Intergenerational Transmission of Inflation Aversion: Theory and Evidence

Etienne Farvaque* and Alexander Mihailov†

Work-in-progress: July 2009‡

Abstract

We study the evolution of inflation aversion preferences across generations. The theoretical part of the paper analyzes the transmission of such preferences in an overlapping-generations model with heterogenous mature agents characterized by differences in inflation aversion. We show how the dynamics of a society's degree of inflation aversion depends on the direction and speed of changes in the structure of the population's preferences. The empirical part then proposes two prominent and topical illustrations in support of our theoretical results. We first provide time-series evidence that demographic structures are one key driver of social preferences with regard to inflation. We then complement this by cross-section evidence on inflation aversion highlighting another of its main longer-run determinants, namely, income inequality.

Keywords: intergenerational transmission, evolving preferences, inflation aversion, central bank independence, demographic change, income inequality

JEL classification: E24, E31, E58, J10

*Equippe – Universités de Lille and DULBEA, Université Libre de Bruxelles. Correspondence to: Faculté des Sciences Economiques et Sociales, Universite de Lille 1, 59655 Villeneuve d'Ascq Cedex France; Etienne.Farvaque@univ-lille1.fr.

†School of Economics, University of Reading, Whiteknights, Reading RG6 6AA, United Kingdom; a.mihailov@reading.ac.uk.

‡This is a revised version of Economics and Management Discussion Paper 08-071 (August 2008) at the Henley Business School of the University of Reading. The first author has benefited from a travel grant from the University of Lille 1. Without implication, we thank Mark Casson, Marina Della Giusta, Nigar Hashimzade, Peter Hart, Stéphane Lambrecht, Stephen McKnight, Yves Rolland and Stéphane Vigeant for helpful remarks on earlier drafts. Feedback is also acknowledged from the audiences at the 4th International Annual Meeting of the Economic and Social Data Service (UK) in London (1 December 2008), a seminar at the University of Reading (10 December 2008), and the 43rd Annual Meeting of the Canadian Economic Association in Toronto, Ontario (28-31 May 2009). The usual disclaimer applies.

Contents

List of Figures

1 Introduction

Is low inflation here to stay? Competing theories may provide hints about the likely permanence – or not – of the contemporary low-inflation regime. Some would probably insist on the evolution of monetary institutions, more independent and more focused on price stability during the recent period of Great Moderation than in the last episode of Great Inflation (see, e.g., Crowe and Meade, 2007). Others have pointed to globalization as a weight on inflationary pressures (see, e.g., Gamber and Hung, 2001, and Rogoff, 2003). And at present, deflationary pressures due to the raging profound global financial crisis and strongly weakened world demand conditions are countered by concerted actions of national authorities of an unprecedented magnitude in an attempt to preserve the reign of low and stable inflation over a medium to longer-term horizon. However, such theories, as well as the mechanisms and policies implied, address the 'how did we arrive there?' question rather than the one that naturally follows, i.e., 'where do we go from here?'.

More deeply rooted explanations of the worldwide trend toward low inflation are therefore needed to answer the second question. In such a context, inflation preferences are fundamental, as their dynamics is shaping a nation's inflation prospects. Hence, investigating the evolution of inflation aversion is crucial to determine if low inflation is here to stay or if central bankers have to be wary of inflation, whatever their degree of independence. One thus has to focus on social preferences with regard to the desirable inflation and explore their transmission from one generation to another. Along such lines, part of an explanation would lie in the 'inflation culture hypothesis'. As shown by Hayo (1998), who coined the expression, preferences for low inflation may have their roots in a nation's culture, the latter being moulded by history. De Jong (2002) complements this theory by showing that nations are influenced by distinct features, where inflation aversion is related to inequality and uncertainty aversions, while Scheve (2004) brings in a more skeptical note showing how sensitive to business cycles those preferences are. Moreover, survey outcomes, e.g., exploited by Jayadev (2006), reveal that such preferences may also originate in an individual's relative position in society.

While most of the literature in economics assumes preferences as 'priors' which are endowed to agents and do not change, a more promising route to understand the sustainability of the recent low-inflation regime is to look at preferences as shaped out by evolutionary and cultural forces in society. Based on such a departing hypothesis, we endogenize inflation preferences as being transmitted from one generation to another. In implementing this approach, popular in the broader field of social sciences but not that much in economics, we essentially follow Bisin and Verdier (2000, 2001). The latter authors build on the emerging literature on endogenous preferences,

e.g., Becker (1996), to develop and analyze formal set-ups with evolving preferences. Though Bisin and Verdier (2000, 2001) were interested in the provision of public goods, their framework has more recently been used by Sáez-Martí and Sjögren (2008) to study the transmission of cultural traits. We here rely on a similar framework to investigate the dynamics of inflation aversion, and – in effect – to answer our 'is low inflation here to stay?' question.

It may seem surprising that very few papers have indeed examined the stability of inflation aversion. However, in addition to the constraining assumption of exogenous preferences in theoretical models, this outcome probably also reflects a simple empirical trend: economists obviously admit that central bank independence – embodied in laws and regulations in many countries over the last two decades – reveals a society's inflation aversion. From such a perspective, then, everything appears as if the world has evolved towards higher inflation aversion, evidenced by the rising number of central banks made independent or, for the ones which were already, by the increase in their degree of independence (see Guillén and Polillo, 2005, or Crowe and Meade, 2007, for example, who document this evolution). Yet, the stability of central bank independence as an institution-design solution to the inflation bias can still be questioned: e.g., di Bartolomeo and Pauwels (2006) have shown in a game-theoretic model that under realistic assumptions there is a limit on central bank conservativeness.[1] Although there are no direct empirical implications of their set-up, such results can only invite further modeling and applied investigation, a task we also address in this study.

In the first part of the present paper, we analyze the dynamics of inflation-aversion preferences in an overlapping-generations (OLG) model with heterogenous mature agents characterized by different degrees of inflation aversion. We show how the stability of a society's degree of inflation aversion in a deterministic version of our framework depends on the direction and speed of changes in the structure of the population, implying an ultimate survival of one of the types and complete extinction of the other (as in evolutionary models recently explored within economic contexts). We also briefly discuss how convergence to an interior equilibrium can emerge under the presence of cultural substitution in the socialization efforts of parents (similarly to the endogenous preference mechanism which is the focus in Bisin and Verdier, 2001, and Sáez-Martí and Sjögren, 2008). We finally argue that in a further, more realistic extension of the set-up to stochastic shocks in the socialization process, periodic reversals would generate an irregular cyclical pattern of the intergenerational dynamics of social preferences.

Two topical – and interrelated – empirical applications are then derived

[1] A related question is raised in Broadbent and Barro (1997), who put in doubt the permanence of the committedness parameter of the Fed.

from our framework to illustrate its main insights. We first report time-series evidence that the evolution of the proportion of retirees is strongly associated with a society's inflation aversion, in both statistical and economic sense. We attribute this relation to the retirees' preferences, as they have all the incentives to support low inflation in order to protect their accumulated wealth. The relation is verified for selected four countries which represent the characteristic extremes of our sample: Germany, Ireland, Japan and Mexico. Our findings imply that, with an aging population structure as a stable trend, low inflation is here to stay. Second, we look into income (in)equality as another major inflation aversion driver. Results, using different measures of inflation aversion and income inequality and corresponding to different cross-section samples, robustly show that inflation aversion tends to be higher in more equal societies, in line with earlier empirical work by De Jong (2002). We also find that whereas inflation aversion is negatively related to the share of the top quintile in the income distribution, it is at the same time positively related to the share of the bottom quintile. I.e., in societies that are 'more equal' (or, rather, more equitable) in the latter sense, the poorest people exhibit relatively higher inflation aversion, which can be attributed to the lack of protection of their few assets and revenues from inflation. A potential trend (back) to more egalitarian societies or to the values of the social-welfare state may thus provide another explanation, in addition to demography (and the Great Moderation, in case it survives through the current financial turbulence across the globe), for inflation aversion and, hence, low inflation to stay longer.

The paper is structured as follows. The next section presents the model, focusing on the types of preferences and the dynamics of preference transmission across generations in relation to the evolving structure of the population. Section 3, in turn, provides two empirical applications in support of the theoretical results, first involving changes in demography and then variation in income inequality. The final section concludes, while Appendix A presents the data definitions and sources.

2 Theoretical Framework

We here build on the OLG set-up of Bisin and Verdier (2000, 2001), to extend and apply it to explaining the long-run evolution of inflation aversion, in theory and in the data.

