# Meat consumption and democratic governance: A cross-national analysis

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## ABSTRACT

Food is a basic human right and democratic regimes are associated with upholding human rights as well as ensuring food security. Given that meat consumption can be regarded as a proxy for dietary quality, this study sheds light on the link between meat consumption and democratic governance using a cross-national panel dataset for 125 countries covering the period from 1972 to 2013. Employing a two-stage demand system, we find that democracy is positively correlated with meat consumption (including bovine, poultry, pig, and mutton and goat meat). A one unit improvement in democracy score, as measured by Freedom House, increases per capita total meat consumption by 3.57%. Furthermore, our results show that the effect varies according to meat product. In particular, a one unit qualitative improvement in democracy score increases the consumption of bovine, pig, poultry, and mutton and goat meat by 2.9%, 2.5%, 3.8% and 3.2% respectively.

## 1. Introduction

The human right to food is acknowledged in numerous legal instruments; nevertheless, approximately 800 million people around the world were undernourished in 2014–2016 (FAO, IFAD and WFP, 2015). This hinders those concerned from living an active and healthy life and above all a life in dignity. Undernutrition entails serious health problems, e.g. increased risk of illnesses, mortality, or impaired motor and cognitive development in children (Alderman, Behrman, & Hoddinott, 2005; Sala-i-Martín, 2005). Consequently, undernutrition results in the perpetuation of poverty and the erosion of economic growth (WB, 2006). The effects are appalling, though appropriate measures to prevent and reduce undernutrition and to ensure food security are well-known (Fan & Rue, 2015; WFP, 1998 & 2012).

Given that governments bear essential responsibilities in implementing effective measures to tackle undernutrition, we hypothesize, that the regime type - ranging from democratic to authoritarian - affects food security in qualitatively different ways. In particular, we assume that democratic regimes uphold human rights and aim at ensuring food security and, therefore, more effectively combat undernutrition. Since, meat consumption can be regarded as a proxy for dietary quality, we examine the association between meat intake and regime type. Though meat demand has been widely analyzed in the literature (e.g. Gallet, 2010a, 2010b; Ortega, Wang, & Eales, 2009; Zhou, Yu, & Herzfeld, 2015), the link between meat consumption and institutional change has not, to the best of our knowledge, been scrutinized so far.

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## 1.1. The concept of food security and the human right to adequate food

Potential impediments to an adequate, safe and nutritious diet are implicitly captured by the food security concept. At the World Food Summit in 1996, food security was defined as "*a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life*" (FAO, 1996). Food insecurity refers to a situation in which one or more of these elements are lacking. Hence, the concept is of multi-dimensional nature; in particular, it encompasses availability as well as economic and physical access to food, adequate utilization of food by the human body and stability of the aforementioned dimensions over time (Jones, Ngure, Pelto, & Young, 2013).

The human right to food adds a legal component to the concept of food security. The Universal Declaration of Human Rights (UDHR), adopted in 1948, acknowledges the right to food in Article 25 as part of the human right to an adequate standard of living. Yet, the UDHR constitutes a non-binding instrument, also referred to as 'soft law'. However, in 1966, the right to food was stipulated in the International Covenant on Economic, Social and Cultural Rights (ICESCR) in Article 11. Thus far, the ICESCR has been ratified by 164 state parties and, hence, legally obliges these to respect, protect and fulfill the therein stated rights (Mechlem, 2004). In particular, states are bound to guarantee individuals' physical and economic access to food (Künnemann, 2002).

In both concepts, government operations are crucial in order to effectively eliminate undernutrition. The government is supposed to evaluate individuals' needs and decide on various policy measures, which aim at reaching food security. Furthermore, the right to food enables individuals to, eventually, seek redress from their government in case their rights are violated (CESCR, 1999; Mechlem, 2004). Several cases do exist, in which groups of individuals have already successfully claimed their rights; e.g. India and Fiji (Knuth & Vidar, 2011).

## 1.2. The right to food and the regime type

Whether a government endeavours to achieve food security or fulfill its obligations concerning the right to food, largely depends on whether it is responsive or accountable. It can be expected, that under an accountable and well-functioning government, citizens have a significant say in policy choices, and can in turn, positively affect measures taken by their government to expedite food security.

We make the following two assumptions in this study. First, people want their right to food to be respected, protected and fulfilled and wish to have access to adequate, safe and nutritious food, such as meat products. The latter preference might be due to the fact that people generally assume that the consumption of meat products results in improved nutrition or consider it as a symbol of wealth and status (Yu, 2015). Second, people possess either various or limited options to signal the aforementioned desires to their government. Possible mechanisms through which preferences can be expressed are elections, public opinion polls or demonstrations, such as food riots (Bellemare, 2013; Lagi, Bertrand, & Bar-Yam, 2011; Manin, Przeworski, & Stokes, 1999).

Nonetheless, the reaction of the government to the signalling of people's preferences mainly depends on whether it is responsive or accountable. In authoritarian regimes people have no power to hold their leaders accountable and are, therefore, subject to the decisions of the rulers. The primary goal of these governments is to remain in power, which may not coincide with the welfare of citizens or the right to food in particular (Langlois, 2003). However, people living in democratic regimes have options to hold their government accountable at election times. Furthermore, throughout the electoral cycle, they usually have stronger signalling powers than people living in authoritarian regimes, such as the freedom of expression or demonstration. Therefore, they can ensure that the government implements policies they convey as preferred, fulfils their needs and protects their rights, such as the right to food (Beetham, 1999).

However, how does responsiveness or accountability in democratic regimes work and what does it entail? A democratic regime is characterized by periodic elections in which voters appoint rulers who govern for a prescribed period. The electorate subjugates itself to the government for multiple reasons, e.g. to delegate various tasks or to assure its own personal rights (Manin et al., 1999). Therefore, citizens choose a person or a party, who they consider to represent their own interests (Pitkin, 1967). A representative regime is considered to be responsive, if it takes citizens' preferences into account and implements policies accordingly (Dahl, 1971). The same measures can be expected if the government can be held accountable; in this case, the government will anticipate the judgement at election days and will, therefore, implement policies that the electorate signals as preferred today. Hence, the electorate can use its vote as a threat to the government to not deviate from the preferences signalled by the people (Manin et al., 1999; Schmitter & Karl, 1991). Consequently, a responsive or accountable government does endorse policies reflecting the requests of citizens.

