more detail the implications of a migration prospect theory. The analysis in Section 3 provides empirical evidence about the expectation-based migration prospect theory on annual and quarterly intra-European migration fluctuations towards Germany before and after the 2008 global financial and economic crisis, which had, besides its effects on real economic indicators, strong implications for economic prospects and the formation and updating of expectations. Section 4 summarises and concludes.

2 Migration prospects and reference-dependent expectations

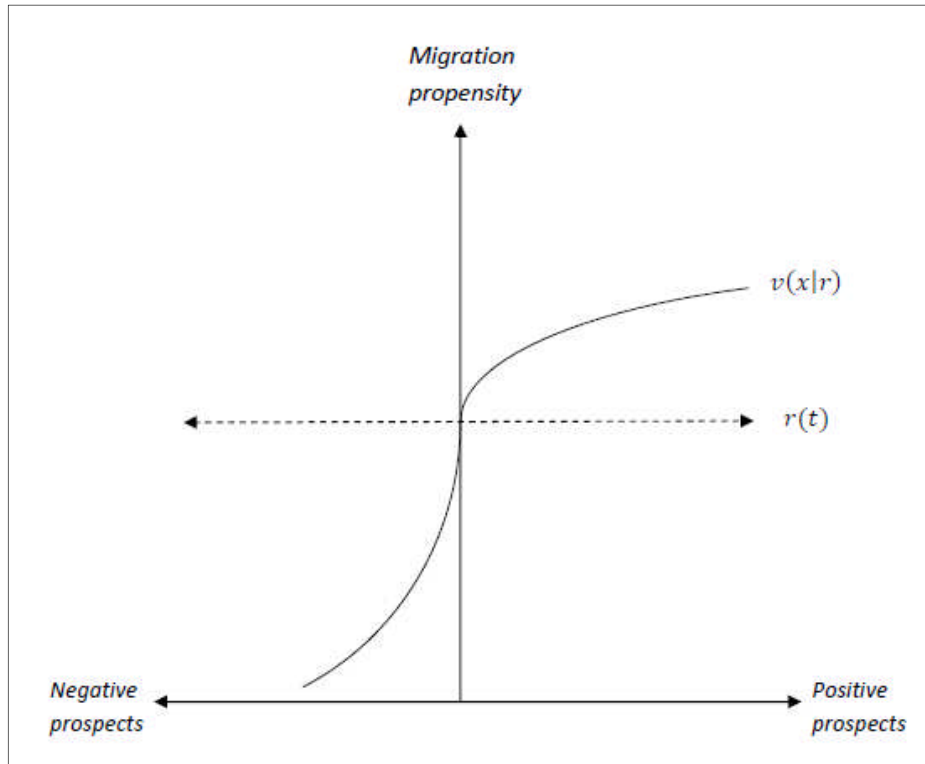
2.1 Prospect theory and its implications for migration value function

The decision about migration is a decision taken in the context of uncertainty and risk. Information about the future is incomplete, and whether migration turns out to be a success or a failure for individuals depends very much on circumstances that are *ex ante* unknown. Migration can be considered as an investment project; the decision about realising this project is based on information and prospects about the future. In the following I argue that migration decisions are influenced *inter alia* by future prospects about the general economic situation and unemployment in both the home country and the potential destination country.

This is a major amendment to the neoclassical migration model formulated by Harris and Todaro (1969, 1970), which was based on the maximisation of the von Neumann-Morgenstern-type of utility (von Neumann and Morgenstern 1944). In the last decades, expected utility theory and the rational choice paradigm have been challenged by new insights in behavioural economics and the idea of bounded rationality (Simon 1983). The seminal contribution by Kahneman and Tversky (1979; Tversky and Kahneman 1992) establishes prospect theory as a response to some empirical anomalies contradicting the expected utility implications. According to prospect theory, people dislike losses more than they love gains. This implies that people are generally more willing to accept higher risks to avoid losses than to secure an equivalent gain. Contrary to reference-independent expected utility theory, the choice between some alternative economic or monetary outcomes is often framed rather as (relative) gains or losses depending on a point of reference. Reference-independent behavioural models of (absolute) expected utility are based on linear probabilities, i.e. the assessment of an outcome does not depend on the status quo or any other reference point. However, Kahneman and Tversky found that individuals would even reverse their preferences depending on whether outcomes are framed as gains or losses. This implies that people generally value a reduction of the unemployment rate from 10 per cent down to 5 per cent more highly than an increase of the employment rate from 90 per cent up to 95 per cent, although both are effectively the same. This *framing effect* transferred into the context of migration decision-making implies that a potential migrant who is considering leaving the home country for another country, and who therefore evaluates future economic and un-/employment prospects, is more likely to leave if an objectively deteriorating economic situation in the home country is framed (and perceived!) negatively as the probability of not finding (or losing) a job increasing from 5 to 10 per cent, than as a probability of finding (or keeping) a job declining from 95 to 90 per cent. However, according to expected utility theory, and thus the neoclassical model, the manner of how information is framed or 'packaged' should not influence the (rational) assessment of the

information, and thus, the behavioural reaction. However, individuals often repackage information to be represented either as gains or as losses by referring to a reference point instead of focusing on absolute outcomes (Mercer 2005).

Figure 1: A migration value function



Properties of a reference-dependent migration value function

Similar to the value function in the original prospect theory, a migration value function explains how prospects about migration-related outcomes are evaluated and how respective values are altered by the presence of a reference point that separates prospective losses from gains. A ‘migration value’ in the domain of losses does not necessarily imply that migration does not take place, but only that the propensity for migration is lower than in the case of positive economic prospects. The properties of this S-shaped value function can formally be expressed x representing economic prospects, r indicating the point of reference, $\alpha < 1$ displaying diminishing sensitivity, and $\theta > 1$ reflecting the coefficient of loss aversion:

$$v(x|r) = \begin{cases} (x - r)^\alpha & \text{if } x-r \geq 0, \\ -\theta(-(x - r))^\alpha & \text{if } x-r < 0. \end{cases} \quad (1)$$

Figure 1 displays this migration value function $v(x|r)$ with its three features. First, individuals, such as potential migrants, evaluate absolute outcomes relative to a reference point; this reference point r separates economic prospects into gains (success) and losses (failure) (Heath et al. 1999). What, however, determines the formation of this reference point? A widely accepted assumption is that the *status quo* determines whether future prospects are evaluated as gains or losses. Alternatively, an individual’s *subjective aspirations* for the future can influence the way future prospects about absolute outcomes

are evaluated. In both alternatives, however, reference points $r(t)$ are not necessarily static but may adjust dynamically.

Second, the value function treats gains differently from losses. The value function encodes losses as more painful and unhappy than equal-sized gains are pleasing, i.e. 'losses loom larger than gains'. This is termed *loss aversion* (Kahneman and Tversky 1979). Falling short of their reference point (e.g. status quo, aspired goals), people should feel more (emotional) pain than they would feel pleasure if they surpassed their reference point by an equivalent amount (Heath et al. 1999). Experiments have shown that losses are weighted approximately twice as much as equivalent gains (Tversky and Kahneman 1991). Technically, loss aversion is represented by a kinked value function with steeper slopes for losses compared to equal-sized gains.