2.1 Preference Types and Optimal Voting

A generation consists of a continuum of individuals, each living for two periods and having one offspring, so that the population is constant and the size of the mature generation is normalized to one. We consider two types, a and b, of preferences in the population defined on a private good c and a

public good G, which we interpret narrowly as independence of the central bank. In the beginning of their mature life, all individuals receive an identical endowment ϖ. The degree of central bank independence is decided in each period by majority voting in parliament through proportional representation of the mature generation.[2] Following Bisin and Verdier (2000), we assume that each period t each adult chooses the total amount of the public good, G_t, knowing that everyone else in the society, irrespective of preference type, will have to contribute an equal share, $\frac{G_t}{1}$ (where unity in the denominator comes from the normalization of the mature population), towards the cost of providing the public good in the same period.[3] However, only agents of type a prefer a strongly independent central bank, whereas agents of type b have milder preferences with regard to central bank independence. Hence, though all agents value central bank independence, the particular degree of independence depends on the outcome of voting in parliament each period, itself a direct projection of the proportion of each type of inflation-aversion preferences in the society. In our set-up, therefore, the benefits of central bank independence are implicit,[4] the choice being between different degrees of independence. Preferences, then, can be represented in the following (separable) form:

$$u^i(c_t, G_t) = u^i(c_t) + \gamma^i \upsilon^i(G_t), \quad \text{with} \quad i \in \{a, b\} \text{ and } \gamma^a > \gamma^b > 0$$

where $u(c_t)$ and $\upsilon(G_t)$ are strictly concave, increasing functions satisfying $u'(0) = \upsilon'(0) = \infty$.

A particular degree of central bank independence, if voted in period t, entails at the same time a social cost, i.e., some function $G_t(\cdot)$. This is an aggregate cost to society which can come from several sources. It could, for example, be related to a distortion of the Phillips curve trade-off that may arise at very low levels of inflation. This argument has been raised by Akerlof *et al.* (1996) and Benigno and Ricci (2008), the mechanism behind it being that the sacrifice ratio would increase at low levels of inflation. Such a situation may be perceived as costly by (part of) the electorate. A complementary source could come from openness, as higher degrees of openness may also worsen the terms of the output-inflation trade-off (see Daniels and VanHoose, 2006), which some polities may find costly as it

[2] Modeling the political system is out of the scope of this article, and we refer the reader to Faust (1996), Bullard and Waller (2004) or Berentsen and Strub (2008).

[3] The literature on the private provision of public goods allows a less restrictive setting where each agent chooses his contribution, in units of consumption good, and the resulting amount of the public good equals the sum of all contributions. We leave this avenue for future research.

[4] The literature has widely insisted on such benefits (see notably the survey by Berger *et al.*, 2001, or Crowe and Meade, 2007), so we avoid their discussion here, to focus on our point.

reduces the ability of the central bank to react to negative shocks.[5]

Without loss of generality and following the huge literature on the provision of public goods, the social cost of central bank independence is hereafter expressed in terms of good c. If the fraction q_t^i, with $0 \leq q_t^i \leq 1$, of type $i \in \{a, b\}$ individuals at time t is more than a half, then $q_t^i > q_t^j$, and the voting equilibrium degree of central bank independence solves the maximization program of the type i (identical) agents

$$\max_{G_t} \quad u^i(c_t, G_t) \quad \text{s.t. } c_t + \frac{G_t}{1} \leq \varpi,$$

so that the corresponding unconstrained optimization problem can be written as

$$\max_{G_t} \quad u^i(\varpi - G_t) + \gamma^i \upsilon^i(G_t),$$

$$\begin{aligned} \text{with FOC} \quad : \quad & \frac{\partial \left[u^i(\varpi - G_t) + \gamma^i \upsilon^i(G_t)\right]}{\partial G_t} = 0 \\ \Leftrightarrow \quad & u^{i\prime}\left(\varpi - G_t^{i*}\right) = \gamma^i \upsilon^{i\prime}\left(G_t^{i*}\right) \\ \Leftrightarrow \quad & u^{i\prime}\left(\varpi - G^{i*}\right) = \gamma^i \upsilon^{i\prime}\left(G^{i*}\right). \end{aligned} \tag{1}$$

Equation (1) implicitly defines the optimal social cost $G_t^*\left(\varpi, \gamma^i\right) = G^*\left(\varpi, \gamma^i\right) = const$ (given that the endowment $\varpi = const$ is identical across time periods as well as mature individuals, which was assumed as a natural counterpart to the assumed constant population above) and the corresponding preferred degree of central bank independence of type i agents in any period t. Plugging that constant optimal degree of central bank independence back into the utility yields the value function of the type i agent:

$$\begin{aligned} V^i(\varpi) \quad \equiv \quad & \arg\max_{G} \quad u^i(\varpi - G) + \gamma^i \upsilon^i(G) \\ = \quad & u^i\left[\varpi - G^{i*}\left(\varpi, \gamma^i\right)\right] + \gamma^i \upsilon\left[G^{i*}\left(\varpi, \gamma^i\right)\right] \end{aligned}$$

Because of the optimality of $G^{i*}(\cdot)$ and the positivity of $\gamma^i > 0$,

$$V^i(\varpi) > u^i(\varpi)$$

so that it is always in the interest of a type i mature agent to enjoy the public good, here her particular, preferred degree of central bank independence, namely $G^{i*}(\cdot)$.

[5] One could also think about relating the social cost of central bank independence to transparency, accountability and reputational issues, which induce a (costly) degree of monitoring by the polity of the central bank's actions. However, such a cost would have to be supported by all the successive generations, and may thus not motivate a will to transfer one's preferences to her offspring.

However, the exact *degree* of central bank independence is determined by the dominant type of agents' preferences via representation in parliament. From (1) above, we have:

$$\gamma^a = \frac{u^{a\prime}\left(\varpi - G^{a*}\right)}{v^{a\prime}\left(G^{a*}\right)} > \frac{u^{b\prime}\left(\varpi - G^{b*}\right)}{v^{b\prime}\left(G^{b*}\right)} = \gamma^b > 0 \tag{2}$$

Hence, the optimal degree of independence for each type is shaped by the agent's endowment and the way she feels affected by the cost of central bank independence. In other words, the higher the cost, the lower the optimal degree of independence to be accepted by the agent. If an agent feels that her net consumption possibilities $(\varpi - G)$ would be reduced under a higher degree of independence, because such an independence would imply a lower level of inflation and thus, along the lines of the above argument, a deterioration of the sacrifice ratio, her opposition to an increase in the degree of independence would be stronger. However, the marginal rates of substitution (MRS) of private good consumption for public good consumption across types implied by (2) differ, with type a's such MRS being higher (which is consistent with the higher degree of central bank independence preferred by this type in the population) than type b's MRS. Therefore the overall dynamics of the fraction of each type in the population will influence the intergenerational transmission of inflation aversion, by socialization and voting behavior each period, as we show in the next subsection. To illustrate that point in passing, and anticipating the empirical applications provided below, one can think of the active working-age population as one type (b in our interpretation) who, fearing the consequences of a less favorable inflation-output trade-off on their probability of finding a job quickly in a recession, would support a lower degree of central bank independence than retirees, for whom such concerns resound less than the protection of their savings from inflation. This reinforces the need to consider the stability of the central bank independence solution to the inflation bias, as the mechanisms supporting this solution may not be permanently operative in the economy.

2.2 Deterministic Dynamics of Preference Transmission

As in Bisin and Verdier (2000, 2001) and Sáez-Martí and Sjögren (2008), we begin by modeling the transmission of inflation aversion preferences as occurring through socialization. Yet we also extend their framework to complement it by learning from experience in a dynamic-stochastic economic environment further down.

Children are born 'naive', i.e., with not well-defined preferences, but acquire them through observation, imitation and adoption of 'cultural models' with which they are matched. This matching, termed 'socialization', naturally comes in two steps and is influenced to some extent by economic

choices, but also by parents. Children are first exposed to their parents model (type a or b), and are thus 'matched' with their family, in what can be termed 'vertical transmission'. If they do not adopt their parents' trait, they are then exposed to the influence of other individuals of the old generation (e.g., teachers, peers, role models) and adopt the preference type of some among these, i.e., 'oblique transmission'.[6]

Moreover, 'imperfect empathy' is assumed throughout the paper, a common assumption in the emerging socialization literature within economics. It means that parents can perceive the welfare of their children only through the filter of their own preferences. Such an assumption may sound relatively intuitive, and it has been grounded on sociological and ethnographic evidence, quoted in Bisin and Verdier (2000). Imperfect empathy is thus a particular form of 'myopia' which implies that parents always want to socialize their children to their own preferences and cultural traits, in essence because they think this will have positive consequences for their children's life (in material or nonmaterial sense). In our set-up the assumption would imply that parents consider the benefits of their preferred degree of central bank independence desirable enough so that they feel a moral duty to bequest it. Such a conviction may arise from a kind of 'veil of ignorance' reasoning, or – rather, in our intergenerational context – from experience learned from past events and transmitted to them by their parents.[7]

Exogenous Vertical Preference Transmission To gain clearer insights into the mechanism driving intergenerational transmission of preferences and to formally outline our argumentation in logical steps, the present subsection initially supposes that the child adopts his parent's preferences with a *fixed (exogenous)* probability τ^i, with $0 \leq \tau^i \leq 1$, $i \in \{a, b\}$. With probability $1 - \tau^i$, the child is matched randomly with another individual of the old generation and adopts her preference type.

