IS THE TURKEY HALAL? GENETICALLY MODIFIED ANIMAL FEED REGULATION WHERE EAST MEETS WEST

Jennifer E. Spreng†

"We cannot move Turkey forward without developing the agriculture sector."[1]

Recep Tayyip Erdoğan
President of the Republic of Turkey

† Legal Writing Professional, Atlanta's John Marshall Law School; Associate Professor of Law, Emeritus, Arizona Summit Law School. LL.M. in Biotechnology & Genomics, 2014, Arizona State University Sandra Day O'Connor College of Law; J.D., 1995, Saint Louis University School of Law, *magna cum laude*.

1. REPUBLIC OF TURKEY, MINISTRY OF FOOD, AGRIC. & LIVESTOCK, STRUCTURAL CHANGES AND REFORMS ON TURKISH AGRICULTURE 2013-14, at 3 (2013) [hereinafter STRUCTURAL CHANGES].

ABSTRACT

Turkey's Biosafety Law (2010) imposes some of the world's most stringent restrictions on the import, release and marketing of genetically modified foodstuffs. The Biosafety Board has not approved a single food event; the Council of State suspended approval of MON810;[2] Turks have endured meat and milk price spikes; herders are going bankrupt for lack of affordable feed; and importers have been arrested and prosecuted for trace contamination with unapproved GMOs. It's a pox on all their houses: Turks want nothing do with GM foodstuffs.

The culprit? The "precautionary principle," which authorizes taking precautions in the face of scientific uncertainty about risk. It vindicates majority perceptions of risks and consequences by inflating estimates of their magnitude and likelihood of harm. People receive protection from risks that do not exist while regulators ignore real risks and opportunities that do. The politically powerful get to feel safe by shifting risk from themselves to others. Precaution is the risk management strategy-of-choice in the European Union that Turkey wants to join.

Studies show that when Europeans perceive risk from GM foodstuffs, they are really just failing to see any benefits. Truth: Europeans do not actually benefit from GM foodstuffs, but agriculture-reliant citizens of developing nations do.

2. Just prior to publication, the Turkish High Court reversed its decision as to MON810 but not its decision to suspend approval of several stacked events made at the same time as the High Court originally suspended approval of MON810. *Turkey's High Court Reverses Decision on MON810 Revocation*, AGRONEWS (June 2, 2015), http://news.agropages.com/News/NewsDetail—-14990.htm [hereinafter *Turkey's High Court Reverses Decision*].

Turkey could benefit from importing reliable and affordable GM feed supplies so that its vital but struggling animal husbandry sector could produce enough milk and meat to stay in business, claim victory over its remaining micro-nutrition deficits, contribute to stability in the Kurdish east, and maybe even carve out a big market share in the global Halal food marketplace!

By regulating foodstuffs like Europeans while getting their daily bread like Middle Easterners, Turks – along with other developing nations – let Brussels and capitals of other export markets decide their futures, not Ankara. If Turkey could make up its democracy deficit, the smallholders who raise animals they struggle to feed might urge policymakers that where there is, "no risk, there is no reward."

I. INTRODUCTION

Before Thanksgiving, 2012, an ugly internet movement demanded a boycott of Butterball for selling a "halal" turkey raised and processed consistent with Muslim dietary restrictions. The incident underscored the emphasis American agribusiness places on the Muslim market.

In the Republic of Turkey, the halal status of foodstuffs may be less clear but the propriety of genetically modified ingredients is not. In 2010, Turkey adopted a draconian Biosafety Act which bans importing genetically modified plants and animals without a license.[3] The new "Biosafety Board" is stingy about approving license applications,[4] while arbitrary and allegedly corrupt enforcement of the new regulations further chills trade.[5] American agriproducers have been all but washed away in Turkey's regulatory maelstrom.[6]

3. Civil Code L. No. 5977, arts. 3, 5(1)(c), 7(3) (Turkey), *translated in* Yasemin Erkut, , *Text of New Biosafety Law in English*, GAIN REP. (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), Mar. 23, 2010 [hereinafter Biosafety Law].