Third, the value function is concave in the domain of gains and convex in the domain of losses, which represents risk aversion for prospective gains and risk-seeking behaviour for avoiding prospective losses. This shape of the migration value function reflects a diminishing sensitivity for large (positive and negative) outcomes, which implies that prospective gains or losses are felt more strongly if these relative outcomes are closer to the reference point. For instance, if full employment (with an unemployment rate of e.g. 2 per cent) is the reference point, an increase in the unemployment rate from 2 to 3 per cent creates more pain than an (equal-sized) increase of the unemployment rate from 8 to 9 per cent.

Status quo bias and loss aversion

Research on the determinants of migration has developed a wide range of explanations for why people migrate (see Massey et al. 1993 and 1998 for overviews). However, the question about the drivers of migration often ignores the related question on why people do *not* migrate despite promising prospects and opportunities. The fact that, for decades now, the global stock of international migrants is surprisingly constant at about 3 per cent of the world's population, implying that about 97 per cent of the world's population keep on living in their country of birth, seems to require rather a theory of non-migration than a theory of migration. Prospect theory, though, has straightforward explanations for this phenomenon: status quo bias and the endowment effects, i.e. the strong preference of individuals for the context and situation in which an individual currently lives.

In an original work, Samuelson and Zeckhauser (1988) distinguish three types of explanation for the robust existence of a status quo bias in a wide array of social contexts. First, rational decision-making has to acknowledge *transition costs*, which makes moving away from the status quo less attractive, predominantly if these transition costs exceed the efficiency gains associated with the status quo context. Transition costs go beyond the direct financial, socio-economic or psychological costs of migration, which are traditionally acknowledged in migration research; transition costs also include various forms of transaction costs such as costs associated with researching information and reducing uncertainty. Therefore, even in the absence of (or with neglectable economic and non-economic) migration costs, uncertainty about migration outcomes may still lead to status quo inertia. For this reason, many people with migration intentions might decide in favour of (or against) permanent migration only after an uncertainty-reducing 'exploration visit' to the potential new country of residence.

As a second reason for a strong (and sometimes irrational) preference for the status quo, Kahneman and Tversky (1979; Tversky and Kahneman 1991) point to the experimental evidence that in individuals' decision-making, losses weigh more than equal-sized gains. This systematic aversion to losses is expressed by the kinked value function with a steeper slope for losses than for gains (Figure 1). If the status quo is the corresponding reference point, an individual places more importance on potential losses than on similarly-sized potential gains, which keeps the individual in the status quo, an explanation termed *endowment effect* (Thaler 1980). This effect leads to a behaviour where individuals value what they have more highly than what they *could* have, even if the latter is related to a smaller risk of failure. Therefore, the responsiveness of individuals with migration intentions and good prospects for realizing significant gains from migration is assumed to be smaller than their responsiveness when facing equal-sized losses from migration.

A third reason for a status quo bias in human mobility and migration – i.e. immobility despite potentially gainful migration opportunities and prospects – is the role of *sunk costs* (i.e. costs that have already been incurred and cannot be recovered), which is contrary to the implications of rational choice theory (e.g. Mankiw 2008). Similar to Thaler's (1980) example of a hobby tennis player who continues to play tennis weekly despite the pain of a tennis elbow because of the sunk costs of an annual membership fee, an individual with migration intentions does not migrate – or a migrant does not return – because of past investments for example in housing or social networks and capital; or in non-transferable skills and knowledge such as language, some type of education, on-the-job training etc. The more an individual has invested in the status quo, the less likely a subsequent self-determined shift of status and context. The longer an individual has spent in a given job, profession, country, or any other socio-cultural context, the less likely it is that the individual will choose a contextual change even if it would be objectively beneficial.

Finally, and similar to the sunk costs effect, Kahneman and Tversky argue that individuals feel stronger regret about negative outcomes that are the result of actions taken by the individual than they do about similar negative consequences resulting from inaction. This propensity to avoid regret implies that potential migrants are more likely to decide against migration, even if prospects for loss seem larger if they were to stay than if they were to leave. Regret avoidance is therefore another reason for a status quo bias and the tendency for retaining the known context instead of choosing the unknown.

Migration prospects based on reference-dependent expectations

The core idea of our theoretical framework is inspired by some previous research suggesting that changes in expectations (or beliefs) about future outcomes are carriers of utility (Bowman et al. 1999; Kőszegi and Rabin 2006, 2009). Consider the following illustration of this idea in the context of migration: in January, an employee, who is a potential migrant with some basic intentions to migrate at some point in the future, is informed by the employer that in July s/he will receive an unexpected wage increase because of improved future economic prospects for the company's business. In May, however, the individual learns that the wage increase has been cancelled because the positive change in economic prospects has not been robust. Consider now an alternative scenario, where the employee was not told anything about a wage increase. In which scenario is the employee more likely to realise the migration project after May? In a similarly phrased lab experiment, 94 per cent of participants preferred the second scenario to the first (Matthey 2008). This implies

that the potential migrant is more likely to realise the migration project after the disappointment of unfulfilled expectations than in an alternative situation where no information on economic prospects and wage increase was reported. Based on this experiment, we can conclude that although the actual economic situation, i.e. the individual's wage, did not change in either scenario, it is quite likely that we would see more migration responsiveness in a scenario where information about changing economic prospects is reported.

The ground for this implication is that updating of expectations about future outcomes affects individual utility in the present. This formulation of a reference-dependent utility from expectations, which is related to Kőszegi and Rabin's (2009) specification of prospective gain-loss utility, is different from Kahneman and Tversky's prospect theory in its definition of a reference point or category. In the above illustration, the reference point is *expectations* about future outcomes and not the status quo of actual outcomes. Matthey (2008) calls this type of relative, reference-dependent utility 'adjustment utility'. This type of utility can easily be combined with other utility concepts such as expected utility theory (von Neumann and Morgenstern 1944) in which absolute, reference-independent utility is derived from realised outcomes; prospect theory in which relative, reference-dependent utility is derived from realised outcomes but those outcomes are compared with a given reference state and therefore perceived as gains or losses (Kahneman and Tversky 1979; Tversky and Kahneman 1991); or anticipatory utility (Caplin and Leahy 2001), which is absolute, reference-independent utility derived from expected future outcomes (Matthey 2008).