Then, consider the transition probabilities at time t, P_t^{ij}, that a parent of type i has a child adopting a preference of type j:

$$\begin{aligned}
P_t^{aa} &= \tau^a + (1-\tau^a)\, q_t^a \\
P_t^{ab} &= (1-\tau^a)\,(1-q_t^a) \\
P_t^{bb} &= \tau^b + \left(1-\tau^b\right) q_t^b = \tau^b + \left(1-\tau^b\right)(1-q_t^a) \\
P_t^{ba} &= \left(1-\tau^b\right)\left(1-q_t^b\right) = \left(1-\tau^b\right) q_t^a
\end{aligned}$$

[6] Terminology taken from the anthropological and psychological literature on child development, notably Cavalli-Sforza and Feldman (1981).

[7] For example, Shiller (1997) shows that older Germans have stronger inflation aversion than their offspring, a cultural trait with an origin that can be traced back to the hyperinflation episodes experienced in 1923 and 1948.

Given these transition probabilities, the fraction q_t^a of adult individuals of type a in period $t+1$ evolves according to:

$$\begin{aligned} q_{t+1}^a &= q_t^a P_t^{aa} + q_t^b P_t^{ba} \\ &= q_t^a P_t^{aa} + (1 - q_t^a) P_t^{ba} \\ &= q_t^a + q_t^a (1 - q_t^a) \left(\tau^a - \tau^b\right) \\ &= \left[1 + (1 - q_t^a) \left(\tau^a - \tau^b\right)\right] q_t^a \end{aligned}$$

It is clear from the last line above that the fraction of type-a agents in the old generation may stay constant across time only if the term in square brackets is equal to 1. This would occur if either (i) $q_t^a = 1$ or (ii) $\tau^a = \tau^b$ or (iii) both. However, case (i) – and, hence, case (iii) – is excluded by assumption for the initial condition ($0 < q_t^a < 1$), as otherwise a stable structure of the mature population's preferences emerges, in which the initial type of preferences perpetuates forever. Therefore, only case (ii) remains as a potentially relevant, symmetric option to consider; yet, it defines a steady state for any initial condition, without any evolution of the relative proportions of preferences in the society, and so is uninteresting for our purposes.

In all other cases, different from (i), (ii) and (iii), the intergenerational dynamics of preferences depends on two parameters: first, the proportion of type-a agents inherited from past history, q_t^a, relatively to that of q_t^b; second, the *sign* of the difference of the vertical transmission probabilities, $\tau^a - \tau^b$, which determines the *direction* of preference convergence. Writing the last-but-one line above as

$$q_{t+1}^a = q_t^a + \left[q_t^a - (q_t^a)^2\right] \left(\tau^a - \tau^b\right) \tag{3}$$

delivers a first-order non-linear sequence, which does not admit any general solution. However, given the assumptions on τ^a and τ^b, we know that the stability points of this function are 0 and 1. The conditions for convergence are the following:

- If $\tau^a < \tau^b$, then for any initial condition q_0^a, $q_{t+1}^a \to 0$: social preferences will converge towards an economy with only type-b agents, i.e., a lower degree of central bank independence.

- If $\tau^a > \tau^b$, then for any initial condition q_0^a, $q_{t+1}^a \to 1$: social preferences will converge towards an economy with only type-a agents. In this case, given the direction of preference transmission convergence, we can say that inflation aversion and, consequently, central bank independence are here to stay. Otherwise, the intergenerational stability

of monetary arrangements favoring central bank independence can not necessarily be sustained.

Since by definition $0 < q_0^a < 1$, no case can be ruled out, and everything will depend on the relative size of τ^a and τ^b. To illustrate this result, we present phase diagrams for the two opposite cases, namely where the difference between the probabilities of transmitting a parent's preference type to her child is positive, $\tau^a - \tau^b > 0$, or negative, $\tau^a - \tau^b < 0$. As can be seen in Figure 1, if the sign of the vertical-preference-transmission probability differential between types a and b, $\tau^a - \tau^b$, is *positive*, then the intergenerational dynamics of the fraction of preference type a converges to the steady state S with coordinates $(1, 1)$ for any initial condition q_0^a. The process is driven by the *concavity* of the phase diagram curves (drawn for different magnitudes of the mentioned probability differential), no matter how large the positive differential in question may be. This leads to an ultimate adoption of type a agents' preferences – which is the only preference type to survive, while the other type is extinguished – implying perpetuation of the higher degree of central bank independence in the deterministic model version with exogenous vertical transmission we developed thus far. Conversely, Figure 2 shows that if the probability differential $\tau^a - \tau^b$ is *negative*, then the preferences of society converge to type b at the steady state S' with coordinates $(0, 0)$ for any initial condition q_0^a. The *convexity* of the phase diagram curves in this case, no matter how large the negative vertical-preference-transmission probability differential may be, directs convergence to an ultimate equilibrium where only type b survives, which results into perpetuation of the lower degree of central bank independence.

[Figures 1 and 2 about here]

Interestingly, the *speed* of the preference convergence process depends – no matter its direction (to extinction of type b or a) – on (the absolute value of) the *magnitude* (or size) of the vertical-preference-transmission probability differential, itself determining the curvature of the path of the fraction of type-a preferences in our two phase diagrams. The larger (the modulus of) this differential (e.g., compare the graphs for 0.9 versus 0.1 in Figure 1 and for -0.9 versus -0.1 in Figure 2), the more curved the path and the quicker the convergence process.

Endogenous Vertical Preference Transmission Up to here, our analysis did not focus explicitly on *endogenous* vertical transmission, whereby preferences of children are acquired through an adaptation and imitation process that depends also on the socialization actions (or efforts) of their parents, and not only on the surrounding cultural and social environment.

Similarly, the earlier literature has dealt with *exogenously determined* transmission of traits, e.g., by evolutionary selection mechanisms, whereby preferences are either inherited by genetic transmission or acquired by a process of imitation. In either case the resulting transmission mechanism is monotonically increasing in the material economic payoff associated to each preference trait, which leads to a 'survival of the fittest' result and complete extinction of the alternative trait, as in our model version with constant τ's illustrated above. However, Bisin and Verdier (2001) argue that preferences, norms, and, more generally, cultural attitudes should be considered as endogenous with respect to socioeconomic systems. They also maintain that various pieces of empirical evidence have been interpreted so as to suggest the relevance of the endogeneity of different elements of preferences, such as the discount factor, the perceived importance of education, the interdependence of agents' consumption or production patterns, and the relevance of ethnic and religious values (p. 299). To endogenize vertical preference transmission requires a next step, which we now incorporate in further refining the described theoretical set-up.

Differently from the situations depicted in figures 1 and 2, the main question of interest and empirical relevance when we analyze here the intergenerational transmission of inflation aversion is to explain not why the system can converge to an ultimate survival of either of the types, with the other extinguished (as in evolutionary selection mechanisms), but rather why an equilibrium such as the one we observe in the real world, where many types coexist, may exist and be globally stable. In other words, what are the conditions on the transmission mechanism that induce *heterogeneity* in the long run stationary distribution of preferences in the population? This same question has been addressed by Bisin and Verdier (2001), and they propose one possible answer, supported by a key assumption they have to make in order to get their result. The assumption is of *cultural substitution*, namely, that the direct vertical socialization of children (inside the family) and their oblique socialization (outside the family) act as substitutes in the cultural transmission mechanism. Under this assumption they find that there exists a heterogeneous distribution of preferences in the population which is globally stable. Intuitively, direct vertical transmission acts as a cultural substitute for oblique transmission whenever parents have less incentives to socialize their children the more widely dominant are their values in the population. This assumption drives the mechanism in their model which ensures convergence toward an interior equilibrium with both traits represented (as social fractions) which is globally stable.

In line with similar mechanisms in the literature on cultural transmission, notably Bisin and Verdier (2001) and Sáez-Martí and Sjögren (2008), we assume in the present subsection, for illustrative purposes, that the probability at time t of vertical socialization to the parent's trait i, τ_t^i, is a *negative* function of the attained level of the fraction in the population with that same

trait, q_t^i: $\tau_t^i\left(q_t^i\right)$, with $\frac{d}{dq_t^i}\tau_t^i\left(q_t^i\right) < 0$. Then (3) becomes

$$q_{t+1}^a = q_t^a + \left[q_t^a - \left(q_t^a\right)^2\right]\left[\tau^a\left(q_t^a\right) - \tau^b\left(1 - q_t^a\right)\right]. \tag{4}$$

This assumption is consistent with cultural substitution. Basically, the effort (or some other cost) of the parent to socialize her child in her own trait decreases as the parent observes a large fraction in the population that has already attained the trait, so that it becomes more likely for the child to be matched to the same trait even outside the family. In the context of the intergenerational transmission of inflation aversion, (4) will have the same effect as in Bisin and Verdier (2001) and Sáez-Martí and Sjögren (2008), i.e., to drive the dynamics of the system to an ultimate convergence to an interior equilibrium. This is reminiscent, in a sense, of the 'inflation culture hypothesis' of Hayo (1998); but there must be more to it, if the resultng stability of preferences at some interior degree of inflation aversion has been a gradual outcome of past experience (with hyperinflation, in the German case and transmitted fears of its eventual recurrence across subsequent generations), which brings us to the next subsection.