4. *See* Nergiz Ozbag, *2015 Turkey Biotechnology Annual*, GAIN REP. NO. TR5004 (USDA Foreign Agric. Serv/Global Info. Network, Wash., D.C.), Apr. 15, 2015, at 4 [hereinafter *Turkey Biotechnology Annual 2015*]; GRAHAM BROOKES, ECONOMIC IMPACTS OF THE BIOSAFETY LAW AND IMPLEMENTING REGULATIONS IN TURKEY ON THE TURKISH IMPORTING AND USER SECTORS 16-17 (2012).

5. *See, e.g*,. Nergiz Ozbag, *Turkey: Food and Agricultural Import Regulations and Standards – Narrative*, GAIN REP. NO. TR5004 (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), Feb. 17, 2015, at 2; MINISTRY OF COMMERCE, PEOPLE'S REPUBLIC OF CHINA, FOREIGN MARKET ACCESS REPORT 2010, at 7-8 (concerning experience of Chinese exporters to Turkey).

6. *See Mixed Prospects for U.S. Agricultural Exports to Turkey,* INT'L AGRIC. TRADE REP. (USDA, Foreign Agric. Trade Rep., Wash., D.C.), June 26, 2012, at 2-3, http://www.fas.usda.gov/data/mixed-prospects-us-agricultural-exports-turkey. Sensitivity to possible genetically modified content of American foodstuffs continues to depress American producers' access to Turkish markets. *Turkey's Biosafety Laws Restrict U.S. DDGS Ship-*

Turkey, one of the largest non-oil-producing Muslim nations and the highest income, stands at the pinnacle of European and Near East/North African agriculture,[7] but this economically vital sector does not maximize its productivity.[8] Like many developing nations, Turkey cannot imperil its markets in radically GM-skeptical Europe,[9] and anti-GM media campaigns have poisoned Turkish public opinion.[10] Turks fear even their robust manufacturing sector cannot absorb former farm workers dislocated by GM-triggered efficiencies.[11]

In December 2013, the Turkish Council of State canceled the import of two Monsanto corn varieties for animal feed,[12] because during the approval process, the Biosafety Board did not properly apply the "precautionary principle": a cornerstone of international environmental protection agreements[13] and the risk management strategy-of-choice in the European Union.[14] The principle magnifies perceived risks of harm in the absence of "full scientific certainty" about the existence of a risk, or the magnitude or likelihood of harm and justifies stringent regulation to avoid these artificially magnified risks from offending society's risk tolerance "threshold."[15] The Council of State recently reversed its decision to rescind approval of MON810 but not the other trait.[16]

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ments, MILLING WORLD (Dec. 15, 2014), http://www.grains.org/news/20141211/turkey%E2%80%99s-biosafety-laws-restrict-us-ddgs-shipments.

7. *See* STRUCTURAL CHANGES, *supra* note 1, at 16.

8. OECD, EVALUATION OF AGRICULTURAL POLICY REFORMS IN TURKEY 10, 26, 58, 98-99 (2011).

9. Gökhan Özertan & Philipp Aerni, *GM Cotton and Its Possible Contributions to Environmental Sustainability and Rural Development in Turkey*, 6 INT'L J. AGRIC. RES., GOVERNANCE & ECOLOGY 552, 555 (2007); *see also* Robert L. Paarlberg, *The Real Threat to GM Crops in Poor Countries: Consumer and Policy Resistance to GM Foods in Rich Countries*, 27 FOOD POL'Y, June 2008, at 247, 250 [hereinafter Paarlberg, *Real Threat*].

10. Özertan & Aerni, *supra* note 9, at 554-55.

11. *Id.* at 567-68.

12. *See, e.g.*, *Turkish State Council Cancels Import of GM Corn Varieties*, SUSTAINABLE PULSE (Dec. 18, 2013, 6:02 PM), http://sustainablepulse.com/2013/12/18/turkish-state-council-cancels-import-gm-corn-varieties/ [hereinafter *Turkish State Council Cancels Import*]. The Council of State is the highest administrative court in Turkey.

13. *See, e.g.*, U.N. Conf. on Env't & Dev., *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF. 151/26/Rev. 1 (Vol. 1), princ. 15 (Aug. 12, 1992) [hereinafter *Rio Declaration*].

14. *See, e.g.*, *Communication from the Commission on the Precautionary Principle*, at 3, COM (2000) 1 final (Feb. 20, 2000) [hereinafter *Communication on the Precautionary Principle*].