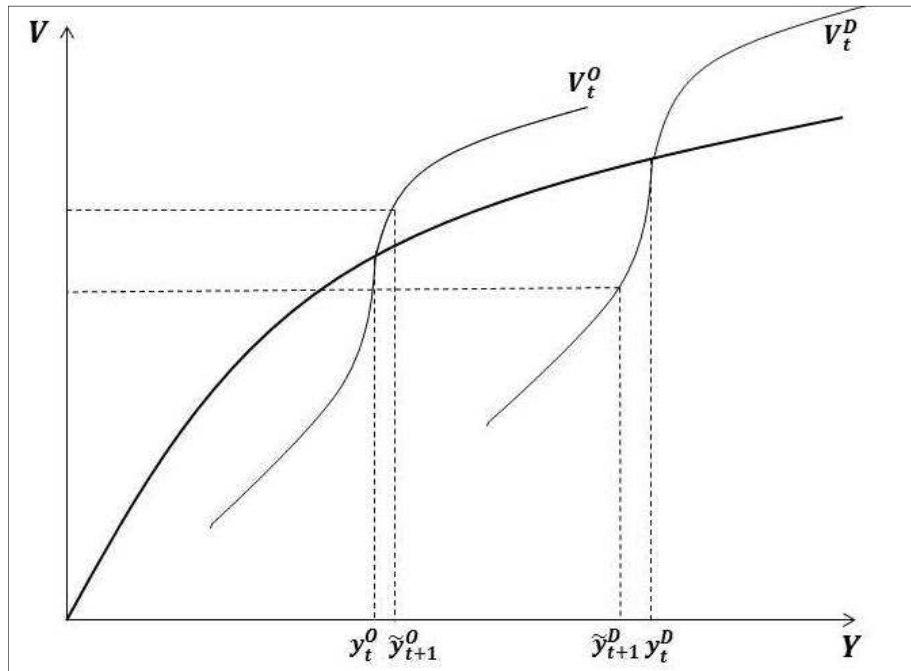
In fact, all types of utility are applicable to migration-related decisions. While expected utility from migrating derived from (differences in) absolute levels of income, consumption, unemployment etc. refers to the standard economic model of migration, prospect theory does imply that migration propensities do not relate on absolute economic levels but depend on deviations from the status quo by which migrants should respond more strongly to negative changes (losses) in absolute levels than to equal-sized gains. This means that, *ceteris paribus*, some deterioration in the home country's living standard increases the outflow of migrants by more than an (equal-sized) improvement in living standards would reduce the outflow. The evaluation of changes in absolute levels is dependent on the definition of the reference point, for which the status quo is a plausible assumption. If, however, the reference point is not the status quo but past expectations about the future living standard, then – even if there is not a change in living standards at all – the adjustment of expectations about future living standards could affect utility in a similar way to the *de facto* changes in living standards.

In the following theoretical and empirical analysis, migration prospects and the 'value' of migration refer to only two types of migration-related utility, namely reference-independent utility on absolute living standards and reference-dependent expectation-based adjustment utility about changes in future outcomes.¹ Figure 2 displays a combination of these two types of utility functions: first, a concave utility function of absolute living standards in the origin country O and destination country D , with country O having a lower living standard, $y_t^O < y_t^D$, and second, for each country S-shaped and kinked utility functions of expectation adjustments about the country's future economic situation. V_t^O and

¹ The term 'value' refers therefore to an aggregation of two types of utility.

V_t^D display the combined overall utility for both countries. Without utility derived from expectation adjustments, differences in absolute utility derived from a significant gap in living standards should lead to a continuous migration flow from O to D . Inclusion of prospects about the economic situation, however, can change this implication: positive adjustment of expectations about the future economic situation in country O and a simultaneous negative adjustment of expectations in country D can turn the value of migration from O to D negative. This implies that diverging economic prospects can neutralise gaps in living standards; however, diverging economic prospects can also create migration incentives between countries without an absolute gap, or even with a negative gap, in living standards.

Figure 2: Value of migration as a combination of absolute and relative utility functions



2.2 Model

The following model formulises the combination of reference-independent utility from absolute outcomes with reference-dependent expectation adjustment utility (Kőszegi and Rabin 2006, 2009). The value of the migration option in period t of moving from country O to country D is an additive-separable function based on the current economic situation, y_t^O in the origin country and y_t^D in the destination country, and bilateral ‘differences-in-differences’ in the adjustment of past expectations about the present, i.e. \tilde{y}_t^D and \tilde{y}_t^O , to present expectations about the future economic situation in period $t + 1$, \tilde{y}_{t+1}^D and \tilde{y}_{t+1}^O :

$$V_t = V_t^D - V_t^O = M(y_t^D - y_t^O) + N(\tilde{y}_{t+1}^D, \tilde{y}_{t+1}^O | \tilde{y}_t^D, \tilde{y}_t^O) \quad (2)$$

$$\text{with } N(\cdot) = \begin{cases} (\tilde{y}_{t+1}^D - \tilde{y}_t^D - \tilde{y}_{t+1}^O + \tilde{y}_t^O)^\alpha & \text{if } \Delta_t \tilde{y}^D - \Delta_t \tilde{y}^O \geq 0 \\ -\theta(\tilde{y}_{t+1}^D - \tilde{y}_t^D - \tilde{y}_{t+1}^O + \tilde{y}_t^O)^\alpha & \text{if } \Delta_t \tilde{y}^D - \Delta_t \tilde{y}^O < 0 \end{cases}$$

This combined migration value function has standard properties of positive but diminishing marginal utility $M' > 0, M'' < 0$) for utility derived from (differences) in absolute living standards, $y_t^D - y_t^O$, whereas the properties for the 'expectation adjustment' function are as follows:

A1: $N(x)$ is continuous for all x and twice differentiable with $N(0)=0$.

A2: $N(x)$ is strictly increasing in x , i.e. $N'(x)>0$.

A3: $N(x)$ is concave for expectation gains, i.e. $N''(x) \leq 0$ for $x > 0$.

$N(x)$ is convex for expectation losses, i.e. $N''(x) > 0$ for $x < 0$.

A4: $N(x_-)/N(x_+) = \theta > 1$.

These assumptions assign the expectation adjustment function the same properties as the value function in prospect theory: different risk attitudes for gains and losses, diminishing sensitivity for larger expectation adjustments, and loss aversion.

An individual will migrate from origin country O to destination D if the migration value of the combination of reference-independent and reference-dependent utility is positive, net of migration costs C_t . That is, a potential migrant will realise the migration project in period t if:

$$V_t(.) - C_t(.) > 0. \quad (3)$$

3 Empirical analysis

The following analysis seeks to provide some evidence on the determinants of intra-European fluctuation of migration flows towards Germany with a particular focus on the role of expectation adjustments about the general economic and labour market situation. In the following, I introduce the data and the construction of the indicators on economic prospects, the empirical model, and give a presentation and interpretation of the results.

3.1 Migration towards Germany: data description

Migration flow data

The migration flow data used for this analysis is based on the German population register system. Information on monthly international migration flows at the federal state level is only available since 2006; before that it is only available as annual aggregates (Statistisches Bundesamt 2011). For the period 2001–2010, I estimate annual bilateral inflows from 26 EU member states to the 16 German Federal States separately for foreigners and German citizens, whereas for the shorter period 2006–2010, quarterly inflows are estimated for the same categories. Although the population register system does not collect information on individual migration histories, we may assume that inflows of Germans can predominantly be characterised as return flows of German citizens who were emigrating at some point in the past. This availability of migration data by citizenship allows a comparison of the relative strength of the effects of economic prospects on foreign inflows and German return flows.