2.3 Stochastic Dynamics of Preference Transmission

So far we have modeled only the simpler case of deterministic dynamics of the intergenerational transmission of preferences – such as, in our case, inflation aversion – allowing for both exogenous and endogenous acquisition of traits by children from their parents. The deterministic model versions led to either ultimate convergence to one of the traits with extinction of the other (with exogenous constant transmission probabilities) or to an interior equilibrum (with endogenous transmission probabilities under assumed cultural substitution). Yet no cyclical shifts towards an increasing proportion of one or the other of the types in the population for longer sequences of periods, followed by reversals, could have been generated under deterministic transmission.

The present subsection thus serves to illustrate how the model can be extended to more realistic settings, where stochastic dynamics is allowed as well. In the richer framework here, we show how stochastic dynamics can also lead (independently, without exogenous transmission) or contribute (through a channel additional to the deterministic one of endogenous transmission proposed by Bisin and Verdier (2001) and outlined in the preceding subsection) to generating irregular cyclical shifts in the evolution of preferences across generations. Any more complete specification and characterization of such mechanisms, however, remains beyond the scope of the present paper.

Exogenous Vertical Preference Transmission The easiest way to generate stochastic exogenous transmission of inflation aversion in the context of the model we are describing is to simply assume that the probabilities of vertical transmission are not constants (τ^i) , but random variables or stochastic processes instead (τ_t^i). Without precise specification of these stochastic processes then, not much would be possible to say about the path of the proportion of types in the population over time. But our aim here is only to demonstrate by a directly relevant and straightforward example how the model will be affected, and such a minor modification when the transmission probabilities are assumed random becomes obvious if we rewrite (3) as

$$q_{t+1}^a = q_t^a + \left[q_t^a - (q_t^a)^2\right]\left(\tau_t^a - \tau_t^b\right). \tag{5}$$

It is also clear from (5), compared to (3), that the stochastic equation in τ_t^i would generate – by frequently changing the sign and magnitude of $\left(\tau_t^a - \tau_t^b\right)$ and, thus, the direction and speed of convergence to one or the other of the types in the adult population – much more variability, that is, irregular cyclical shifts, in the intergenerational transmission of inflation aversion. To mitigate such an effect, one possibility is to specify stochastic processes for the transmission probabilities and impose more persistence (deterministic or stochastic, as we outline further down).

Endogenous Vertical Preference Transmission At a final stage of illustrating the more realistic extensions of the baseline set-up we have been analyzing so far for our purposes here is to build upon the preceding subsections and combine their features altogether. To keep things as straightforward as possible and in line with similar mechanisms in the literatures on cultural transmission and social learning, we now assume:

1. that the probability at time t of vertical socialization to the parent's trait i, τ_t^i, is a *positive* function of the effort the parent exerts (or the cost she pays, in a broader sense) to socialize her offspring to her own trait, e_t^i: $\tau_t^i\left(e_t^i\right)$, with $\frac{d}{de_t^i}\tau_t^i\left(e_t^i\right) > 0$;

2. that the latter effort (or cost), e_t^i, in turn, is a *positive* function of the severity of actual inflation, π_t, a particular generation has witnessed in its adult life-span t relative to the actual inflation observed by the preceding generation, π_{t-1}, i.e., that of their parents: $e_t^i\left[k^i\left(\pi_t - \pi_{t-1}\right)\right]$, with $\frac{d}{d(\pi_t - \pi_{t-1})}e_t^i\left[k^i\left(\pi_t - \pi_{t-1}\right)\right] > 0$ and $K > k^a = const > 1$ and $0 < k^b = const < 1$;

3. and that inflation itself is driven by some simple stochastic autoregressive process: $\pi_t = \rho_t \pi_{t-1} + \varepsilon_t$.

In a very general notation, we can then write $\tau_t^i \left\{ e_t^i \left[k^i \left(\pi_t - \pi_{t-1} \right) \right] \right\}$ or $\tau_t^i \left\{ e_t^i \left[k^i \left(\left(\rho_t - 1 \right) \pi_{t-1} + \varepsilon_t \right) \right] \right\}$ and substitute back in our key dynamic equation to obtain:

$$q_{t+1}^a = q_t^a + \left[q_t^a - \left(q_t^a \right)^2 \right] \left(\begin{array}{c} \tau^a \left\{ e_t^a \left[k^a \left(\left(\rho_t - 1 \right) \pi_{t-1} + \varepsilon_t \right) \right] \right\} \\ -\tau^b \left\{ e_t^b \left[k^b \left(\left(\rho_t - 1 \right) \pi_{t-1} + \varepsilon_t \right) \right] \right\} \end{array} \right). \quad (6)$$

The simple stochastic mechanism driving inflation dynamics, hence socialization effort across types that affects the preference transmission probabilities, and ultimately the evolution of the proportions of types across generations allows us to clearly see in (6) how periods of convergence towards ($q_t^a \uparrow$ for some sequences of t's) or away from ($q_t^a \downarrow$ for some other sequences of t's) a higher degree of inflation aversion (to be precise, the degree defining the a-type in our model) institutionalized through voting on central bank independence will, more realistically, shift in irregular cyclical 'waves' as people learn from experience. Of course, much in the details of such preference shift cycles would depend on the parameters, k^a and k^b, and the driving stochastic processes, for ρ_t and ε_t, a researcher would assume in (6). We leave a more focused exploration of this issue for future analysis, yet our point here – without loss of generality – can now be well understood and appreciated. It is, essentially, that endogenous preference transmission in a stochastic economic environment can be justified as a process of social learning whereby parent generations experience inflation and transmit their preferences (i.e., their degree of inflation aversion) and institutions (i.e., the corresponding degree of central bank independence they voted for) to children generations, and that therefore, depending on social experience (given the underlying shocks hitting the system), shifts in dynamic trends can be generated easily in a more realistic extension of the model we developed. The frequency of shifts occurring in the extended model version in the present subsection and their durations will, for example, be driven by the assumptions about alternative degrees of persistence even for constant $\rho_1 \neq \rho_2$: higher persistence will generate less frequent shifts of 'fashion' from more to less independent central banks and vice versa. Along these lines, simulations can be performed for different shock process specifications. But, as we noted, this daunting task remains for further research.

2.4 Testable Implications Summarizing Our Theory

Everything else being equal, then, the degree of central bank independence will be linked to the political influence and preference structure of the mature generation in any period t. And the dynamics of the exact degree of inflation aversion over time will be a function of the transmission mechanism and the intergenerational evolution governing these people's preferences. Hence, one testable structural-form equation implied by our theory would, for example,

give the degree of central bank independence as a function of the evolution of older people's aversion to inflation. This relationship could be approximated by regressing a measure of inflation aversion on the share of retirees, assuming that retirees have higher inflation aversion (i.e., are type-a agents), an assumption we ground in the first empirical application of the following section.

In parallel, the degree of central bank independence will also depend on the relative effort the different types of agents will provide to ensure that their preferences prevail (i.e., under endogenous τ_t^i's). Hence, another testable implication of our model would be that in more equal (i.e., inequality-averse) societies this relative effort should be higher (assuming they are also more inflation-averse, as the findings in De Jong, 2002, confirm, insofar inflation generates asymmetry across lenders and borrowers) than in more unequal societies. And, depending on the prevailing type of preferences, inflation aversion would also be linked to a society's degree of inequality. The second empirical application looks broadly at this relationship.

3 Illustrative Empirical Relevance

The present section attempts to illustrate, in some very general sense, the relevance of our theoretical framework in explaining inflation aversion dynamics. As suggested by the model of intergenerational preference transmission we analyzed, two of its key long-run determinants are likely to be (related to) changes in demographic and inequality structures. For purposes of robustness, we employ alternative measures of inflation aversion, different data sets and complementary, although straightforward, empirical methods to assess the role of these major factors underlying the variation of inflation aversion across time and locations.

As Shiller (1997) notes, there are striking intergenerational differences in inflation aversion, even more important than the international ones. De Jong (2002), on the other hand, finds empirically that countries where inhabitants tend to tolerate a higher degree of inequality and centralization of authority are characterized by a dependent central bank and, to a lesser extent, by relatively high inflation rates. In particular, national attitudes towards inequality appear to be another factor explaining the negative correlation between inflation and the degree of central bank independence usually emerging from cross-section regressions. Thus, intergenerational or international differences in inflation aversion have certainly been shaped out to a large extent by the ongoing demographic and income distribution transformations across the globe. Moreover, as will become clear from our empirical applications to follow, demographic changes and inequality measures fit well in illustrating some of the mechanisms that were captured by the theoretical

model of the preceding section.

Evolving inflation aversion perceptions have, most likely, translated into an increased degree of central bank independence. During the last two decades at least, granting more independence to the monetary authority from the government has been thought of as a quick fix against inflation. As noted, it has also been econometrically shown that central bank independence can bear strongly on inflation (see, among others, Brumm, 2002, and the meta-regression analysis by de Haan and Klomp, 2008). Hence, it may be the case that evolving preferences have modified – and may still modify in the future – monetary institutions. Both empirical applications we discuss below ultimately influence, via voting and legislation, central bank independence, and the present section aims at giving first evidence on the existence of these deep processes.