15. Henk van den Belt, *Debating the Precautionary Principle: "Guilty until Proven Innocent" or "Innocent until Proven Guilty,"* 132 PLANT PHYSIOLOGY 1122, 1123-24 (2003).

16. *Turkey's High Court Reverses Decision*, *supra* note 2, at 2. The Court did not repeal

But with "better safe than sorry," also comes, "no risk, no reward:" improved human health and life outcomes foregone for protection from hazards which may not even exist.[17] While Muslim Turkey was barring the door to most GMO imports, a group of Islamic law scholars issued a fatwa stating that GM foods are halal ("permitted") under Muslim dietary laws, if all of the sources are halal.[18] Therefore, meat from animals raised on GM feed may also be considered halal.[19]

Turkey would love to flex its economic muscles in the burgeoning international halal food marketplace which demands reliable halal animal products.[20] But milk and meat are among Turkish agriculture's weakest subsectors.[21] Turkish cattle farmers cannot even satisfy Turkey's depressed local demand.[22] They chafe under the yoke of unrelentingly high feed costs[23] while Turkish children's health suffers;[24] the government barely hangs on to a peace deal with Kurdish

its decision on MON88107xMON810's approval, even though MON810 and MON88107 are both approved as individual traits. *Id.* Stacked traits are not automatically approved in Turkey even if each individual constituent trait is approved. *Turkey Biotechnology Annual 2015*, *supra* note 4, at 7.

17. *See also* Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. PA. L. REV. 1003, 1023-24 (2003).

18. INT'L WORKSHOP FOR ISLAMIC SCHOLARS ON AGRIBIOTECHNOLOGY: SHARIAH COMPLIANCE 53-54 (Shaikh Mohd Saifuddeen Shaikh Mohd Salleh, ed., 2012) [hereinafter INT'L WORKSHOP FOR ISLAMIC SCHOLARS].

19. *See, e.g.*, Jabar Zaman Khan Khattak et al., *Concept of Halal Food and Biotechnology*, 3 ADVANCE J. FOOD SCI. & TECH. 385, 389 (2011).

20. *Turkish Companies Eye on $1 Trillion Halal Food Market*, TODAY'S ZAMAN (Sept. 1, 2011, 17:00), http://www.todays zaman.com/news-255503-turkish-companies-eye-on-1-trillion-Halal-food-market.html. Many regulations in Islamic dietary law govern the slaughter and preparation of animal products. *See* AZHAR-UL-HAQ LODHI, UNDERSTANDING THE HALAL FOOD SUPPLY CHAIN 20 (2009) (describing the growing business opportunities for halal food based on global demand by the Muslim population).

21. *See* Ferhat Selli et al., *International Competitiveness: Analysis of Turkish Animal Husbandry: An Empirical Study in GAP Region*, 1 ENTERPRISE RISK MGMT. 100, 102, 110 (2010).

22. *See* Huseyin Özer, *Consumption Patterns of Major Food Items in Turkey*, 1 PAK. DEV. REV. 29, 34-38 (2003); Kemalettin Taşdan et al., *Turkish Dairy Sector Analysis*, *in* SECTORAL ANALYSIS: DAIRY, TOMATO, CEREAL, POULTRY 27-32 (İlkay Dellal & Siemen van Berkum eds., 2009).

23. Erdoğan Güneş et al., *The Analysis of Some Factors on Feed Compound Production: A Case Study Focused on the Turkish Feed Industry*, 4 AFR. J. BUS. MGMT. 1329, 1330, 1332 (2010).

24. *See, e.g.*, Y. Keskin et al., *Prevalence of Iron Deficiency Among Schoolchildren of Different Socio-Economic Status in Urban Turkey*, 59 EUR. J. CLINICAL NUTRITION 59, 68-70 (2005).

revolutionaries in the east where small-holding animal husbandry is king[25] but also where momentum in support of independent Kurdish states in Syria and Iraq frightens Turks even more than the Islamic State;[26] and the Biosafety Law halts at the border the cheap GM ingredients which could make a difference.[27] The voices of these stakeholders are heard least in the biotechnology regulatory process.[28]

The recent fatwa also endorsed scientific innovation, and urged regulators to "facilitate the acceptance and use of GM products,"[29] – an attitude that contrasts sharply with that of the European Union, which Turkey hopes to join.[30] By mimicking the west's obsession about future risks, when its problem of the present is in the east and its best opportunity for the future is worldwide, Turkey may have stumbled out of step with the faith traditions and economic aspirations of its citizens.[31]

Surely it cannot be that Turkey is not halal!