Figure 3: Annual migration flow to Germany by citizenship and origin

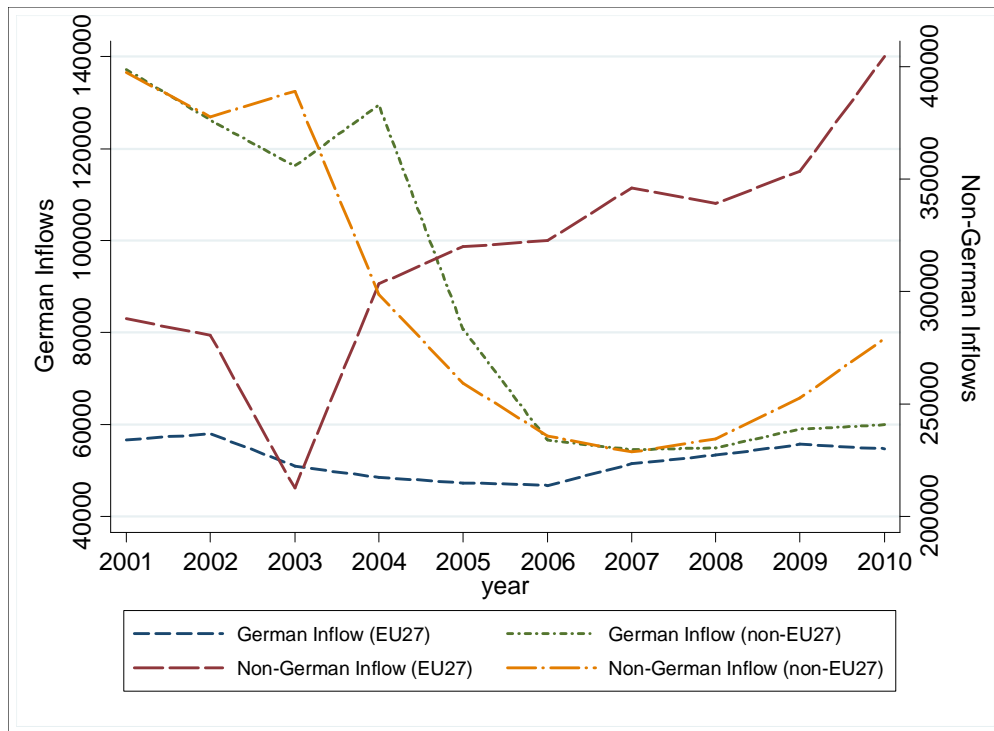


Figure 4: Monthly (unadjusted) inflow of foreigners and German citizens, 2006–2010

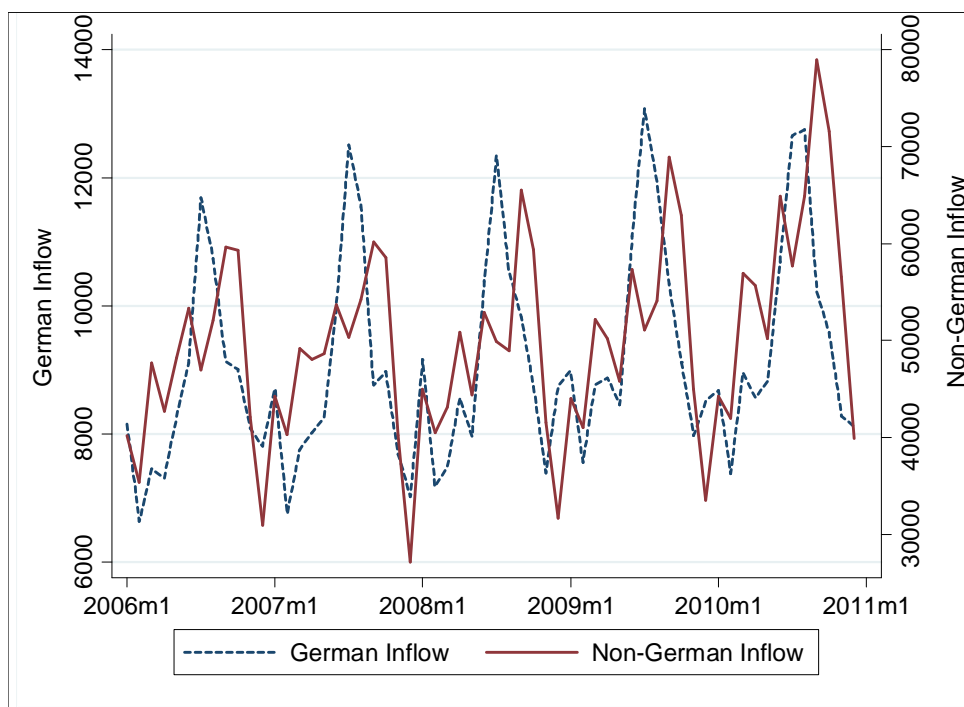


Figure 3 displays annual inflow to Germany by citizenship and origins. The graph shows two broader trends throughout the last decade: first, intra-European inflows have increased significantly and since 2003 continuously, while inflows from non-EU 27 countries dropped until they reached their turning point during 2008; since then, inflows of German and foreign citizens from non-European countries increase again. Second, intra-European return flows of German citizens have been surprisingly stable. For intra-annual fluctuations of migration inflows by citizenship between 2006 and 2010, Figure 4 displays monthly fluctuations of German and foreign inflows, confirming the above-mentioned trend of a turnaround in foreign inflows in 2008, but also revealing intra-annual migration cycles with seasonal peaks of foreign inflows being lagged by about two months compared to peaks of German (return) flows.

Economic prospect indicators

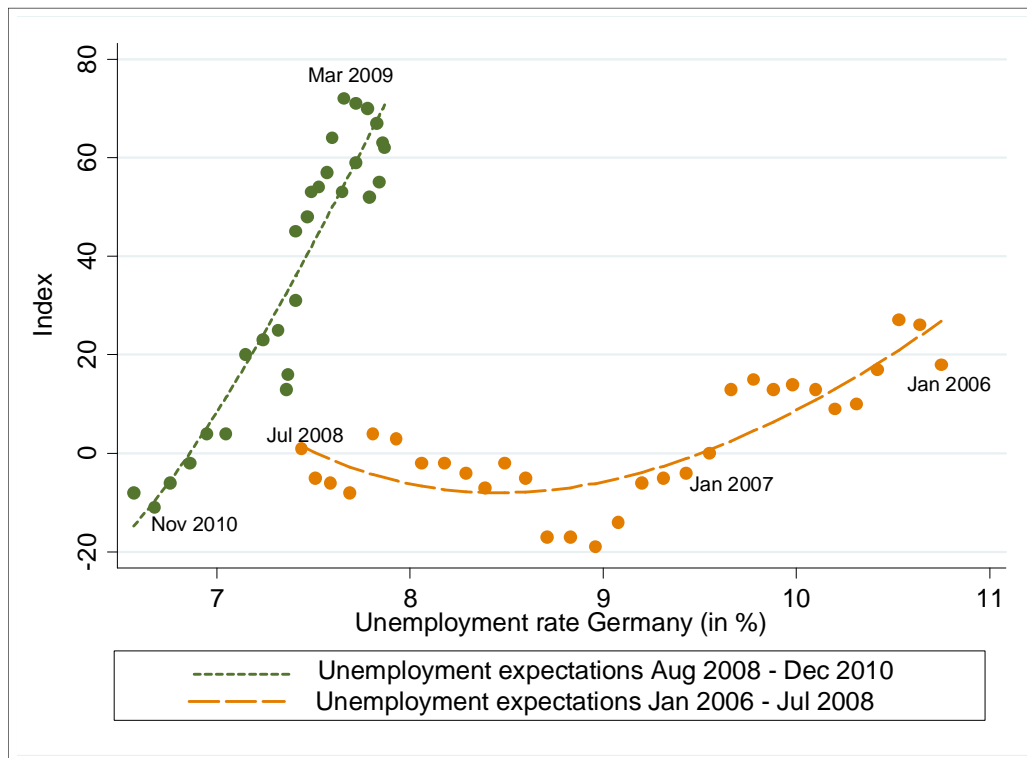
The main variables of interest are two indicator variables about the future general economic and unemployment prospects in Germany and all other 26 EU member states. Based on data from the monthly EU Business and Consumer Survey run by the European Commission, information is available on expectations about the future economic situation in all EU member states at the micro level. Surveys are conducted on a monthly basis with an overall sample size of about 40,000, and national samples varying between 500 observations for Luxembourg and 3,300 observations for France (European Commission 2011). The two survey indicators are based on an individual assessment of the general economic and unemployment situations, respectively, in terms of their development in the next 12 months.² I have chosen these two variables for their attribute of capturing a representative assessment of expectations about the future economic situation and expectations about a more narrow perspective on the future of the labour market.