In addition to the accountability of democratic regimes, multiple scholars (Beetham, 1999; Hafner-Burton & Tsutsui, 2007; Langlois, 2003; Sen, 1999a; Spicker, 2008) elaborate on the connection between human rights and democracy. They argue that human rights are most respected, protected and fulfilled in democratic regimes, while human rights violations in dictatorships are widespread. Sen (1999a, 2002) claims that famine can be best prevented in democratic regimes, as the government is more 'threatened by the prevalence of hunger' and, therefore, more ready to counteract. According to Beetham (1997, 1999), the political system in place systematically affects the human rights standards in a country. Furthermore, the author (ebenda) argues that human rights are a necessary prerequisite for a functioning government; e.g. if people are starving they are unable to

participate in the political process in the first place. In addition, Beetham (ebenda) outlines that the accountability mechanism and the empowerment of ordinary people to office ensures that the policies implemented are geared towards citizens' needs.

What are democracies doing differently from authoritarian regimes in order to ensure food security? Democratic regimes usually offer substantial social security programs, such as social insurance or assistance programs and health care services (Besley & Kudamatsu, 2006; Safai, 2006; Wise & Sainsbury, 2007). Furthermore, several scholars find that democracies conduct higher spending on social welfare (Avelino, Brown, & Hunter, 2005; Brown & Hunter, 1999; Lake & Baum, 2001). Government policies, such as transfer payments or work programs, directly affect people's capability to effectively access a high quality diet. The Food Assistance and Nutrition Programs (FANPs) in the US are a popular example, which comprise the provision of food, financial support and nutritional education (Fox, Hamilton, & Lin, 2004). Similarly, the government of India carries out a Ration Card Program, which provides basic food and energy at lower prices to the poor to ensure 'the right to food'. The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) represents a related social security program in India. It aims at fulfilling the 'right to work' by guaranteeing 100 labor days per year to rural households willing to do unskilled labor. Sivasakthi Devi, Balasubramanian, and Ganesh Kumar (2011) examine the effect on food intake of households participating in this program and find that participants consume more high-value commodities than non-participants.

### 1.3. Meat consumption and democratic governance

In our analysis, we decide to elucidate food security from a new perspective, which specifically links meat consumption to institutional change. We consider meat consumption as a proxy for people's dietary quality and, hence, to a certain extent, food security. We believe that people who can effectively access meat products, can also access vegetables or fruits, in contrast to, for example, solely rice or potatoes, which could result in an improved dietary intake. Furthermore, meat can be regarded as a better source of protein and fat (Yu, 2015).

Whereas the link between famine or food insecurity and democratic governance has been scrutinized by various scholars (Safai, 2006; Sen, 1999a; Pinstrup-Anderson & Watson, 2011; Wise & Sainsbury, 2007), the association between meat consumption and regime type has, to the best of our knowledge, not been evaluated so far. However, the above analysis indicates that the possibility to hold the government accountable at election could affect food security positively. Indeed, an accountable government might take more effective measures to enable people to effectively access food and, hence, improve dietary quality.

Hence, we hypothesize that democratic governance affects the consumption of meat products, and, therefore, dietary quality. In order to test our hypothesis, we estimate a two-stage demand system for meat products from a cross-national perspective. While in the first stage we employ a pragmatic demand model with fixed effects, we run a Quadratic Almost Ideal Demand System (QUAIDS) in the second stage for four meat categories: pork, bovine, poultry, as well as mutton and goat meat. In addition to controlling for meat prices and income, as usually done in demand models, we incorporate a democracy score in our estimation. Furthermore, we include country dummies, to control for differences in preferences, resource endowments, religious dietary practices or geographic location.

Interestingly, the results of our first step estimation confirm that qualitatively higher democracy scores have a positive and significant effect on meat consumption. Consistently, the estimation results of our second stage show that an increase in the democracy score - being equivalent to a regime becoming more authoritarian - results in a reduced consumption of bovine, mutton and goat, as well as poultry meat. Hence, we can conclude that political rights and civil liberties significantly affect meat consumption.

The rest of the paper is organized as follows: In section two we continue our discussion on meat consumption and democratic governance and present the data used in the analysis. This is followed by an introduction to the methods applied in section three: a two-stage demand system using a pragmatic model for the first stage and a Quadratic Almost Ideal Demand System for the second stage. In section four we show the results and elasticities obtained and discuss possible concerns in section five. Section six concludes and gives policy implications.

## 2. Data

### 2.1. Data on meat consumption

We examine the demand for meat products using a panel data set covering 125 countries for the period 1972–2013. From multiple databases we collect information on quantity of meat consumed, meat prices, income and democracy score, i.e. the FAO, World Bank and Freedom House. Upon merging the various databases, we obtain a dataset containing low, middle and high income countries, which guarantees the representativeness of our study.

We obtain meat prices and quantity of meat consumed from the FAO database. In particular, we focus on four categories of meat products: bovine, pork, mutton and goat, and poultry. The FAO Food Balance Sheets provide us with the average yearly per capita meat consumption of all four meat groups. Furthermore, we choose to derive implicit prices given by the ratio of import value to import quantity from the FAO trade databases, which are known as 'unit values'. Observations, for which import quantity and/or value are indicated as zero, do not enter our estimation, as a unit value of zero does not match reality. Although producer prices are publicly available on the FAO website, they are only accessible for a small subset of countries, which would substantially reduce our sample size; therefore, we decide to use unit values instead. In an era of globalization and free international trade, meat quality is well standardized, so that we are able to use unit values as proxies for prices. Given that our main

research purpose is to study the link between institutional change and meat consumption, the use of unit values as proxies for prices will not change our main results, even though there could be some bias in price and income elasticities (Yu & Abler, 2009).

Furthermore, we retrieve Consumer Price Index (CPI) and yearly per capita Gross Domestic Product (GDP) from the World Bank database. We use the latter as a proxy for income in our demand model.

In order to capture potential regional differences in resource endowments or geographic location as well as possible divergences in preferences due to religion or cultural background, we include country dummies in our study. All countries in our dataset have ratified the ICESCR, which ensures that they have the same legal obligations to respect, protect and fulfill the right to food.

Although, our dataset extends over forty years, it does not represent a balanced panel for two reasons. First, the required information is unavailable for all countries and all years. Second, while conflicts and the fall of the iron curtain resulted in the formation of new countries i.e. former Yugoslavian and Soviet Socialist republics, other countries merged after years of separation, i.e. East and West Germany or North and South Yemen.

## 2.2. Data on democratic governance

Numerous definitions of democracy exist; they range from constitutional to substantive, procedural or process-oriented approaches (Tilly, 2007). Schumpeter (1947) adheres to a procedural and, hence, minimal approach, according to which a political system represents a democracy if its main positions are filled through free, fair and competitive elections. Otherwise, Dahl (1998, 2005) argues that, in addition to the aforementioned, a modern democracy requires further political institutions to be in place, such as freedom of expression, alternative sources of information, associational autonomy and inclusive citizenship.