Developing nations struggle to exploit the benefits of biotechnology, and a big challenge is the invention of developed nations: the precautionary princi-

25. *See* Samir Salha, *Opinion: Erdogan Hits Back*, ASHARQ AL-ASSAT (Jan. 11, 2014), http://english.aawsat.com/2014/01/article55326988/opinion-erdogan-hits-back; *see also* TAHA ÖZHAN, NEW ACTION PLAN FOR SOUTHEASTERN TURKEY (SETA Pol. Br. No. 18, 2008).

26. *See, e.g.*, Uzay Bulut, *Turkey Prefers Islamic State to Kurdish State*, GATESTONE INST. (July 5, 2015, 5:00 AM), http://www.gatestoneinstitute.org/6101/turkey-syria-kurdish-state; Nihat Ali Ozcan, *Understanding Turkey's Hesitation Over the Kobane Crisis*, JAMESTOWN FOUND. (Nov. 7, 2014, 1:26 PM), http://www.jamestown.org/single/?tx_ttnews%5Bswords%5D=8fd5893941d69d0be3f378576261ae3e&tx_ttnews%5Bany_of_the_words%5D=Kurd&tx_ttnews%5Bpointer%5D=3&tx_ttnews%5Btt_news%5D=43061&tx_ttnews%5BbackPid%5D=7&cHash=70e77c01188f8dc323900559fb48f4ab#.VZmTXPlVikp.

27. *See Turkey Biotechnology Annual 2015*, *supra* note 4, at 4; *see also* Ercan Baysal, *Red Meat Crisis in Turkey Looms as High Feed Prices Haunt Markets*, TODAY'S ZAMAN (Aug. 5, 2012, 12:00), http://www.todayszaman.com/news-288616-red-meat-crisis-in-turkey-looms-as-high-feed-prices-haunt-markets.html.

28. Hayriye Erbaş, The Perceptions on GMOs and GM Food with Some Selected Social Indicators in an "Irrelevant State," Turkey (unpublished Presentation at Eighty Annual IAS-STS Conf.) 8-12 (May 4-5, 2009), http://www.ifz.tugraz.at/ias/IAS-STS/Publications/Proceedings-8th-Annual-IAS-STS-Conference; *see also* Özertan & Aerni, *supra* note 9, at 569; Joel I. Cohen & Robert Paarlberg, *Unlocking Crop Biotechnology in Developing Countries – A Report from the Field*, 32 WORLD DEV. 1563, 1575 (2004).

29. INT'L WORKSHOP FOR ISLAMIC SCHOLARS, *supra* note 18, at 53.

30. *See* GARY E. MARCHANT & KENNETH L. MOSSMAN, ARBITRARY & CAPRICIOUS: THE PRECAUTIONARY PRINCIPLE IN THE EUROPEAN UNION COURTS 46-54 (2004).

31. *See generally* Emmanuel B. Omobowale et al., *The Three Main Monotheistic Religions and GM Food Technology: An Overview of Three Perspectives*, 9 BMC INT'L HEALTH & HUM. RTS. 18 (2009).

ple.[32] Part II of this article tells a tale of a former empire transitioning to democracy and reaching for its full economic development potential.[33] Part III observes the characteristics and paradoxes of precautionary regulation which purports to use science to protect society from risk but, in fact, uses politics to redistribute even more risk while also withholding benefits of non-regulation from those who need them most. Part IV explains the international environmental protection agreements and the European Union regulations which manipulate developing nations such as Turkey into regulating GM animal feed similarly to the European method, while Turks get their daily bread like Middle Easterners.

Part V switches the focus to Turkey's own GM feed regulation along with the intellectual, economic, social, technical, and democratic deficits that make it so hard for developing nations to regulate more productively. Part VI demonstrates that as a result, Turkey is foregoing potentially paradigm-shifting benefits of more liberal regulation, such as the revitalization of the critical meat and milk production subsector, elimination of ubiquitous micro-nutrition and children's health deficits, maintenance of stability in the Kurdish east, and perhaps even

32. *See generally* Paarlberg, *Real Threat*, *supra* note 9.