Figure 5 shows descriptive evidence on the ambiguous relationship between the actual situation and expectations about the future, here displayed for unemployment rates and unemployment expectations in Germany between January 2006 and December 2010. During the periods before the outbreak of the financial crisis in September 2008, declining unemployment expectations largely reflect, despite some seasonal fluctuations, the positive trend of a continuously relaxing situation on the labour market, with unemployment rates decreasing from above 11 per cent in early 2006 to about 7.5 per cent in mid 2008. The following shock on the financial markets and its effects on the real economy led to extremely negative expectations for the future general economic situation (not shown) as well as unemployment prospects – though unemployment rates were kept relatively low, partly because of some political interventions on the labour market (see Burda and Hunt 2011). The expectation shock was brief though, and prospects re-adjusted to pre-crisis levels in line with continuously declining unemployment rates. This imperfect correlation between the actual situation and expectations about the future economic situation, including the

² The future economic and unemployment situations were assessed by two versions of the following question: ‘How do you expect the [general economic situation][the number of people unemployed] in this country to develop over the next 12 months?’ Respondents to these two questions could choose between six possible answers: (++) [get a lot better] [increase sharply], (+) [get a little better][increase slightly], (=) [stay the same][remain the same], (-) [get a little worse][fall slightly], (--) [get a lot worse][fall sharply], (N) don’t know. Indicators obtained are aggregates in the form of balances, which are constructed as differences between the percentages of respondents giving positive and negative responses: $Indicator = ((++) + 1/2(+)) - (1/2(-) + (--))$. These aggregates are seasonally adjusted.

labour market, suggests that both the ‘present’ and the ‘future’ have separate and distinct implications for the migration decision-making of individuals.

Figure 5: Labour market in Germany: unemployment rates and expectations, 2006–2010



Other control variables

For estimation of annual migration inflows between 2001 and 2010, I control for the effects of the free movement principle for citizens and workers of signatory states of the Maastricht and Schengen Treaty. Article 39 of the Treaty on the European Union requires that all member state citizens have the right to solicit and obtain work in Germany free from discrimination on the basis of citizenship. However, citizens of Eastern European countries have been partly exempted from the free movement of workers principle for a transition period. Nevertheless, I assume that EU accession has facilitated labour migration for Eastern Europeans towards Germany despite the transitional regulations that Germany and other EU member states have implemented (e.g. Kahanec et al. 2009). Therefore, I include an *EU member* dummy indicating those countries which were acceding to the EU in 2004 and 2007, respectively. Furthermore, migration networks are well-established factors in driving bilateral migration flows (Fawcett 1989; Pedersen et al. 2008). Due to the fact that intra-European migration is largely employment-driven I use the stock of employment by nationality (*Foreign employment*) as a proxy variable to capture the strength of bilateral linkages and corresponding network effects. This disaggregation of the total employment stock by nationality allows me to control for some heterogeneity in fluctuations of labour market participation across different nationalities. This suggests that potential migrants are very likely to take the employment situation of compatriots into account more than the overall employment situation. Absolute differences in living standards are captured by the *income gap* variable, which measures bilateral differentials in GDP per capita (in 1000 Euro)

at current prices, correcting for differences in price levels between countries by applying purchasing power standards (Eurostat 2011). The expected sign of the respective estimate is positive, implying that inflows from countries richer than Germany (i.e. with negative income gaps) will *ceteris paribus* be smaller than from countries with a lower living standard. Actual labour market effects on migration flows are captured by two alternative types of variables: first, unemployment rates (seasonally adjusted for quarterly flows between 2006 and 2010) for Germany and all 26 origin countries (ECB 2011), and second, the job vacancy ratio at the German Federal state level to control for differences in labour market situations on a sub-national level. Data for job vacancies and foreign employment come from the German Federal Employment Agency (Bundesagentur für Arbeit 2011).

3.2 Empirical model

The following empirical model examines the impact of economic prospects P concerning the future general economic and future unemployment situation on *annual* and *quarterly* bilateral migration flows M in a three-dimensional panel dataset from 26 EU origin countries towards 16 German Federal States for two separate, though overlapping, observation periods (2001–2010 and 2006Q1–2010Q4, respectively):

$$M_{ijt} = \sum_{s=1}^q \alpha_s M_{ij,t-s} + \beta_1 P_{ij,t-1} + \beta_2 X_{ijt-1} + \omega_{ij} + \varepsilon_{ijt} \quad (4)$$

with $i, j = 1, \dots, N$; $t = 1, \dots, T$ and α_s being parameters to be estimated for autoregressive terms of order q , $P_{ij,t-1}$ as a vector of exogenous indicators, respectively, on economic and unemployment prospects lagged by one period, X_{ijt-1} is a vector of supposedly predetermined covariates lagged by one period, β_1 and β_2 are vectors of parameters to be estimated, ω_{ij} are the panel-level time-invariant fixed effects, and ε_{ijt} are *i.i.d.* idiosyncratic errors assuming independence of all t , i.e. $E[\omega_{ij}] = E[\varepsilon_{ijt}] = E[\omega_{ij}\varepsilon_{ijt}] = 0$.

By design, the autoregressive terms are correlated with the unobserved panel-level fixed effects, and thus, causing inconsistent standard OLS estimators. For the combination of many panels (16x26=416) and rather few periods (10 years and 20 quarters, respectively), the Arellano-Bond estimator uses first-differences to remove the panel-level fixed effects and instruments to form moment conditions (Arellano and Bover 1995; Arellano and Bond 1991). However, Blundell and Bond (1998) point to the fact that lagged-level instruments become weak as the autoregressive process becomes too persistent or the variance of the panel-level fixed effects ω_{ij} to the variance of the idiosyncratic errors ε_{ijt} becomes too large. The Arellano-Bover/Blundell-Bond (one-step) estimator, therefore, uses moment conditions in which lagged differences are used as instruments for the level equation in addition to the moment conditions of lagged levels as instruments for the differenced equation. The additional moment conditions are valid only if the initial condition $E(\omega_{ij}\Delta M_{ij,2}) = 0$ holds for all panels (Roodman 2006).