Consequently, numerous measurements of democracy developed. For instance, the Economist Intelligence Unit provides the so called Democracy Index on a yearly basis to measure the state of democracy in 167 countries. The U.S. based Polity data is a widely used data series published by the Center for Systemic Peace; it provides coded annual information on regime characteristics and transitions for all independent states with a population >500.000 from 1800 until today. The non-governmental organization Freedom House sheds light on civil liberties and political rights in >200 countries and territories on a yearly basis since 1972, and publishes the so called Freedom Rating.

Given that Freedom House measures procedural elements of democracy as well as political rights and civil liberties, we decide to use the Freedom Rating as the measure of democracy levels in our study. The indicators on political rights cover electoral process, political pluralism and participation, and functioning of government. The indicators on civil liberties focus on freedom of expression and belief, associational and organizational rights, rule of law, and personal autonomy and individual rights. Each country is assigned one to seven points for political rights as well as civil liberties, where a score of 1 refers to full implementation and a score of 7 to violation of all aforementioned rights. The average of the two depicts the Freedom Rating; a score of 1 represents a liberal democracy and a score of 7 an authoritarian regime (Diamond, 1999, 2002). The mean of the democracy score is 3.72 in our full sample.

The Freedom Rating captures citizens' possibilities to signal their preferences as well as their potential to hold the government accountable. In particular, an accountable government can be sanctioned if it is unrepresentative and does not implement policies the electorate signals as preferred. According to Sen (1999b) 'political and civil rights give people the opportunity to draw attention forcefully to general needs, and to demand appropriate public action'. Therefore, enhanced political rights and civil liberties may induce the government to put into practice policies which ensure food security.

## 2.3. Descriptive statistics

When depicting yearly average meat consumption by Freedom Rating, as shown in Table 1, we find that enhanced political rights and civil liberties are positively correlated with meat intake. Yet, we also observe that authoritarian regimes consume on average more meat than regimes with qualitatively slightly better scores. When comparing these results to average animal protein intake, we find that, people living in authoritarian regimes have a lower animal protein intake than people living in countries who

**Table 1**
Meat consumption and animal protein intake.

| Freedom rating | Meat (kg/capita/year) | Animal protein (g/capita/day) |
|---|---|---|
| 1 | 81.35 | 59.27 |
| 2 | 55.75 | 38.02 |
| 3 | 32.53 | 25.93 |
| 4 | 24.00 | 21.66 |
| 5 | 22.69 | 19.87 |
| 6 | 14.89 | 19.50 |
| 7 | 25.42 | 18.69 |

Notes
1. Meat consumption: 2331 observations, averages for the period 1990–2012.
2. Animal protein intake: 4094 observations, 3-year averages for the period 1990–2012.
3. Source: FAO Food Balance Sheets.

score qualitatively slightly better. Hence, we conclude that the meat consumed in authoritarian regimes may contain more fat and may, hence, be relatively lower in protein content.

While democracy was on the rise since the American and French revolutions, Freedom House (2015) finds that between 2006 and 2014 more countries experienced a decline in their freedom rather than a gain. Huntington (1991) divides the rise of democracy into three subsequent waves and shows that the first and the second wave were followed by reverse trends. The third wave was set loose in Europe in 1974 with the fall of several military regimes, such as Portugal, Greece and Spain and was followed by numerous Asian and Latin American countries (Huntington, 1991). As a consequence, the percentage of democracies in the world increased from a remarkably low level of 27% in 1974 to 60% in the mid-1990s (Diamond, 2005). Fukuyama (1989, 1992) even predicted the 'end of history', hypothesizing that the world is converging to a system in which the principles of liberalism in the form of democracy and free market economy will finally prevail. Yet, Diamond (2015) shares the observation of Freedom House indicating that we seem to see a 'mild but protracted democratic recession since about 2006'. Although the deterioration to date can be categorized as modest, a continuation of this trend might have detrimental effects on food security and the right to food.

## 3. A two-stage demand model

Our decision to employ a demand model in this specific context mainly leans on the framework of Amartya Sen's (1981) entitlement approach. Sen argues that the poor might not be 'entitled' to food, due to e.g. high food prices or insufficient demand for their labor. Consequently, they might be unable to effectively access food and therefore become food insecure or experience famine. In addition, Sen (1981) highlights the possibility of social security programs provided by the state to effectively improve people's entitlements to food. Hence, by using a demand model we aim to capture, to a certain extent, people's entitlements by means of income or social security transfers guaranteed in democratic regimes. Nevertheless, our approach falls short of incorporating Sen's framework to its fullest; two reasons should be mentioned here. First, we consider meat consumption at a national rather than an individual or household level. Second, we solely consider prices, income and democracy score, while entitlements, as defined by Sen (1981), encompass further areas, e.g. inheritance and own-production.

### 3.1. Demand model

Multiple demand models exist, such as the Linear Expenditure System (Stone, 1954), the translog model (Christensen, Jorgenson, & Lau, 1975), the Almost Ideal Demand System (AIDS, Deaton & Muellbauer, 1980b) or the Quadratic Almost Ideal Demand System (QUAIDS, Banks, Blundell, & Lewbel, 1997). In our study we apply a two-stage demand model comprising the pragmatic demand and QUAIDS model. From the results obtained, we estimate conditional and unconditional price and expenditure elasticities as well as the elasticity of the democracy score.

A common approach in demand analysis is to apply a two stage budgeting procedure, which assumes that the consumer allocates total expenditure in two steps. In the first stage, the consumer decides on how to allocate the entire expenditure to different commodity groups, such as meat, vegetables or fruits, and in the second stage he or she decides on how to distribute the allocated expenditure within each commodity group. Consequently, at each step the consumer needs different information. At the first stage, knowledge on total expenditure and group prices is sufficient for the allocation decision. At the second stage, knowledge on the prices of the commodities within the group as well as the expenditure share allocated to the group is necessary for the decision process. This procedure implies that the consumer can maximize her or his utility in two separate steps. A necessary and sufficient condition for the second stage of the estimation procedure is the separability of preferences (Deaton & Muellbauer, 1980a). This procedure entails an essential advantage; there are usually too many goods in practice to be considered, and therefore, a grouping of products is required, in order to reduce the number of parameters to be estimated.

Various studies have analyzed consumption patterns at national levels (Cornet & Tulkens, 1992; Cranfield, Eales, Hertel, & Preckel, 2003; Selvanathan, 1993; Theil & Suhm, 1981). Given that we apply the demand models to cross-national data, we implicitly assume that each country constitutes a single, representative consumer (Cranfield et al., 2003).