33. The article focuses on imports of GM feed because imported feed is least risk-objectionable and probably in fact the least risky of many ways Turkey could harness the benefits of genetic modification in agriculture. For example, some worry that GMOs increase the allergenicity and toxicity of foods, *e.g.*, Peggy G. Lemaux, *Genetically Engineered Plants and Foods: A Scientist's Analysis of the Issues (Part I)*, 59 ANN. REV. OF PLANT BIOL., 771, 779-80, 786-87 (2008), but GM feed is not food. *Cf.* Özertan & Aerni, *supra* note 9, at 562 (observing that GM cotton is less objectionable because the public is most concerned about health risks of GM food). Nor is it likely that meaningful, if any, genetically modified content of feed remains in the meat and dairy products eventually processed into human food. *See* G. Flachowsky et al., *Studies on Feeds from Genetically Modified Plants (GMP) – Contributions to Nutritional and Safety Assessment*, 133 ANIMAL FEED SCI. & TECH. 2, 23-27 (2007); *cf.* MICHAEL ANTONIOU ET AL., GMO MYTHS AND TRUTHS 56 (2012) (citing studies with ambiguous or weak findings that GM DNA remain in food products). Cultivating GM inputs for animal feed might risk contaminating nearby non-GM and organic farms, but this article focuses on imported feed and feed ingredients only. *Cf.* Felicia Wu, *An Analysis of Bt Corn's Benefits and Risks for National and Regional Policymakers Considering Bt Corn Adoption*, 2 INT'L J. TECH. & GLOBALIZATION 115, 122-24 (2006) (denying the significance of this risk); *but see* Cem İskender Aydin et al., *Should Turkey Adopt GM Crops? A Social Multi-Criteria Evaluation for the Case of Cotton Farming in Turkey* (2010), http://www.econ.boun.edu.tr/public_html/RePEc/pdf/201107.pdf (unpublished manuscript) (on file with author) (questioning whether science can construct "facts" in spite of ecological complexity and uncertainty, and ignorance of ignorance). GM feed itself is also not released into the environment where it could damage Turkey's unusually rich biodiversity. *See* Melike Baran & Remziye Yılmaz, *The Biosafety Policy on Genetically Modified Organisms in Turkey*, 7 ENVTL. BIOSAFETY RES. 57, 57 (2008) (urging that "all the safety bases are covered" to protect Turkey, which ranks ninth in the world in biodiversity). All the article envisions is expanding Turkey's nearly non-existent imports of GM feed for beef and dairy cattle.

leadership in the international halal food marketplace. The article concludes that Turkey's precautionary GM feed regulation is actually imperiling its economic, social, and political growth and security.[34]

II. TWENTIETH CENTURY TURKEY: ALWAYS THE BRIDESMAID, NEVER THE BRIDE

Turkey is exceptional: it was the heart of one of the greatest empires of the second millennium. From the vantage point of the past five hundred years, some see Turkey as a great power which experienced an unwelcome, but temporary setback.[35] But it was an extreme setback: when the post-World War I Treaty of Sevres dismembered the Ottoman Empire, the former empire's citizens emerged extremely impoverished by European standards.[36]

After World War I, Topkapı Palace presided over a collection of semi-autonomous Third World regions which became fully autonomous soon afterwards.[37] What Turkey retained was Istanbul, where a bridge starts in Ortaköy, passes over the Bosphorus Strait, and ends in Beylerbeyi. That geographic layout, along with three small provinces west of the city, is why Turkey calls itself a European nation which bridges two continents.

A. Conflicted Society

Mustafa Kemal Ataturk cobbled the Republic of Turkey together in the ear-

34. *See* Sunstein, *supra* note 17, at 1023; AARON WILDAVSKY, SEARCHING FOR SAFETY 48-50 (1988).

35. *See, e.g.*, Mustafa Şahin, *Islam, Ottoman Legacy and Politics in Turkey: An Axis Shift?*, WASH. REV. TURKISH & EURASIAN AFFS. (Jan. 2011), http://www.thewashingtonreview.org/articles/islam-ottoman-legacy-and-politics-in-turkey-an-axis-shift.html.