The indicator on economic and unemployment prospects P_{ijt} requires some more explanation. Based on monthly Europe-wide survey data on economic and unemployment prospects (see footnote 1), I basically construct two different indicators for testing implications of the outlined migration prospect theory: first, in the regression of annually aggregated migration flows between 2001 and 2010 I create dummy variables indicating whether the average economic and/or unemployment prospects have been better or worse than in the previous year, which is assumed as a reference point for evaluating present

economic prospects for the future. For the more short-term, i.e. quarterly, aggregations of migration flows between 2006Q1 and 2010Q4, the reference point for assessing changes in economic prospects is the three-month-average of past economic prospects of the preceding quarter. For this short-term migration model I use the difference-in-difference *DID*-indicator (see equation 2). I test the following features of the outlined migration prospect theory with reference-dependent expectations: first, *loss aversion* with respect to both country-specific economic prospects and bilateral migration prospects based on differences in country-specific economic prospects between the respective EU origin country and Germany; second, *differences in risk attitudes* for positive versus negative changes in economic and unemployment prospects; and third, *diminishing sensitivity of migration propensities* for positive versus negative changes in economic and unemployment prospects. The latter non-linearity is tested by adding a squared term for the *DID*-indicator. For both migration models of annual and quarterly inflows, we can expect stronger effects for expectation-based losses (i.e. negative changes in economic and/or unemployment prospects) than for expectation-based gains (i.e. positive changes in economic and/or unemployment prospects). The model on quarterly migration flows tests additionally some hypotheses about *convexity of expectation-based losses* and *concavity of expectation-based gains*. Finally, X_{ijt} is a vector of the following control variables: seasonally-adjusted *Unemployment rates* in the respective origin countries and Germany, differentials in living standards measured by *Income per capita gaps* between the origin country and Germany, *Employment stock* of each EU-26 immigrant group in Germany (variable is only used for models on the inflow of foreigners), and the *Vacancy ratio* at federal state level defined as the number of job vacancies as a percentage of the total number of registered unemployed persons.

3.3 Results

Table 1 displays the dynamic panel regression results on annual bilateral inflows from the 26 European Union member states towards the 16 German Federal States between 2001 and 2010. Models (1) and (2) display inflows of people with foreign citizenship, whereas models (3) and (4) estimate return flows of German citizens. EU accession of eight Eastern European countries plus Malta and Cyprus in 2004 and of Romania and Bulgaria in 2007 has a significant effect on bilateral flows – and this despite a seven-year transition period before Germany (and some other EU member states) had fully implemented the free movement of workers principle for the Eastern European countries (Article 39 of the Treaty on European Union). EU accession of these countries increased annual bilateral flows of foreign citizens – on average – by about 63 per cent while return flows of German citizens increased on a smaller scale by about 17 per cent.

The effect of the size of the bilateral networks is captured by the total (log) number of people in full-time employment by citizenship. Obviously, this control variable is only used in the models on inflows of foreigners. It is shown that an increase of employment by 1 per cent induces further bilateral migration flows of compatriots by about 0.62 per cent. This network effect is in addition to the overall effect of the general economic and labour market situation. Living standards within the European Union between member states are still heterogeneous with Bulgaria and Romania at the low end, with per capita income levels in 2010 at about 11000 Euro, and in Luxembourg at about 69000 Euro (at market prices and purchasing power standards). The EU-27 average of income per capita was about 24,400

Euro in 2010 with Germany ranked number seven with an income per capita of about 29,000 Euro. Thus, and although income levels have been converging over the last decade, there are still significant gaps in living standards across Europe, with Germany having positive income differentials with most other EU countries, but also some small negative gaps in living standards with (mostly neighbouring) countries such as Austria, Denmark, and the Netherlands. Despite some convergence, these income gaps change rather slowly, and therefore this income gap indicator rather controls for living standard effects on long-term inflows. A hypothetical decline of bilateral income gaps by about 1000 Euro would decrease the annual inflow of foreigners – on average – by about 1.7 per cent and the average return flow of Germans by around 2.3 per cent.

Table 1: System dynamic panel estimation (GMM): Annual bilateral inflow (state level), 2001–2010

VARIABLES	(1) Foreign	(2) Foreign	(3) German	(4) German
AR(1)	0.379*** (15.90)	0.371*** (15.79)	0.262*** (8.901)	0.256*** (8.736)
Dum: EU member	0.626*** (16.80)	0.644*** (17.90)	0.161*** (3.145)	0.170*** (3.431)
Log: Foreign employment (GER)	0.610*** (11.84)	0.633*** (12.42)		
Income gap (GER-origin)	0.0176*** (3.298)	0.0166*** (3.076)	0.0222*** (2.878)	0.0230*** (3.048)
Unemployment rate (GER)	-0.0423*** (-3.600)	-0.0335*** (-2.913)	-0.0568*** (-4.024)	-0.0543*** (-3.965)
Unemployment rate (origin)	0.0659*** (15.40)	0.0628*** (14.74)	0.00950 (1.442)	0.00721 (1.130)
Vacancy ratio (GER, state level)	0.0142*** (4.086)	0.0152*** (4.435)	0.00540 (1.298)	0.00545 (1.333)
Dum: Neg economic prospect (origin)	0.0675*** (3.985)		0.0338* (1.688)	
Dum: Pos economic prospect (GER)	0.0474** (1.999)		0.0665** (2.393)	
Dum: Neg unemployment prospect (origin)		0.0619*** (2.970)		0.0597** (2.417)
Dum: Pos unemployment prospect (GER)		0.0509* (1.944)		0.0877*** (2.838)
Constant	-4.038*** (-9.740)	-4.247*** (-10.40)	1.929*** (7.944)	1.924*** (7.952)
Observations	3,122	3,138	2,863	2,879
Number of groups	409	409	395	395

Notes: z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All explanatory variables are lagged by one period.

Besides differences in absolute living standards, current labour market situations in origin countries and Germany have a strong influence on bilateral inflows. I measure the effect of unemployment on migration flows separately for all sending countries and Germany. Similar to differences in absolute living standards, unemployment situations and respective rates vary significantly across European Union member states. Despite the immediate, but only short-term effects of the global financial crises in 2008 on economic growth, the labour

market situation in Germany has been surprisingly robust and, after a dip in early 2009, continued its upward trend. Over the last decade, the unemployment situation in Germany has improved due to the effects of the long-term trend of demographic change, reforms of labour market institutions (e.g. the Hartz IV laws) and some short-term interventions of active labour market policy during the recent economic crisis (see Burda and Hunt 2011). Our regression results for annual migration inflows between 2001 and 2010 show that an increase of the average annual unemployment rate in Germany by one percentage point results in a decline of bilateral inflows between 3.4 and 4.2 per cent for foreigners and of about 5.5 per cent for (return) inflows of German citizens. Unemployment in origin countries has had a rather ambiguous effect on annual inflows of foreigners and Germans: while foreign citizens respond quite strongly to increasing unemployment in their home country, return flows of German citizens seem rather to be independent from the current labour market situation in the host countries. For foreigners, however, a hypothetical one percentage point decrease of the German unemployment rate and an equivalent increase of the unemployment rate in the origin country, i.e. a net increase of the bilateral 'gap in unemployment rates' of about two percentage points results in an increase of the respective bilateral migration flow by about 10 per cent. In addition to unemployment rates, I control for the vacancy ratio at the federal state level.³ Here I can find robust and significant effects only for foreigners whose inflow increases between 1.4 and 1.5 per cent as a result of a one percentage point increase of the job vacancy ratio. This vacancy effect has to be interpreted cautiously since these are only job vacancies reported to the job centres. Most vacancies are normally filled 'informally', i.e. without the job centres being involved into the intermediation.