For the first-stage demand estimation, we use a pragmatic fixed effects model of the following form:

$$\ln q_{I,t} = \eta_I \ln p_{I,t} + \varepsilon_I \ln \frac{m_t}{P_t} + \beta_I z_{I,t} + \alpha_I + u_{I,t} \qquad (1)$$

While $q_{I,t}$ stands for per capita total consumption of commodities in group I at time t, $p_{I,t}$ represents the aggregate price for commodities within group I at time t, and $\eta_I$ denotes the corresponding price elasticity. Furthermore, $m_t$ represents average per capita expenditure at time t, $P_t$ the CPI and $\varepsilon_I$ the corresponding expenditure elasticity. In addition, $z_{I,t}$ represents a national characteristic, as in our case, political rights and civil liberties, $\beta_I$ the corresponding elasticity, $\alpha_I$ the unobserved time-invariant country effects and $u_{I,t}$ the error term.

For the second-stage estimation, we employ a QUAIDS model, which represents a generalized version of the Almost Ideal Demand System (AIDS) developed by Deaton and Muellbauer (1980b). The AIDS model specifies a linear relationship between commodity expenditure share and log of income, which seems plausible for many commodities. Furthermore, the model has nice properties, such as aggregation, homogeneity, and symmetry. Hence, this model has been widely applied by scholars to both, individual household as well as country level data. Nevertheless, Banks et al. (1997) consider linear Engel curves as too rigid for

specific commodities, and provide the option to estimate a more flexible Engel curve by including a quadratic expenditure term. Consequently, they call their model Quadratic Almost Ideal Demand System (QUAIDS). This model still possesses all the relevant properties of the AIDS model, but additionally allows for nonlinear Engel curves in the estimation. The QUAIDS model is based on the following indirect utility function:

$$\ln V = \left\{ \left[ \frac{\ln m_I - \ln a_I(\boldsymbol{p})}{b_I(\boldsymbol{p})} \right]^{-1} + \lambda_I(\boldsymbol{p}) \right\}^{-1} \tag{2}$$

where $\boldsymbol{p}$ is the price vector and the term $[\ln m_I - a_I(\boldsymbol{p})/b_I(\boldsymbol{p})]$ represents the indirect utility function of the PIGLOG (price-independent, generalized logarithmic) demand system, which incorporates a linear relationship between budget shares and log of income. Furthermore, $\ln a_I(\boldsymbol{p})$ constitutes a price index of the following translog form:

$$\ln a_I(\boldsymbol{p}) = \alpha_{0,I} + \sum_{i=1}^{n} \alpha_{i,I} \ln p_{i,I} + \frac{1}{2} \sum_{i=1}^{n} \sum_{j=1}^{n} \gamma_{ij,I} \ln p_{i,I} \ln p_{j,I} \tag{3}$$

and $b_I(\mathbf{p})$ is the Cobb-Douglas price aggregator defined as follows:

$$b_I(\boldsymbol{p}) = \prod_{i=1}^{n} p_{i,I}^{\beta_{i,I}} \tag{4}$$

In addition, $\lambda_I(\boldsymbol{p})$ is defined as:

$$\lambda_I(\boldsymbol{p}) = \sum_{i=1}^{n} \lambda_{i,I} \ln p_{i,I} \tag{5}$$

where $\sum \lambda_{i,I} = 0$.

Applying Roy's identity, the expenditure share equations are of the following form:

$$w_{i,I} = \alpha_{i,I} + \sum_{j=1}^{n} \gamma_{ij,I} \ln p_{j,I} + \beta_{i,I} \ln \left[ \frac{m_I}{a_I(\boldsymbol{p})} \right] + \frac{\lambda_{i,I}}{b_I(\boldsymbol{p})} \left\{ \ln \left[ \frac{m_I}{a_I(\boldsymbol{p})} \right] \right\}^2 \tag{6}$$

In order to comply with demand theory, the following constraints are imposed on the estimated parameters: (1) adding up, (2) homogeneity and (3) Slutsky symmetry. The adding up condition requires $\sum_{i=1}^{n} \alpha_{i,I} = 1$, $\sum_{i=1}^{n} \beta_{i,I} = 0$, $\sum_{j=1}^{n} \gamma_{ij,I} = 0 \ \forall j$ and $\sum_{i=1}^{n} \lambda_{i,I} = 0$. The homogeneity of degree zero in prices is given if $\sum_{j=1}^{n} \gamma_{ij,I} = 0 \ \forall j$ is ensured. Slutsky symmetry is satisfied by $\gamma_{ij,I} = \gamma_{ji,I}$. Given that the expenditure shares add up, one of the demand equations is dropped, in order to ensure that the variance-covariance matrix is non-singular. The remaining equations are estimated by maximum likelihood and the parameters of the omitted equation are obtained by applying the additivity constraints as set out above.

### 3.2. The democracy score in the demand model

Numerous methods exist for the integration of demographic variables in demand systems (Lewbel, 1985; Pollak & Wales, 1981; Ray, 1983). In order to introduce the democracy score in the QUAIDS model, we choose the scaling technique proposed by Ray (1983). Following the terminology of Poi (2012), $\boldsymbol{z}$ represents a vector of s characteristics and $e_I(\boldsymbol{p}, \boldsymbol{z}, u)$ the expenditure function of the following form:

$$e_I(\boldsymbol{p}, \boldsymbol{z}, u) = m_{0,I}(\boldsymbol{p}, \boldsymbol{z}, u) * e_I^R(\boldsymbol{p}, u) \tag{7}$$

The first term $m_{0,I}(p, z, u)$ scales the function in order to account for demographics such as the democracy score. This scaling function consists of two components:

$$m_{0,I}(\boldsymbol{p}, \boldsymbol{z}, u) = \dot{m}_{0,I}(\boldsymbol{z}) * \varnothing_I(\boldsymbol{p}, \boldsymbol{z}, u) \tag{8}$$

$\dot{m}_0(\boldsymbol{z})$ takes the following form:

$$\dot{m}_{0,I}(\boldsymbol{z}) = 1 + \boldsymbol{\rho}' \boldsymbol{z} \tag{9}$$

and $\boldsymbol{\rho}$ represents a vector of parameters. Furthermore, $\varnothing_I(\boldsymbol{p},\boldsymbol{z},u)$ is given by:

$$\ln \varnothing_I(\boldsymbol{p},\boldsymbol{z},u) = \frac{\prod_{j=1}^{k} p_{j,I}^{\beta_{j,I}} \left( \prod_{j=1}^{k} p_{j,I}^{\boldsymbol{\eta}'_{j,I}\boldsymbol{z}} - 1 \right)}{\dfrac{1}{u} - \sum_{j=1}^{k} \lambda_{j,I} \, \ln p_{j,I}} \tag{10}$$