3.1 Alternative Measures of Inflation Aversion

The dependent variable in our regressions is always the degree of (relative) inflation aversion, either in percentage changes or in levels, in compliance with the particular econometric specification as explained further down.

Our first measure of inflation aversion is the index constructed by Krause and Méndez (2005) and employed in Krause and Méndez (2008) for 34 countries over a period of 24 years. We shall refer hereafter to the Krause–Méndez (2005, 2008) data set and inflation aversion measure as the KM ones. The specific feature of the KM relative inflation aversion index, λ in their notation, is that it describes a policymaker's (relative) preferences as the weight she puts on inflation stabilization in an objective function that is optimized under the constraint of an ad-hoc economic environment. The authors compute the λ parameter, derived as a function of deeper model parameters, by substituting each parameter with its second-order vector autoregression estimate.[8] As Krause and Méndez (2008) argue, the main advantage of using their 'lambdas' instead of the actual inflation rate, as most of the related literature has done, is that macroeconomic outcomes are also affected by factors different from policy intentions (which should not change, in principle, policy behavior).

To check that our econometric results do not remain sensitive to the particular policymaker's inflation aversion measure implied by the KM (2005) model and estimated the way they did, we use a second, differently defined and obtained, measure, now for the (relative) inflation aversion of a country's population at large. The latter is computed as the percentage of respondents to a question in the International Social Survey Program (ISSP) who would

[8] Since these λ measures of inflation aversion are already empirical estimates with some underlying theoretical justification, we abstain from adding control variables in our regressions further down that attempt to attribute most of the variation in the KM index to a key demographic or income inequality determinant.

prefer to keep down inflation rather than unemployment.[9] This measure for the relative inflation aversion is employed, in a related context, in Jayadev (2006). The ISSP studies the preferences regarding the role of government in society of more than 30,000 individuals in 27 countries through a survey containing over 200 questions. The ISSP measure of the relative inflation aversion of a nation thus emerges as the average answer in a given country to one particular question of the survey (see, e.g., Jayadev, 2006, p. 68). Henceforth we refer to this alternative inflation aversion proxy as the ISSP one.

A disadvantage of the ISSP measure is that it is available only for 1996 – which prevents a time-series dimension of our analysis when employing it – and for 18 countries. A disadvantage of the KM measure may be that it is inferred indirectly through combining without explicit microfoundations a number of structural parameters characterizing the economy, themselves estimated in a particular fashion. Both inflation aversion measures are therefore employed, within differing data sets due to availability limitations.

3.2 Inflation Aversion and Demography

Since the 1960s, demographic changes have been tremendous, as a large generation of baby-boomers is now entering into its retirement period. This generation has accumulated some capital, and this sheer fact would have contributed to make it much more conservative than it was in the 1960s. This would have been unnoticeable except for the size of this generation, which has enabled baby-boomers to translate their evolving preferences into policies (see, e.g., Farvaque *et al.*, 2009, for some empirical estimates). The span of our data[10] across time (1960-2007) and space (the 34 countries in the KM set, to which we later add 6 from the ISSP set) provide overwhelming evidence that the share of retirees has been increasing continually and sometimes dramatically in European economies (Figure 3) as well as in non-European ones (Figure 4), either OECD members or developing countries.

[Figures 3 and 4 about here]

A stark European example of an aging population structure is Germany, while the opposite case is illustrated most clearly by Ireland; Japan and Mexico are the corresponding parallels for non-European countries. Because these four country cases represent the characteristic extremes of our sample, they are the focus of the time-series analysis further down.

[9] The ISSP was conducted in 1996 by the Inter-university Consortium for Political and Social Research.

[10] World Bank *World Economic Indicators* (April 2008) database, accessed online via the UK Economic and Social Data Service (ESDS). For further detail and precision, see Appendix A.

As already stated, Germany, Ireland, Japan and Mexico offer cases of, respectively, European and non-European, developed and developing countries, with contrasted demographic and inflation experiences. Germany and Japan have witnessed a large increase in the proportion of their retirees; as is also well known, inflation outcomes in these two countries have generally produced low and stable rates, with the exception of the years following German re-unification. The proportion of retired people is relatively stable in Ireland, while for Mexico it is much lower but slightly increasing over time; both these countries have experienced prolonged episodes of higher actual inflation rates. For each of these countries we run four time-series regression specifications based on annual data for the years when the KM inflation aversion index is available. The most general of these specifications is of the form

$$\mathbf{z}_t^i = \beta_0^i + \beta_1^i \mathbf{w}_t^i + \beta_2^i \mathbf{z}_{t-1}^i + \boldsymbol{\epsilon}_t^i \tag{7}$$

where $\mathbf{z}_t^i$ is the employed inflation aversion vector measure (in level) for the selected country i in year t, $\mathbf{w}_t^i$ is the vector share of retirees in percentage of total population, and $\boldsymbol{\epsilon}_t^i$ is a country-specific i.i.d. disturbance vector process. (7) encompasses three potential less general specifications, with $\mathbf{z}_{t-1}^i$ excluded, with β_0^i excluded instead, and with both $\mathbf{z}_{t-1}^i$ and β_0^i excluded, which we also test econometrically. For all these four countries the regression discarding only the lagged dependent variable had its intercept and slope always significant at the 10% or lower level.[11] For all four countries too the simplest regression retaining $\mathbf{w}_t^i$ as the sole regressor always displayed a coefficient p-value of 0.0000. Based on such criteria of econometric output and comparability across countries, we thus select as our preferred specification the following

$$\mathbf{z}_t^i = \beta_0^i + \beta_1^i \mathbf{w}_t^i + \boldsymbol{\epsilon}_t^i$$

whose estimation results are presented in Figure 5.

[Figure 5 about here]

As can be seen, our simple time-series demographic regressions explain between 21% (for Ireland) and 52% (Mexico) of the observed variation in inflation aversion. Moreover, coefficient estimates show that a one percentage point increase in the proportion of retirees increase inflation aversion by a magnitude going from 3 (Japan) to 38 (Ireland) percentage points. In the terms of the outlined model, these coefficients can be interpreted as revealing differentiated efforts by retirees to transmit their preferences. And,

[11] For Japan and Mexico the lagged dependent variable came out statistically significant only when the intercept was excluded, and not otherwise; for Germany and Ireland it was found statistically significant in both these cases, but eliminating the statistical significance of the remaining variables in the most general, encompassing equation (7).

interestingly in this perspective, it is in Ireland (respectively, in Japan), the country with a notoriously high (respectively, low) inflation experience over the period that the highest (respectively, lowest) efforts to transmit low inflation preferences are revealed.[12]

In our view, the estimates provide results which are supportive of the thrust of the theoretical predictions. First, they show that the underlying evolution of a society's preferences is fundamental to observed macroeconomic trends such as, in our case, inflation. Second, they suggest that individuals may vary their efforts to transmit their preferences, depending on the context and the relative incentives they have to do it within.

3.3 Inflation Aversion and Income Inequality

As already stated, structural changes in income inequality are partly originating in the demographic transitions that are ongoing throughout the world. But they may well have other, independent drivers, which also influence inflation aversion perceptions and – through transmitting and legislating them – ultimately, inflation outcomes (recall the conclusions in De Jong, 2002). To explore this important role of social inequalities in determining the evolution of inflation aversion, we move now to our second empirical application of the model we started with.

Widely accessible and comparable data on national income distributions across time are, unfortunately, not available. This precludes any further exploration of the time dimension of the inflation aversion measure borrowed from Krause and Méndez (2005, 2008). Yet it provides the opportunity to check the findings based on our two proxies for inflation aversion here, now adding the ISSP one, in a cross-section (in)equality context. Moreover, the respective data sets have only a minor intersection (of 12 countries and 1 year) in common, and have methodologically differing backgrounds. This avenue, then, offers a test of how robust our cross-section results would be to the definition of the dependent variable and to regressing it on different data sets.

Cross-Section Analysis Based on KM Inflation Aversion We first present our results based on the KM proxy and sample for the year 1997, the latest year with full data for all 34 countries. To get a feel for the data and for the potential similarity or discrepancy between the two available proxies to employ as dependent variable, consider the spread of the Gini index in Figure 6 (ranging from around 25 for the 'egalitarian' societies of Japan, Denmark, Sweden and Norway to around 50 for the 'unequal' societies of Colombia, Chile, Mexico and Peru) and the alternative inflation

[12] For a discussion of the inflation experiences of those countries see, among others, Nelson (2008) for Ireland and Okina *et al.* (2001) for Japan.

aversion measures in Figure 7 of the 12 countries common to the KM and ISSP samples.