The role of economic prospects in shaping annual migration fluctuations is tested by using dummy variables for positive versus negative economic and unemployment prospects (lagged by one period) in Germany and the origin country, respectively. The results show that foreign inflows respond (i) positively on negative prospects in the origin country and positive prospects in the destination country, (ii) more strongly to negative economic prospects in the home country than positive economic prospects in Germany. Interestingly, the second result does not hold for German return flows. Those flows respond more strongly to positive prospects in Germany than to negative prospects in the EU host country. This seems to contradict the implications of prospect theory; however, it might also point to an aspect which we have not considered so far: geographical reference-dependence. German citizens working and living abroad may keep relatively strong links to Germany by maintaining social networks, which allows them not only to respond more strongly to short-term developments in Germany, but also more quickly than foreigners without the same informational and behavioural dispositions (see Figure 4).

Noteworthy, besides statistical significance, is the economic significance of these indicators about economic and unemployment prospects. For instance, a shift from negative economic prospects towards positive prospects concerning the general economic situation in Germany increases foreign inflows by about 4.7 per cent. This is about the equivalent of a decline of the actual unemployment rate by one percentage point, which increases foreign

³ Job vacancies and unemployment levels normally have a negative (non-linear) relationship ('Beveridge effect') with a significant correlation. In fact, cross-correlation for the number of unemployed and job vacancies at the national level is -0.53, while cross-correlation with data at state level has a correlation coefficient of -0.12, which reduces potential problems of multicollinearity.

inflows by about 4.2 per cent. For German return flows, the relative importance of real economic indicators versus economic prospects is similar: the negative effect on inflows of an increase of the unemployment rate in Germany by one percentage point is more than compensated by a positive shift in future prospects about the general economic situation and labour market conditions.

Table 2 shows the results for the estimates on the drivers of quarterly intra-European migration flows to Germany between 2006 and 2010 (20 quarters). The same set of drivers (except the EU membership dummy) is applied to the model on short-term migration fluctuations as in the previous model on annual flows. The only difference is that the prospect variables are defined as difference-in-difference indicators about the quality of the migration option based on differences in economic and unemployment prospects between the origin country and Germany.⁴ This different approach serves three purposes: first, it is an alternative way of checking robustness about the loss aversion of migrants which we have identified before by using dummies for country-specific economic and unemployment prospects; second, we can test for a change in risk attitudes, i.e. whether migrants are risk-averse towards positive prospects and risk-friendly with respect to negative prospects; and third, we can control for a diminishing sensitivity of migrants towards more extreme changes in expectations about the future economic and unemployment situation.

Empirical evidence on the role of economic prospects in short-term migration fluctuations shows that positive differences between general economic and unemployment prospects between Germany and a sending country have a positive but smaller effect than equal-sized negative prospect differences. Interestingly, this holds for both types of inflows, i.e. foreign inflows and German return flows. When economic prospects are defined as bilateral differences-in-differences, instead of separate origin- and destination-specific prospects, German return flows and foreign inflows respond qualitatively similarly: stronger for negative than for equal-sized positive prospects. This provides additional evidence that *loss aversion* is a valid but so far ignored behavioural aspect in the migration decision-making process. On an individual level, loss aversion implies that when faced with negative migration prospects, potential migrants tend to respond more strongly, e.g. by postponing or even cancelling the realisation of their migration project, than they do when future prospects are positive. This study provides evidence that loss aversion is a valid and measurable concept also on an aggregate level by indicating that migration flows drop more significantly as a result of negative economic or unemployment prospects than they increase in the case of equal-sized positive prospects.

The empirical results indicate that (annual and quarterly) inflows of German and foreign citizens respond more strongly to unemployment prospects than to general economic prospects. A possible explanation of this finding is that potential migrants and returnees consider information on labour market conditions to be more relevant than information about the future general economic situation. Though being associated according to the implications of Okun's law, a changing general economic situation corresponds only imperfectly, and only in a deferred fashion, to similar changes in labour market conditions and unemployment (Okun 1970; Prachowny 1993). Migrants seem to be

⁴ Alternatively, and as a robustness check for the previous results on annual flows, I also used prospect dummies, which led to qualitatively similar results as in the previous model (not reported).

aware of the fact that positive economic prospects do not necessarily turn into an immediate improvement of the labour market situation.

Table 2: System dynamic panel estimation (GMM): Quarterly bilateral inflow (state level), 2006–2010

VARIABLES	(1) Foreign	(2) Foreign	(3) Foreign	(4) Foreign	(5) German	(6) German	(7) German	(8) German
AR(1)	0.0515*** (2.794)	0.0488*** (2.663)	0.0222 (1.187)	0.0337* (1.757)	0.0593*** (2.913)	0.0515** (2.547)	0.0643*** (3.165)	0.0735*** (3.566)
Foreign employment (GER)	0.521*** (11.74)	0.534*** (12.05)	0.509*** (11.90)	0.507*** (11.81)				
Income gap (GER-origin)	0.105*** (16.16)	0.104*** (15.94)	0.118*** (17.58)	0.114*** (16.48)	-0.0160 (-1.631)	-0.0198** (-2.025)	-0.0206** (-2.085)	-0.0276*** (-2.762)
Unemployment rate (origin)	0.0404*** (9.073)	0.0383*** (9.281)	0.0380*** (9.426)	0.0372*** (9.014)	0.0198** (2.418)	0.00901 (1.190)	0.00249 (0.329)	0.00482 (0.623)
Unemployment rate (GER)	-0.0235*** (-2.875)	-0.0159* (-1.909)	-0.0505*** (-5.247)	-0.0494*** (-5.192)	-0.0608*** (-5.429)	-0.0468*** (-4.075)	-0.0716*** (-5.176)	-0.0726*** (-5.360)
Vacancy ratio (GER, state level)	0.0221*** (6.590)	0.0219*** (6.614)	0.0195*** (5.893)	0.0168*** (4.934)	0.0124*** (2.887)	0.0103** (2.472)	0.00290 (0.679)	-0.00171 (-0.392)
Pos economic prospect	0.00295*** (3.438)				0.00175 (1.457)			
Pos economic prospect (sq)	-5.53e-05*** (-3.615)				-6.42e-05*** (-2.917)			
Neg economic prospect		0.00333*** (3.277)				0.00233* (1.746)		
Neg economic prospect (sq)		7.63e-05*** (3.902)				8.39e-05*** (3.405)		
Pos unemployment prospect			0.00396*** (4.258)				0.00438*** (3.438)	
Pos unemployment prospect (sq)			-5.38e-05*** (-3.083)				-5.88e-05** (-2.428)	
Neg unemployment prospect				0.00446*** (5.889)				0.00532*** (5.309)
Neg unemployment prospect (sq)				4.59e-05*** (4.316)				4.63e-05*** (3.297)
Constant	-1.986*** (-4.570)	-2.115*** (-4.858)	-1.552*** (-3.663)	-1.541*** (-3.620)	2.586*** (12.04)	2.601*** (12.18)	2.816*** (12.51)	2.895*** (12.79)
Observations	6,184	6,184	5,892	5,892	4,615	4,615	4,424	4,424
Number of groups	398	398	397	397	352	352	350	350

Notes: z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All explanatory variables are lagged by one period. In all models, AR(3) is estimated although only AR(1) is reported. Inclusion of AR(3) shall control for potential seasonal migration cycles.