Consequently, we obtain the following expenditure share equations:

$$w_{i,I} = \alpha_{i,I} + \sum_{j=1}^{n} \gamma_{ij,I} \, \ln p_{j,I} + \left( \beta_{i,I} + \boldsymbol{\eta}'_{i,I}\boldsymbol{z} \right) \ln \left[ \frac{m_I}{\dot{m}_{0,I}(\boldsymbol{z})a_I(\boldsymbol{p})} \right] + \frac{\lambda_{i,I}}{b_I(\boldsymbol{p})c_I(\boldsymbol{p},\boldsymbol{z})} \left\{ \ln \left[ \frac{m_I}{\dot{m}_{0,I}(\boldsymbol{z})a_I(\boldsymbol{p})} \right] \right\}^2 \tag{11}$$

where $c_I(\boldsymbol{p},\boldsymbol{z})$ is given by:

$$c_I(\boldsymbol{p},\boldsymbol{z}) = \prod_{j=1}^{k} p_{j,I}^{\boldsymbol{\eta}'_{j,I}\boldsymbol{z}_I} \tag{12}$$

### 3.3. Conditional elasticities

The expenditure and price elasticities incorporating the scaling technique are obtained by differentiating Eq. (11) with respect to $\ln m_I$ and $\ln p_{j,I}$ and are specified by Poi (2012). The uncompensated or Marshallian price elasticities take the following form:

$$\varepsilon_{ij,I} = -\delta_{ij,I}$$
$$+ \frac{1}{w_{i,I}} \left( \gamma_{ij,I} - \left[ \beta_{i,I} + \boldsymbol{\eta}'_{i,I}\boldsymbol{z} + \frac{2\lambda_{i,I}}{b_I(\boldsymbol{p})c_I(\boldsymbol{p},\boldsymbol{z})} \ln \left\{ \frac{m_I}{\dot{m}_{0,I}(\boldsymbol{z})a_I(\boldsymbol{p})} \right\} \right] \times \left( \alpha_{j,I} + \sum_l \gamma_{jl,I} \, \ln p_{l,I} \right) - \frac{\left( \beta_{i,I} + \boldsymbol{\eta}'_{j,I}\boldsymbol{z} \right) \lambda_{i,I}}{b_I(\boldsymbol{p})c_I(\boldsymbol{p},\boldsymbol{z})} \left[ \ln \left\{ \frac{m_I}{\dot{m}_{0,I}(\boldsymbol{z})a_I(\boldsymbol{p})} \right\} \right]^2 \right) \tag{13}$$

where $\delta_{ij,I}$ represents the Kronecker delta and the conditional expenditure elasticity is given by:

$$\varepsilon_{i,I} = 1 + \frac{1}{w_{i,I}} \left[ \beta_{i,I} + \boldsymbol{\eta}'_{i,I}\boldsymbol{z} + \frac{2\lambda_{i,I}}{b_I(\boldsymbol{p})c_I(\boldsymbol{p},\boldsymbol{z})} \ln \left\{ \frac{m_I}{\dot{m}_{0,I}(\boldsymbol{z})a_I(\boldsymbol{p})} \right\} \right] \tag{14}$$

The conditional compensated or Hicksian price elasticities are then obtained using the Slutsky equation:

$$\varepsilon_{ij,I}^{C} = \varepsilon_{ij,I} + \varepsilon_{i,I} w_{j,I} \tag{15}$$

Furthermore, we calculate the conditional elasticity of the democracy score by taking the derivative of Eq. (11) with respect to $\ln z_i$, and get the following form:

$$\varepsilon_{iz,I} = \frac{1}{w_{i,I}} \left[ \eta_{i,I} z_{i,I} * \ln \left\{ \frac{m_I}{\dot{m}_{0,I}(\boldsymbol{z})a_I(\boldsymbol{p})} \right\} - \left( \beta_{i,I} + \boldsymbol{\eta}'_{i,I}\boldsymbol{z} \right) * \frac{1}{(1+\boldsymbol{\rho}'\boldsymbol{z})} \rho_{i,I} z_i + \frac{\lambda_i}{b_I(p)c_I(p,z)\left( \sum_{i=1}^{4} \ln p_{i,I}\eta_{i,I} \right) z_i} \left[ \ln \left\{ \frac{m_I}{\dot{m}_{0,I}(\boldsymbol{z})a_I(\boldsymbol{p})} \right\} \right]^2 \right.$$
$$\left. - \frac{2\lambda_{i,I}}{b_I(\boldsymbol{p})c_I(\boldsymbol{p},\boldsymbol{z})} \left[ \ln \left\{ \frac{m_I}{\dot{m}_{0,I}(\boldsymbol{z})a_I(\boldsymbol{p})} \right\} \right] * \frac{1}{(1+\boldsymbol{\rho}'\boldsymbol{z})} \rho_{i,I} z_i \right] \tag{16}$$

### 3.4. Unconditional elasticities

When estimating a second-stage conditional demand system, the expenditure and price elasticities represent conditional or partial elasticities. Given that these elasticities are difficult to use for policy recommendations, unconditional or total elasticities have to be estimated. We adopt the calculation of unconditional elasticities by Fan, Wailes, and Cramer (1995). The unconditional expenditure elasticities are given by

$$\varepsilon_i = \varepsilon_{i,I} \, \varepsilon_I \tag{17}$$

The unconditional uncompensated price elasticities take the following form:

$$\eta_{ij} = \eta_{ij,I} + \varepsilon_{i,I} w_{j,I}(1 + \eta_I) \quad (18)$$

The unconditional compensated price elasticities are again given by the Slutsky equation as in Eq. (15).

Eq. (16) only gives the conditional demand elasticity with respect to the democracy score. As democracy is correlated with income levels, the unconditional elasticities with respect to the democracy score can be derived as follows:

$$\varepsilon_{iz} = \varepsilon_{iz}|_{conditional} + \frac{d \ln q_i}{d \ln m} \frac{d \ln m}{d \ln z}$$

$$= \varepsilon_{iz,I} + \varepsilon_i \frac{d \ln m}{d \ln z} \quad (19)$$

where $\frac{d \ln m}{d \ln z}$ can be obtained from estimating a simple fixed effects model between income and democracy score.[1]

Given that the democracy score is not continuous and falls in the range of 1 to 7, it is also interesting to illustrate marginal effects, defined as the percentage change in meat consumption due to a one unit increase in democracy score. The unconditional marginal effects can be obtained by the following equation:

$$\frac{dq_i}{q_i} = \frac{\varepsilon_{iz}}{z_i}. \quad (20)$$

### 3.5. Estimation procedure

Our estimation comprises three steps. First, we run a fixed-effects model regressing average per capita meat consumption on average meat price, average GDP per capita and the democracy score. Second, we employ a QUAIDS model; in particular, we estimate the demand equations for four meat categories: bovine, mutton and goat, pork, and poultry meat respectively, again controlling for price, income, democracy score, and country dummies. Incorporating the option to fit nonlinear Engel curves is essential in our analysis, given that meat may be a luxury good at low expenditure levels and a necessity at higher levels. Finally, we calculate conditional and unconditional price and expenditure elasticities, the elasticity with respect to the democracy score as well as its marginal effects in the third stage.