[Figures 6 and 7 about here]

We ran simple cross-section regressions of the form

$$\mathbf{u}(\text{circa } 96-97) = \gamma_0 + \gamma_1 \mathbf{v}(\text{circa } 00) + \boldsymbol{\eta} \tag{8}$$

where vector $\mathbf{u}$ denotes the dependent variable, either the KM measure and then the sample includes 33 countries in 1997, or the ISSP measure and then the sample is of 18 countries dated 1996; vector $\mathbf{v}$ is the key explanatory variable, and can be, respectively, (i) the Gini index, (ii) the income share of the richest quintile or (iii) the income share of the poorest quintile; vector $\boldsymbol{\eta}$ is an i.i.d. error process. Most income inequality data were sampled in 2000, but for some countries these refer to the closest earlier or later years (for the precise date by country, refer to the note below Figure 6).[13]

[Figure 8 about here]

The findings from running equation (8) in its specifications corresponding to (i), (ii) and (iii) just above when the KM sample was used are presented in the left-hand side, middle, and right-hand side panels of Figure 8, respectively.

Cross-Section Analysis Based on ISSP Inflation Aversion The parallel findings from equation (8) in its specifications corresponding again to (i), (ii) and (iii) but now with the ISSP sample instead are presented in the left-hand side, middle, and right-hand side panels of Figure 9, respectively.

[Figure 9 about here]

It is easily seen comparing the corresponding panels in figures 8 and 9 that the qualitative essence – and to a large extent even the quantitative detail – of our income inequality cross-section regression results based on the two alternative data sets[14] is preserved. Basically, the Gini index agrees with the top 20% share in the income distribution, in their capacity of acting as the sole independent variable, that inflation aversion depends negatively on the degree of social inequality measured so. Inversely, the share of the bottom 20% in the income distribution, as a measure of a higher social equality (deriving from the lower tail of the distribution at least) influences

[13] Like the demographic data, these were available via online ESDS access to the World Bank *World Economic Indicators* (April 2008) database.

[14] Whose common intersection of only 12 cases reveals no particular correlation pattern, as indicated in Figure 7.

positively inflation aversion across countries. These results are econometrically well supported (see the summary of the regression output we propose in the mentioned figures).

Thus, a key result that emerges from our empirical work in a relatively robust way across the two samples employed in the inequality cross-section regressions is that the richer is the poorest quintile of the population, the more inflation averse the nation is. Using logistic regressions based on the ISSP data set, Jayadev (2006) notably finds that 'the poor' would prefer more inflation rather than more unemployment. They are, hence, "less likely than the rich to prioritize combating inflation rather than unemployment" (p. 67). This result only seemingly contradicts ours. Since the poorest are mostly living on fixed money amounts in terms of social assistance benefits or low salaries, they are the biggest losers from inflation and have no alternative stores of value, neither can they save much in the first place. So, they should be more inflation-averse relative to the richest people, as our regressions demonstrate, no matter that they still may have preference for suffering from inflation rather than ending up without a job.

4 Concluding Remarks

In this paper, we have proposed a theoretical framework appropriate to study the transmission of inflation aversion across generations that builds on Bisin and Verdier (2000, 2001). We show that the stability of a society's degree of inflation aversion depends on the direction and speed of changes in the structure of the population. The empirical part of the paper provides robust evidence that both demographic and income inequality variation influence considerably the evolution of inflation preferences. Our findings, thus, support the suggested theory, notably stressing how fundamental it is to understand the underlying trends in individuals' preferences and the mechanisms behind their intergenerational transmission.

Our results also point to the mutually reinforcing effects of global aging and a likely trend toward more egalitarian societies, both implying an increased role for the social-welfare state. Under this scenario, stronger inflation aversion and, consequently, lower actual inflation, is here to stay for some time. If, however, transmission of cultural and social values in favor of equality and social protection of the most vulnerable is threatened, for example, by burgeoning social security burdens and the risk of public debt unsustainability, population aging and income inequality may not act in the same direction to keep low inflation down for long, especially if the demographic trends also change dramatically in a more distant future.

References

Akerlof, G., W. Dickens, and G. Perry (1996): "The Macroeconomics of Low Inflation," *Brookings Papers on Economics Activity*, 1996(1), 1–76.

Becker, G. (1996): *Accounting for Tastes*. Harvard Univ. Press, Cambridge, MA.

Benigno, P., and L. A. Ricci (2008): "The Inflation-Unemployment Trade-Off at Low Inflation," Working Paper 13986, National Bureau of Economic Research.

Berentsen, A., and C. Strub (2008): "Central Bank Design with Heterogenous Agents," *European Economic Review*, forthcoming.

Berger, H., J. de Haan, and S. C. Eijffinger (2001): "Central Bank Indpendence: An Update of Theory and Evidence," *Journal of Economic Surveys*, 15(1), 3–40.

Bisin, A., and T. Verdier (2000): "A Model of Cultural Transmission, Voting and Political Ideology," *European Journal of Political Economy*, 16(1), 5–29.

——— (2001): "The Economics of Cultural Transmission and the Dynamics of Preferences," *Journal of Economic Theory*, 97(2), 298–319.

Broadbent, B., and R. J. Barro (1997): "Central Bank Preferences and Macroeconomic Equilibrium," *Journal of Monetary Economics*, 39(1), 17–43.

Brumm, H. J. (2002): "Inflation and Central Bank Independence Revisited," *Economics Letters*, 77, 205–209.

Bullard, J. B., and C. J. Waller (2004): "Central Bank Design in General Equilibrium," *Journal of Money, Credit and Banking*, 36(1), 95–114.

Cavalli-Sforza, L., and M. Feldman (1981): *Cultural Transmission and Evolution: A Quantitative Approach*. Princeton Univ. Press, Princeton, NJ.

Crowe, C., and E. E. Meade (2007): "The Evolution of Central Bank Governance around the World," *Journal of Economic Perspectives*, 21(4), 69–90.

Daniels, J. P., and D. D. VanHoose (2006): "Openness, the Sacrifice Ratio, and Inflation: Is There a Puzzle?," *Journal of International Money and Finance*, 25(8), 1336–1347.

DE HAAN, J., AND J. G. KLOMP (2008): "Inflation and Central Bank Independence: A Meta-Regression Analysis," *Paolo Baffi Centre Research Paper No. 2008-03, Bocconi University, Milan.*

DE JONG, E. (2002): "Why are Price Stability and Statutory Independence of Central Bank Negatively Correlated? The Role of Culture," *European Journal of Political Economy*, 18(4), 675–694.

DI BARTOLOMEO, G., AND W. PAUWELS (2006): "The Issue of Instability in a Simple Policy Game between the Central Bank and a Representative Union," *Public Choice*, 126(3/4), 275–296.

FAUST, J. (1996): "Whom Can We Trust to Run the Fed? Theoretical Support for the Founders' Views," *Journal of Monetary Economics*, 37(2), 267–283.

GAMBER, E. N., AND J. N. HUNG (2001): "Has the Rise in Globalization Reduced U.S. Inflation in the 1990s?," *Economic Inquiry*, 39(1), 58–73.

GUILLÉN, M. F., AND S. POLILLO (2005): "Globalization Pressures and the State: The Global Spread of Central Bank Independence," *American Journal of Sociology*, 110(6), 1764–1802.

HAYO, B. (1998): "Inflation Culture, Central Bank Independence and Price Stability," *European Journal of Political Economy*, 14(2), 241–263.

JAYADEV, A. (2006): "Differing Preferences between Anti-Inflation and Anti-Unemployment Policy Among the Rich and the Poor," *Economics Letters*, 91(1), 67–71.

KRAUSE, S., AND F. MÉNDEZ (2005): "Policy Makers' Preferences, Party Ideology, and the Political Business Cycle," *Southern Economic Journal*, 71(4), 752–767.

——— (2008): "Institutions, Arrangements and Preferences for Inflation Stability: Evidence and Lessons from a Panel Data Analysis," *Journal of Macroeconomics*, 30, 282–307.

NELSON, E. (2008): "Ireland and Switzerland: The Jagged Edges of the Great Inflation," *European Economic Review*, 52, 700–732.

OKINA, K., M. SHIRAKAWA, AND S. SHIRATSUKA (2001): "The Asset Price Bubble and Monetary Policy: Japan's Experience in the Late 1980s and the Lessons," *Bank of Japan Monetary and Economic Studies*, Special Edition, 395–450.

ROGOFF, K. (2003): "Globalization and Global Disinflation," in *Monetary Policy and Uncertainty: Adapting to a Changing Economy*, pp. 77–112. Federal Reserve Bank of Kansas City, Jackson Hole Proceedings.

Saéz-Martí, M., and A. Sjögren (2008): "Peers and Culture," *Scandinavian Journal of Economics*, 110(1), 73–92.

Scheve, K. (2004): "Public Inflation Aversion and the Political Economy of Macroeconomic Policymaking," *International Organization*, 58(1), 1–34.

Shiller, R. (1997): "Why Do People Dislike Inflation?," in *Reducing Inflation: Motivation and Strategy*, ed. by C. Romer, and D. Romer, pp. 13–69. National Bureau of Economic Research and University of Chicago Press: Chicago, IL.

A Data Definitions and Sources

- **share of retirees in the population**
  - World Bank, *World Development Indicators* (April 2008), access via ESDS; Item Code: 587; Default Label: Population ages 65 and above (% of total) (SP.POP.65UP.TO.ZS).
  - *Definition:* Population ages 65 and above is the percentage of the total population that is 65 or older.
  - *Source:* World Bank staff estimates from various sources including census reports, the United Nations Population Division's World Population Prospects, national statistical offices, household surveys conducted by national agencies, and Macro International.