Furthermore, potential migrants tend to change risk attitudes by being risk-averse when facing positive migration prospects, and risk-friendly when expecting negative bilateral differences in economic or unemployment prospects. This behavioural property implies that – contrary to the standard economic model – individuals do not have systematically risk-averse preferences, but risk attitudes can change when realised or expected outcomes are *reference-dependent* (Kahneman and Tversky 1982; Kőszegi and Rabin 2009). Thus, besides having individual-specific risk attitudes, these results imply that migrants are neither extremely ‘risk-loving’ as suggested by Sahota (1968) nor systematically risk-averse as assumed by neoclassical models (Harris and Todaro 1970; Sjaastad 1962) or the new economics of labour migration (Stark and Levhari 1982; Katz and Stark 1986). Instead, migrants ‘adjust’ their risk attitudes depending on their individual reference point and the type of information they receive about real or expected outcomes.

Depending on whether real or expected outcomes are interpreted as a relative gain or loss, i.e. a positive or negative deviation from the expectation-based reference point, individual migrants are risk-averse (gains) or risk-seeking (losses). Related to the change in risk attitudes is the diminishing sensitivity of potential migrants towards expectation-based gains and losses: the impact of a change in expectations diminishes with the ‘distance’ from the reference point, which is assumed to be the expectations of the previous period about the future economic situation. The more positive or negative economic prospects become compared to previous periods’ economic prospects, the smaller becomes the marginal effect on migration propensities. This non-linearity in expectation-based utility is supported by the estimates on positive (concavity) and negative (convexity) prospects about the future situation of the economy for both foreign and German citizens.

For the set of control variables I find qualitatively very similar effects on short-term migration fluctuations as for annual flows. Bilateral networks seem to have a similar effect on facilitating quarterly inflows of foreigners. A hypothetical 1 per cent increase in the nationality-specific employment level increases the corresponding bilateral inflow of compatriots by about 0.5 per cent. A differential in living standards, measured by income per capita, between origin countries and Germany has a positive effect on the level of foreign inflows only, while for German returnees the effect is either insignificant or slightly negative.

Estimates on unemployment rates in both origin countries and Germany show the expected signs with a relatively strong and robust effect of the German unemployment situation on German return flows confirming the above-mentioned concept of geographical reference-dependency. Job vacancies, as an alternative indicator of the present labour market situation, seem to signal important information to which foreign migrants particularly respond strongly. An increase of the job vacancy ratio by one percentage point increases the bilateral inflow of foreigners in the short run, i.e. in the next quarter, in the range of about 1.7 to 2.2 per cent. This attraction effect of job vacancies remains significant also in the longer term, i.e. about 1.5 per cent in the subsequent year (see Table 1), while German return flows seem to be rather independent of the number of job vacancies, at least in the longer term.

4 Summary and conclusion

Based on Kahneman and Tversky's (1979) seminal work on prospect theory, this study is an attempt to apply related behavioural economic insights on reference-dependent expectations to the individual decision-making process of potential migrants and to identify, on the aggregate level of intra-European migration flows, some empirical evidence supporting the implications of a 'migration prospect theory'. This analysis shows that expectation-based loss aversion is a valid concept to explain why negative economic and unemployment prospects in the origin country have a stronger effect on bilateral migration flows than equal-sized positive prospects in the destination country. Hereby, I identify reference-dependency not only for the assessment of overall migration prospects, but also 'geographical reference-dependence' of potential returnees towards their home country. This means that migrants, when deciding whether to return home, respond more strongly to economic prospects in their home than in their host country. Another known feature in prospect theory is diminishing sensitivity about prospective gains *and* losses. Furthermore, migration responsiveness tends to decline the larger reference-dependent expectation gains or losses are, implying a diminishing sensitivity to positive and negative economic prospects. Additionally, risk attitudes depend on the type of prospects: potential migrants are risk-averse when expecting an improvement of economic and/or unemployment prospects and risk-seeking when expecting relatively negative prospects for the future.

Thus, a migration prospect theory based on reference-dependent expectations implies that short-term bilateral migration flows are rather driven by *changes* in future prospects about the origin and destination country's economic situation, respectively. This migration prospect theory has presumably less explanatory power for long-term trends in international migration patterns, which seem rather driven by bilateral differences in absolute economic living standards. However, reference-dependent and expectation-based prospects about the future can cushion structural economic differentials – at least in the short term. For instance, 'structural' migration incentives, based on positive bilateral differences in living standards between origin and destination countries, can be compensated by positive (negative) expectation-based prospects about the future economic situation in the home (destination) country, which can theoretically reduce or even interrupt long-term migration flows. Similarly, expectation-based economic prospects can also create migration incentives even if positive economic differentials between the origin and destination country do not exist. Thus, by referring to reference-dependent utility derived from expectations about future outcomes, the outlined migration prospect theory provides an explanation of a 'downward migration' from, in absolute terms, richer to poorer countries. Further research, however, has to validate these more long-term implications by analysing long-term trends in bilateral migration as a result of long-term future economic prospects (i.e. more than 12 months).

Beyond this empirical endeavour, a comprehensive behavioural model of migration should integrate all four sources for utility, i.e. reference-independent expected utility, reference-independent expectation-based anticipatory utility, reference-dependent utility on realised outcomes, and reference-dependent expectation-based utility. It is very likely that all utility sources play at least some role in the decision-making process of potential migrants. Realising these steps forward in migration theory is left for future research.

Annex

Table A1: Descriptive statistics

Variables	Obs	Mean	St. Dev.	Min	Max
Foreign annual inflow (Germany, state level)	4064	780.2	2392	0	34743
German annual inflow (Germany, state level)	4064	128.84	364.0	0	5104
Unemployment rate (Germany, national level)	4160	8.77	1.28	7.10	11.2
Unemployment rate (country of origin, national level)	4160	8.10	3.79	1.90	20.1
Income per capita(Germany)	4160	26410	2169	23100	29000
Income per capita(country of origin)	4160	21798	10455	5500	70000
Vacancy ratio (Germany, state level)	4160	8.61	5.59	1.47	27.81
EU membership (dummy, country of origin)	4160	0.85	0.36	0	1
Foreign Employment (bilateral, national level)	4160	28057	40709	106	205791
Unemployment prospects (country of origin)	4128	25.59	19.78	-26.89	83.68
Economic prospects (country of origin)	4096	-11.89	14.60	-56.96	25.07
Unemployment prospects (Germany)	4160	25.06	18.62	-8.42	61.78
Economic prospects (Germany)	4160	-14.05	11.57	-35.20	7.63

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