## 4. Results

In the first stage, we estimate a pragmatic demand model for per capita total meat consumption. The results are presented in Table 2. We find that all parameters are statistically significant at the 1% level and have the expected signs. In particular, with a 1% increase in average meat price, meat consumption decreases by 0.20%; with a 1% increase in per capita real GDP, which proxies income, per capita meat consumption increases by 0.28%. Interestingly, raising the democracy score by 1% - being equivalent to the government becoming more authoritarian - results in a reduction of meat consumption by 0.13%. Equivalently, a country which becomes more democratic tends to consume more meat products. Given that the mean democracy score is 3.72, the marginal effect of democracy is −3.57%. This implies that a one unit improvement in the democracy score leads to an increase in per capita meat consumption by 3.57%. Given that meat production requires essential amounts of feed grains, a 3.57% increase in meat consumption necessitates a sizable amount of additional grains to feed animals.

Hence, from stage one we can conclude that democratic governance exhibits a positive and significant effect on meat consumption. As outlined above, an accountable government will implement policies signalled as preferred by citizens, such as policies to reach food security. In particular, democratic regimes can be expected to offer substantial social security programs, such as transfer payments or the distribution of food in case of food shortages. These entitlements directly affect people's access to food and, consequently, meat consumption and dietary quality. Overall, this will result in improved food security.

For the second stage, we employ a QUAIDS model, which represents a non-linear system of equations allowing us to estimate the demand for bovine, mutton and goat, pork and poultry meat respectively. The parameter estimates are presented in Table 3. As expected, we find that all own and cross-price parameters are statistically significant. In addition, all expenditure parameters, except for poultry, and all parameters of the quadratic expenditure terms, except for mutton and goat, are statistically significant. Furthermore, we find that the majority of country dummies are significant; nevertheless the results are not presented due to limited space. Hence, we can conclude that country differences due to preferences, religion or geographic location are crucial in our demand estimation. Finally, the significance of the democracy score is evident in the three demand equations of bovine, mutton and goat as well as poultry meat. This implies that political rights and civil liberties exhibit a significant effect on the consumption of these meat products in the conditional demand model. However, the impact of the democracy score on pig meat is not statistically significant. This might be due to exceptional cases such as China or various Muslim-majority countries. Pork represents the main meat product consumed in China; in specific, >60% of all meat products in China are pig meat. Furthermore, China's consumption accounts for about 50% of global pork consumption, but the increase has recently slowed down (Yu, 2015). In addition, in Muslim-majority countries pork is hardly consumed due to religious reasons. It is also not surprising that conditional demand elasticities with respect to the democracy score for all meat products are not large in terms of magnitude, as income is controlled for.

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[1] The value of $\frac{d \ln m}{d \ln z}$ is −0.39 in this study.

**Table 2**
Panel regression using fixed effects.

| Meat consumed (kg/capita/year, log) | Coef. | R. Std. Err. |
|---|---|---|
| Meat price (average, real USD, log) | −0.1990*** | 0.0276 |
| GDP (per capita, real USD, log) | 0.2820*** | 0.0357 |
| Freedom rating (log) | −0.1328*** | 0.0440 |
| Constant | 1.4713*** | 0.3142 |

Notes
1. Observations: 2331.
2. $R^2$ within: 0.4545, $R^2$ between: 0.7483, $R^2$ overall: 0.7487.
3. Significance level: *, **, and *** denote $p < 0.10$, $p < 0.05$ and $p < 0.01$, respectively.
4. Data Sources: Meat consumed: FAO Food Balance Sheets; Meat price: FAO Trade Database and FAO Food Balance Sheets; GDP: World Bank; Freedom Rating: Freedom House.
5. Meat price: average weighted unit values of pork, bovine, mutton and goat, and poultry meat; unit values are given by the ratio of import value to import quantity as indicated in the FAO Trade Database; weights are assigned according to quantity consumed as indicated in the FAO Food Balance Sheets.
6. Freedom Rating: ranges from 1 to 7, where 1 represents a liberal democracy and 7 an authoritarian regime.

**Table 3**
Estimated coefficients of the quadratic almost ideal demand system.

| | Constant | Expenditure | Price bovine | Price mutton & goat | Price pig | Price poultry | Expenditure squared | Freedom rating |
|---|---|---|---|---|---|---|---|---|
| Bovine | 0.2049*** | −0.1458*** | 0.1991*** | | | | −0.0047*** | −0.0057*** |
| | 0.0094 | 0.0104 | 0.0052 | | | | 0.0018 | 0.0008 |
| Mutton & goat | 0.0606*** | −0.0911*** | −0.0569*** | 0.0849*** | | | −0.0002 | −0.0011*** |
| | 0.0073 | 0.0070 | 0.0034 | 0.0047 | | | 0.0012 | 0.0004 |
| Pig | 0.4584*** | 0.2251*** | −0.0856*** | −0.0179*** | 0.1620*** | | 0.0146*** | 0.0008 |
| | 0.0114 | 0.0109 | 0.0037 | 0.0025 | 0.0051 | | 0.0011 | 0.0005 |
| Poultry | 0.2761*** | 0.0118 | −0.0566*** | −0.0100*** | −0.0585*** | 0.1252*** | −0.0097*** | 0.0060*** |
| | 0.0102 | 0.0123 | 0.0038 | 0.0025 | 0.0043 | 0.0057 | 0.0020 | 0.0008 |

Notes
1. Observations: 2331.
2. Significance level: *, **, and *** denote $p < 0.10$, $p < 0.05$ and $p < 0.01$, respectively.
3. Using robust standard errors.
4. Bovine, mutton & goat, pig and poultry refer to the four budget share equations respectively.
5. Data sources: Expenditure: FAO Food Balance Sheets and FAO Trade Database; Price: FAO Trade Database; Freedom Rating: Freedom House.
6. Expenditure: amount of per capita GDP dedicated to each of the four meat products, real USD.
7. Prices: unit values, given by the ratio of import value to import quantity, real USD.
8. Freedom Rating: ranges from 1 to 7, where 1 represents a liberal democracy and 7 an authoritarian regime.

We then test for the validity of our model using two specification tests. In order to evaluate whether the specification of the QUAIDS model is correct, we compare the restricted model incorporating traditional linear Engel curves to the unrestricted model incorporating quadratic Engel curves using a Wald Test. Our results are presented in Table 4. The test yields a value of 178.32 against a critical value of 7.81; hence, we can clearly reject the AIDS model in favour of the QUAIDS model. Furthermore, we test the null hypothesis of the absence of effects of the democracy score also using a Wald Test. The test statistic of 72.66 against a critical value of 7.81 proves that the null hypothesis of no effects can be rejected. This demonstrates the importance of including the democracy score in our demand analysis.