- **Gini inequality index**
  - World Bank, *World Development Indicators* (April 2008), access via ESDS; Item Code: 268; Default Label: GINI index (SI.POV.GINI).
  - *Definition:* Gini index measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution. A Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest individual or household. The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.
  - *Source:* World Bank staff estimates based on primary household survey data obtained from government statistical agencies and World Bank country departments. Data for high-income economies are from the Luxembourg Income Study database. For more information and methodology, please see PovcalNet (http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp).

- **share of top income quintile**
  - World Bank, *World Development Indicators* (April 2008), access via ESDS; Item Code: 368. Default Label: Income share held by highest 20% (SI.DST.05TH.20).

  - *Definition:* Percentage share of income or consumption is the share that accrues to subgroups of population indicated by deciles or quintiles.
  - *Source:* World Bank staff estimates based on primary household survey data obtained from government statistical agencies and World Bank country departments. Data for high-income economies are from the Luxembourg Income Study database. For more information and methodology, please see PovcalNet (http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp).

- **share of bottom income quintile**

  - World Bank, *World Development Indicators* (April 2008), access via ESDS; Item Code: 370. Default Label: Income share held by lowest 20% (SI.DST.FRST.20).
  - *Definition:* Percentage share of income or consumption is the share that accrues to subgroups of population indicated by deciles or quintiles.

Source: World Bank staff estimates based on primary household survey data obtained from government statistical agencies and World Bank country departments. Data for high-income economies are from the Luxembourg Income Study database. For more information and methodology, please see PovcalNet (http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp).

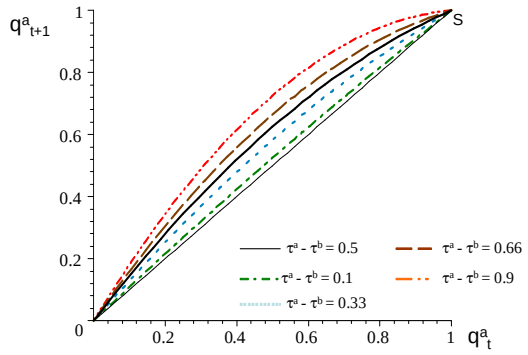

Figure 1: Deterministic Convergence to Type-a Preferences

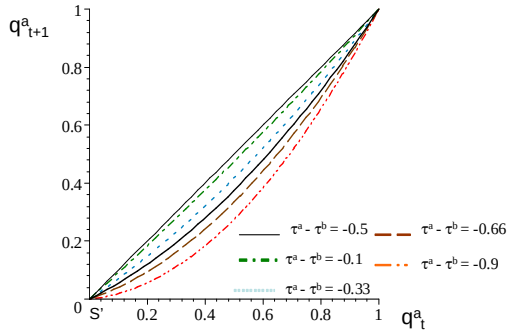

Figure 2: Deterministic Convergence to Type-b Preferences

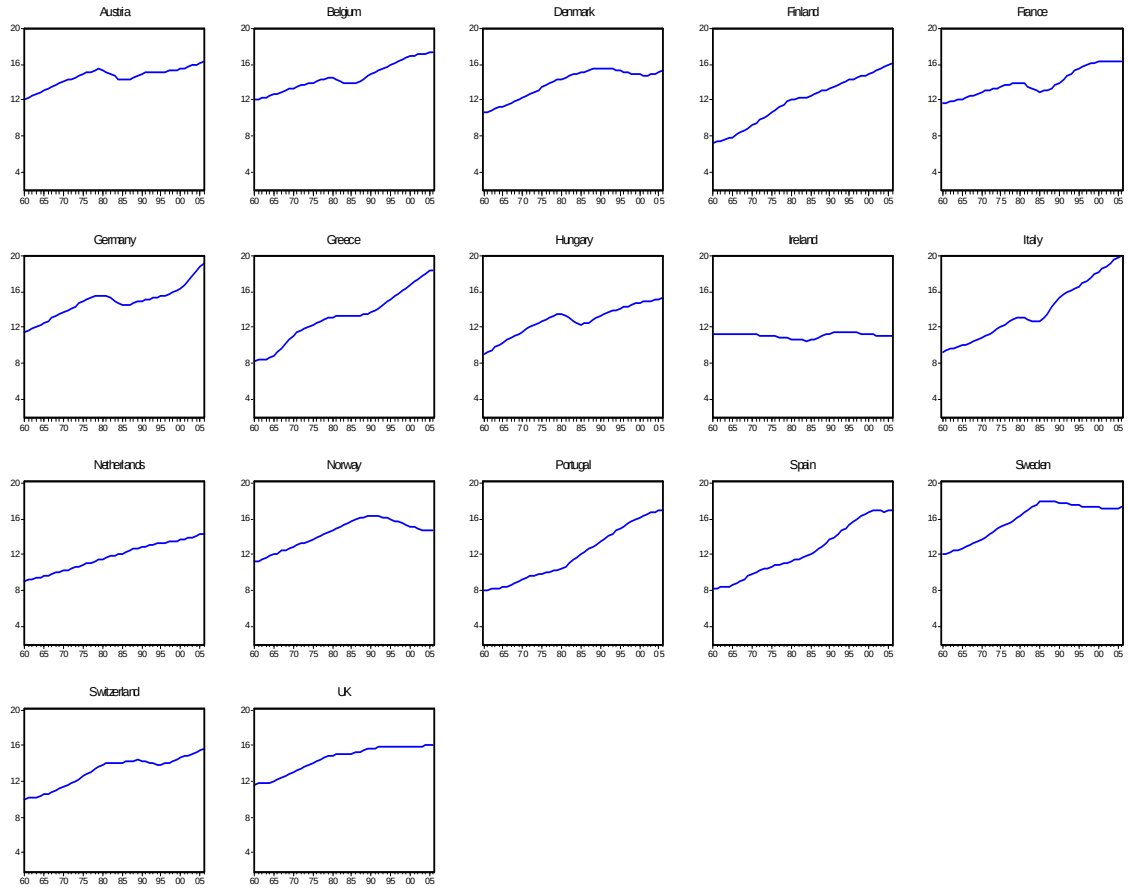

Figure 3: Share of Retirees for the 17 European Countries in the Krause–Méndez sample, annual data, 1960-2007. Source: World Bank, *World Development Indicators* (April 2008), access via the UK Economic and Social Data Service (http://www.esds.ac.uk/).

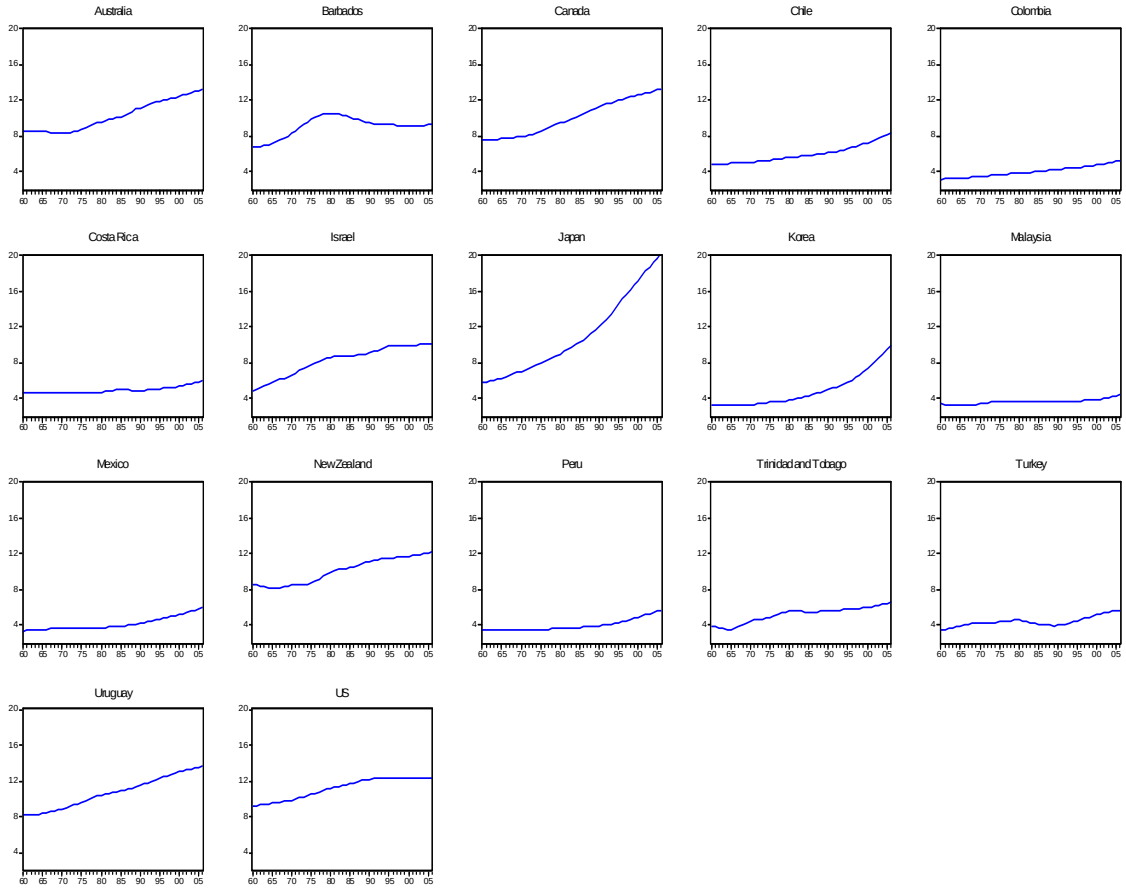

Figure 4: Share of Retirees for the 17 Non-European Countries in the Krause–Méndez sample, annual data, 1960-2007. Source: World Bank, *World Development Indicators* (April 2008), access via the UK Economic and Social Data Service (http://www.esds.ac.uk/).