Compensated and uncompensated price and expenditure elasticities give us a better understanding of price and income effects. Table 5 shows the conditional price, expenditure and democracy score elasticities for different meat products. However, the final effects of price, expenditure and democracy should rely on unconditional elasticities; in Table 6 we report the corresponding results.

Taking a close look at the unconditional elasticities, we find that all compensated own price elasticities are negative, which satisfies the negativity property of consumer theory. The unconditional compensated and uncompensated own price elasticities range between −0.05 and −0.30. The unconditional expenditure elasticities of all four equations are positive and range between 0.26 and 0.34, indicating that all goods are necessities and normal goods from a global perspective. While the consumption of meat products increases with growing income, the proportional increase diminishes. Hence, meat products are still normal goods, and increasing meat prices result in reduced consumption. These findings are consistent with the current literature (e.g. Gallet, 2011a, 2011b; Tian & Yu, 2015; Zhou et al., 2015; Chen, Abler, Zhou, Yu, & Thompson, 2015) and meat consumption statistics. The FAO statistics show that the global per capita meat consumption reached 42.4 kg per year in 2011, which represents a relatively high level.[2] Nevertheless, the growth rate in meat consumption in recent years was very low.

Finally, we shed light on the effect of democracy on meat consumption, which represents the main part of our research. Following Carothers (2002), we do not postulate that the path of authoritarian or hybrid regimes (Diamond, 2002) towards

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[2] Source: FAO World Food Balance Sheet. http://faostat3.fao.org/download/FB/FBS/E.

**Table 4**
Wald tests.

| Restriction | Test statistic | Critical value | Conclusion |
| --- | --- | --- | --- |
| (1) AIDS vs QUAIDS | 178.32 | χ2 (3.0.95) = 7.81 | Rejected |
| (2) Non-political effects | 72.66 | χ2 (3.0.95) = 7.81 | Rejected |

Note:
1. Comparisons of two models: (1) AIDS vs. QUAIDS; (2) QUAIDS including Freedom Rating and QUAIDS excluding Freedom Rating, indicated as 'non-political effects'.
2. Data source: calculated by the authors.

**Table 5**
Conditional price and expenditure elasticities from QUAIDS model.

| | Bovine | Mutton & goat | Pig | Poultry | Expenditure | Freedom rating |
| --- | --- | --- | --- | --- | --- | --- |
| Uncompensated | | | | | | |
| Bovine | −0.4689 | −0.1427 | −0.1733 | −0.1373 | 0.9222 | −0.0042 |
| Mutton & goat | −0.5951 | −0.1372 | −0.2010 | −0.1133 | 1.0465 | −0.0008 |
| Pig | −0.2333 | −0.0591 | −0.4678 | −0.1684 | 0.9286 | 0.0097 |
| Poultry | −0.3276 | −0.0565 | −0.2809 | −0.5275 | 1.1926 | −0.0072 |
| Compensated | | | | | | |
| Bovine | −0.1178 | −0.0524 | 0.0900 | 0.0802 | | |
| Mutton & goat | −0.1966 | −0.0346 | 0.0977 | 0.1335 | | |
| Pig | 0.1202 | 0.0319 | −0.2027 | 0.0506 | | |
| Poultry | 0.1264 | 0.0604 | 0.0595 | −0.2462 | | |

Notes
1. Elasticities: percentage change in the quantity of bovine, mutton and goat, pig, or poultry meat (rows) due to a 1 % increase in the price of bovine, mutton and goat, pig or poultry meat, expenditure and the Freedom Rating (columns).
2. Data sources: Expenditure: FAO Food Balance Sheets and FAO Trade Database; Price: FAO Trade Database; Freedom Rating: Freedom House.
3. Expenditure: amount of per capita GDP dedicated to each of the four meat products, real USD.
4. Prices: unit values, given by the ratio of import value to import quantity, real USD.
5. Freedom Rating: ranges from 1 to 7, where 1 represents a liberal democracy and 7 an authoritarian regime.

**Table 6**
Unconditional price and expenditure elasticities from QUAIDS model.

| | Bovine | Mutton & goat | Pig | Poultry | Expenditure | Freedom rating |
| --- | --- | --- | --- | --- | --- | --- |
| Uncompensated | | | | | | |
| Bovine | −0.1877 | −0.0606 | 0.0390 | 0.0880 | 0.2600 | −0.1068 |
| Mutton & goat | −0.3139 | −0.0550 | 0.0113 | 0.1120 | 0.2951 | −0.1173 |
| Pig | 0.0479 | 0.0230 | −0.2555 | 0.0569 | 0.2618 | −0.0936 |
| Poultry | −0.0464 | 0.0256 | −0.0686 | −0.3022 | 0.3363 | −0.1399 |
| Compensated | | | | | | |
| Bovine | −0.1850 | −0.0598 | 0.0411 | 0.0902 | | |
| Mutton & goat | −0.3112 | −0.0542 | 0.0133 | 0.1142 | | |
| Pig | 0.0506 | 0.0238 | −0.2534 | 0.0591 | | |
| Poultry | −0.0437 | 0.0264 | −0.0666 | −0.3001 | | |

Notes
1. Elasticities: Percentage change in the quantity of bovine, mutton and goat, pig, or poultry meat (rows) due to a 1 % increase in the price of bovine, mutton and goat, pig or poultry meat, expenditure and the Freedom Rating (columns).
2. Data sources: Expenditure: FAO Food Balance Sheets and FAO Trade Database; Price: FAO Trade Database; Freedom Rating: Freedom House.
3. Expenditure: amount of per capita GDP dedicated to each of the four meat products, real USD.
4. Prices: unit values, given by the ratio of import value to import quantity, real USD.
5. Freedom Rating: ranges from 1 to 7, where 1 represents a liberal democracy and 7 an authoritarian regime.

democracy is predetermined. Nevertheless, we are interested in how the advancement of political rights and civil liberties is associated to meat consumption. In Tables 5 and 6 we report the conditional and unconditional elasticity of the democracy score, defined as the percentage change in meat consumption due to a 1% increase in democracy score. Table 6 shows that a 1% increase in democracy score reduces the consumption of bovine, mutton and goat, pig, as well as poultry meat by 0.11%, 0.12%, 0.09%, 0.14% respectively. The largest impact incurs for poultry meat, followed by mutton and goat, bovine, and pig meat.

As the democracy score is not continuous and ranges between 1 and 7, it is more interesting from a policy perspective to calculate the marginal effects of improvements in political rights and civil liberties. These effects depict the percentage change in

**Table 7**
Marginal effects of democracy score/freedom rating (%, unconditional).

| Freedom rating | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Mean (3.72) |
|---|---|---|---|---|---|---|---|---|
| Marginal changes in freedom rating (1/freedom rating) | 0.000 | 0.500 | 0.333 | 0.250 | 0.200 | 0.167 | 0.143 | 0.269 |
| Bovine | 0.000 | −5.340 | −3.556 | −2.670 | −2.136 | −1.784 | −1.527 | −2.873 |
| Mutton & goat | 0.000 | −5.865 | −3.906 | −2.933 | −2.346 | −1.959 | −1.677 | −3.155 |
| Pig | 0.000 | −4.680 | −3.117 | −2.340 | −1.872 | −1.563 | −1.338 | −2.518 |
| Poultry | 0.000 | −6.995 | −4.659 | −3.498 | −2.798 | −2.336 | −2.001 | −3.763 |
| Total meat | 0.000 | −6.640 | −4.422 | −3.320 | −2.656 | −2.218 | −1.899 | −3.572 |

Notes
1. Marginal effects of the democracy score are given by the percentage change in meat consumption due to a one unit increase in democracy score.
2. Freedom Rating: ranges from 1 to 7, where 1 represents a liberal democracy and 7 an authoritarian regime.
3. Data source: Calculation by the authors.

meat consumption due to an improvement in the democracy score by one unit, e.g. from 7 to 6. Given that 1 is the qualitatively highest score, the marginal effect is zero. The results are reported in Table 7. For instance, in 2014, China obtained a democracy score of 6.5. If the score improves to 5.5, the consumption of bovine, mutton and goat, pig as well as poultry meat can be expected to increase by 1.64%, 1.81%, 1.44% and 2.15% respectively. Correspondingly, per capital total meat consumption will increase by 2.04%. Given the sheer size of the Chinese population, this effect would be substantial.

## 5. Discussions

### 5.1. Meat consumption as desirable outcome in itself?

Undernourishment may be due to a lack of different nutrients, such as protein. A deficiency in protein can result in protein-energy malnutrition (PEM) and can occur in two forms, marasmus and kwashiorkor. This kind of malnutrition has serious health effects, such as poor physical and cognitive development (Fukagawa, 2007; Whitney & Rolfes, 2002). Consuming sufficient amounts of protein is, therefore, essential for human development and sustenance. Though protein can be retrieved from plant sources such as wheat or beans, animal protein is more easily digestible and provides all necessary amino acids needed by the human body for protein synthesis in adequate quantities (Whitney & Rolfes, 2002). Furthermore, animal products also provide other nutrients in addition to protein, such as fat, vitamins and minerals. (WHO, 1974, 2002).

When few animal products are consumed, an increase in meat consumption can have substantial positive effects on the nutritional status of individuals (Bender, 1992; FAO, 2009). Nevertheless, excessive meat consumption is undesirable from health, environmental, and resource scarcity perspectives. (Raphaely & Marinova, 2016; Satoru, 2015; Yu, 2015). Numerous studies report a positive association between meat intake and risk of coronary heart disease, stroke, colorectal cancer and type 2 diabetes mellitus (Larsson & Wolk, 2006; Micha, Wallace, & Mozaffarian, 2010).

### 5.2. Authoritarian regimes ensuring food security?

Donnelly (1999) argues that non-democracies can also uphold human rights to a certain extent - such as the right for food - and can, according to de Waal (2000) even derive legitimacy from averting famine; China represents a popular example. Wallace (2011) points out that in case of famine the legitimacy of any government is at stake. This became particularly apparent after the global food crisis in 2008, when food riots took place in various authoritarian regimes, such as Yemen and Uzbekistan. Hence, food security can also be of importance for the survival of an authoritarian regime.

Yet, in authoritarian regimes the respect, protection and fulfillment of the right to food rests upon the benevolent ruler and in turn, according to Langlois (2003), amounts to 'little more than charity', putting in question its long-lasting effect. This implies that authoritarian regimes might not take the need for safe, nutritious and adequate food as strongly into account as democratic regimes. Authoritarian regimes might provide social security programs, but, as outlined above, their scope compared to democratic regimes is limited.

Nevertheless, democratic regimes exist in which the Global Hunger Index (GHI) is strikingly high, such as India (von Grebmer et al., 2015). According to Drèze (2004), most people in India cannot actively take part in the democratic process for various reasons, e.g. missing education or economic insecurity. Consequently, the priorities of deprived citizens are less considered in public policy making. Yet, India already experienced two cases in which people successfully claimed their right to food at the Supreme Court, resulting in the implementation of various new government programs (Banik, 2005; Knuth & Vidar, 2011).

## 6. Conclusion

This study examines whether democratic governance significantly affects dietary quality or meat consumption and, hence, food security. We argue that democratic regimes uphold human rights and implement policies the electorate signals as preferred, such as measures to reach food security. Possible policies might comprise transfer payments or the provision of food in case of emergency. These policies improve people's entitlements to adequate, safe and nutritious food and, therefore, affect food security

positively. Given that meat intake can be considered as a proxy for people's dietary quality, we shed light on the link between meat consumption and democratic governance.

We estimate a two-stage demand system, using a panel dataset for 125 countries covering the period from 1972 to 2013 and integrate political rights and civil liberties into our model. Our results show that political rights and civil liberties exhibit a significant and positive effect on meat consumption. In particular, meat consumption increases when a regime becomes more democratic. A one unit qualitative improvement in democracy score as measured by Freedom House increases per capita total meat consumption by 3.57%. Furthermore, we find that the effect of democracy varies according to meat product. In particular, a one unit qualitative improvement in democracy score increases the consumption of bovine, pig, poultry, and mutton and goat meat products by 2.9%, 2.5%, 3.8% and 3.2% respectively.

According to Freedom House, in the past nine years, more countries have experienced losses in their Freedom Rating rather than gains. This worrisome tendency might have detrimental effects on food security and the respect, protection and fulfillment of the right to food in the upcoming years. People's entitlements to nutritious, safe and adequate food could deteriorate worldwide. Aiming to achieve food security and upholding the right to food have to stay top priorities of governments in the future in order to reduce the number of people still suffering from undernourishment. In order to ensure that governments implement policies which the electorate signals as preferred, people have to be entitled to hold their government accountable and have to be given political rights as well as civil liberties. Consequently, the advancements of democratic governance should become an integral part of any development process.

Nevertheless, on a global level advanced democratisation and, hence, growing meat consumption, might result in an increased demand for feed grains, and probably tighter food supply. Further technological innovation and collective action are called for breaking the resource constraints to increase food supply.

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