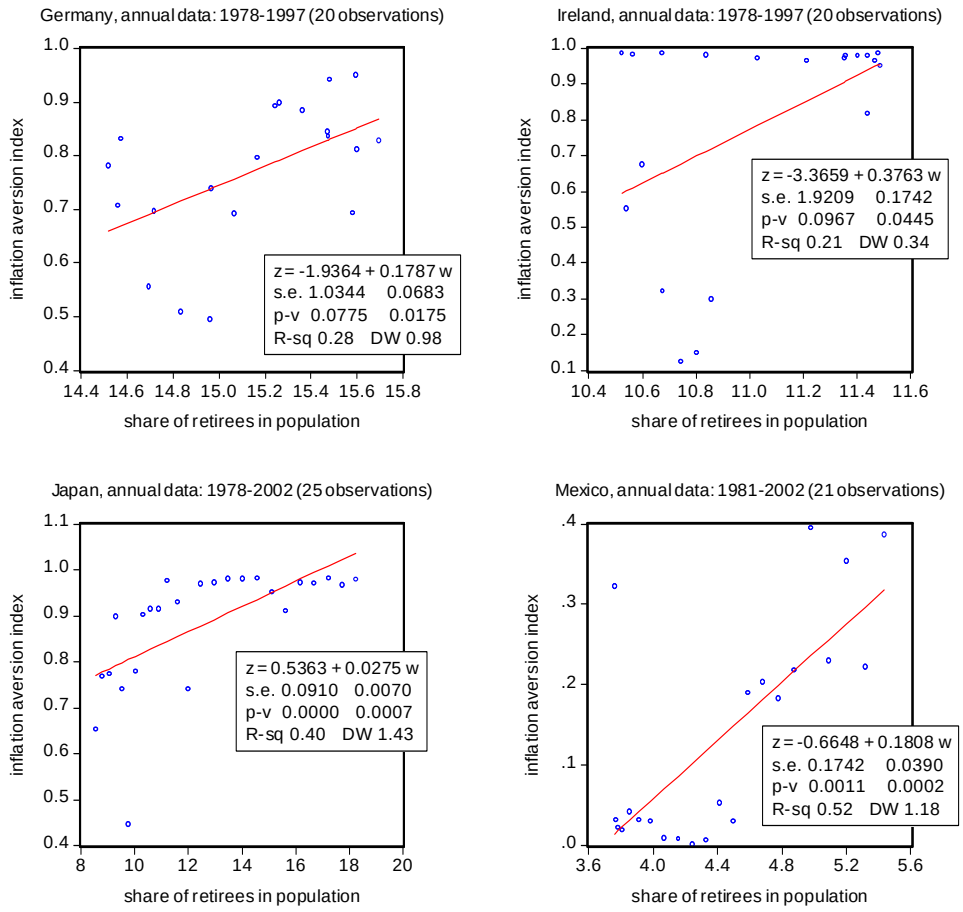

Figure 5: Time-Series Demographic Regressions for Representative Cases

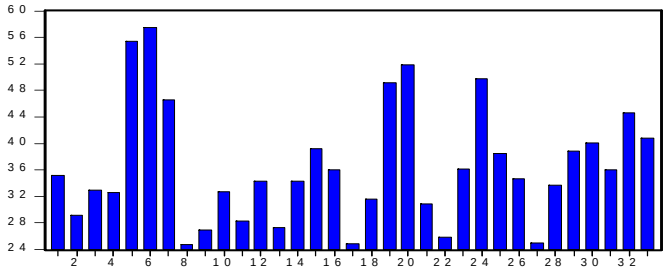

Figure 6: Gini Index for 33 Countries in the Krause–Méndez sample, excluding Barbados for lack of income inequality data: 1=Australia (1994), 2=Austria (2000), 3=Belgium (2000), 4=Canada (2000), 5=Chile (2000), 6=Colombia (2000), 7=Costa Rica (2000), 8=Denmark (1997), 9=Finland (2000), 10=France (1995), 11=Germany (2000), 12=Greece (2000), 13=Hungary (2000), 14=Ireland (2000), 15=Israel (2001), 16=Italy (2000), 17=Japan (1993), 18=Korea (1998), 19=Malaysia (1997), 20=Mexico (2000), 21=Netherlands (1999), 22=Norway (2000), 23=New Zeland (1997), 24=Peru (2000), 25=Portugal (1997), 26=Spain (2000), 27=Sweden (2000), 28=Switzerland (2000), 29=Trinidad and Tobago (1992), 30=Turkey (2000), 31=UK (1999), 32=Uruguay (2000), 33=US (2000)

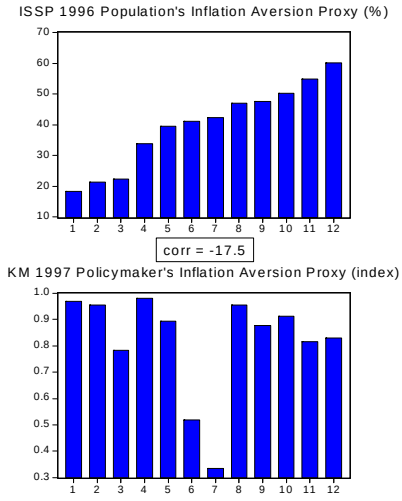

Figure 7: Correlation between 12 Common Countrries' KM (1997) and ISSP (1996) Inflation Aversion Proxies: 1=France, 2=Spain, 3=Italy, 4=Ireland, 5=Canada, 6=Australia, 7=Israel, 8=US, 9=New Zealand, 10=Japan, 11=Hungary, 12=Germany

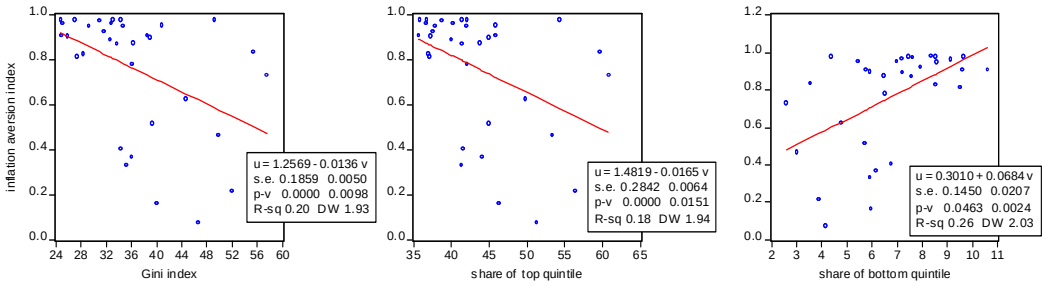

Figure 8: Cross-Section Inequality Regression of KM Inflation Aversion Index (1997) on – Respectively – Gini Index, Top Income Share Quintile and Bottom Income Share Quintile (all measures with values around 2000), 33 countries (excluding Barbados for lack of income inequality data)

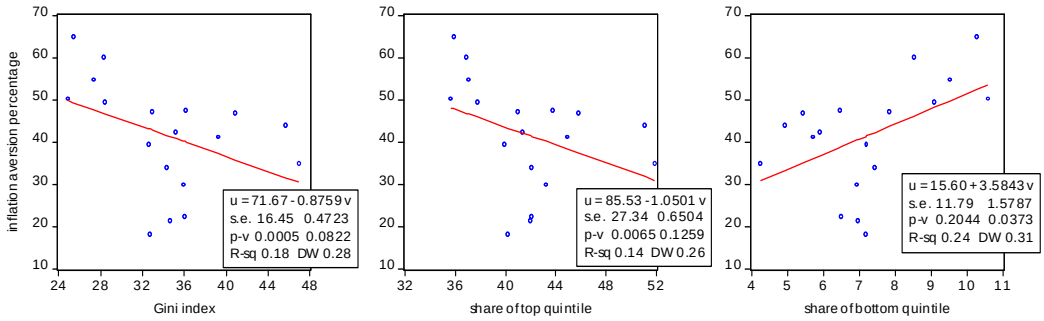

Figure 9: Cross-Section Inequality Regression of ISSP Inflation Aversion Percentage (1996) on – Respectively – Gini Index, Top Income Share Quintile and Bottom Income Share Quintile (all measures with values around 2000), 18 countries