36. The flaw in the so-called temporary setback narrative is that Ottoman citizens were always poor. Even in 1500, the Empire was rich in an imperial sense, but not in a per capita income sense. *See, e.g.*, ARTHUR GOLDSCHMIDT, JR. & LAWRENCE DAVIDSON, A CONCISE HISTORY OF THE MIDDLE EAST 121-31 (10th ed. 2013) (observing that the Ottoman Empire was a militaristic, not an economic, power). A tentative analysis estimates that in 1500, per capita income in the Ottoman Empire was in the magnitude of $514 per year in 1990, while western Europe's was $600. Sharon Ouziely & Yakir Plessner, *Ottoman GDA Compared to Western Europe: A Preliminary Analysis* 1 (unpublished manuscript) (on file with author). While western Europeans grew rich from the Industrial Revolution, the Ottoman Empire's standard of living remained mired in the Middle Ages. *See* FEROZ AHMAD, THE MAKING OF MODERN TURKEY 43-44, 73 (1993). By World War I, the Ottoman Empire's per capita income finally reached that of western Europe in 1500. Ouziely & Plessner, *supra*, at 3.

37. ERIK J. ZÜRCHER, TURKEY: A MODERN HISTORY 60, 81, 146-47 (3d ed. 2004).

ly 1920s from the Anatolian rump of the Ottoman Empire in the early 1920s.[38] Ataturk preached the gospel of western culture and state secularism,[39] and he ruthlessly cleansed competing influences (such as Islam) from the new state-centric public life.[40] He remains the most revered figure of modern Turkish history: he may have been callous, but he was prescient.[41]

Later governments ruled under a military tutelage dedicated to preserving the secular state.[42] The generals met trivial threats with uncompromising and often violent responses.[43] Allied with what some believe was an extensive "deep state" network,[44] the generals would not stop at overthrowing the government when that was what it took.[45] As late as the 1990s, the generals and their judicial allies were purging competent Islamists from public posts.[46]

By the end of the twentieth century, Turks were losing patience with the disorder: economic collapse, corruption, inept public administration, and street violence between armed wings of mainstream political parties.[47] Unsurprisingly, when asked in 2004 if relevant government ministries were "capable of regulating GM foods," eighty-seven percent of university students surveyed said "no" or "I do not know."[48] State institutions did not seem capable of doing anything, and Turkey was essentially a democracy in name only.

In 2001, former Islamist party leaders Recep Tayyip Erdoğan and Abdullah Gül established the "conservative and democratic" Justice and Development Par-

38. *See generally id.* at 148-69.

39. *Id.* at 187-95.

40. *See, e.g.*, *id.* at 172-73, 176, 181-82, 187-95.

41. *See, e.g.*, Yüksel Oktay, *Atatürk and his Contribution to Humanity*, HÜRRIYET DAILY NEWS (Aug. 21, 2011, 12:00 AM), http://www.hurriyetdailynews.com/ataturk-and-his-contribution-to-humanity.aspx?pageID=438&n=ataturk-and-his-contribution-to-humanity-2011-08-21.

42. *See* SONER ÇAĞAPTAY, HOW WILL THE TURKISH MILITARY REACT? 2 (2007). The 1982 Constitution's Article 2, partly defines the Republic of Turkey as "a democratic, secular and social state," CONST. OF THE REPUBLIC OF TURKEY, art. 2, and Turkish Army Internal Service Law, art. 34 states: "The duty of the armed forces is to protect and defend the Turkish Homeland and the constitutionally designed Turkish Republic." Ahmet T. Kuru, *Rise and Fall of Military Tutelage in Turkey: Fears of Islamism, Kurdism, and Communism*, 14 INSIGHT TURKEY, no.2, 2012, at 37, 43 n.40; Turkish Armed Forces Internal Service Law, Art. 34 (1961).

43. ZÜRCHER, *supra* note 37, at 238, 258-64; *see also* Kuru, *supra* note 42, at 47-48.

44. *See, e.g.*, Serdar Kaya, *The Rise and Decline of the Turkish "Deep State": The Ergenekon Case*, 11 INSIGHT TURKEY, no. 4, 2009, at 99, 101-03.

45. *See* ZÜRCHER, *supra* note 37, at 299-301.

46. *Id.*

47. *Id.* at 304.

48. Pervin Basaran et al., *Public Perceptions of GMOs in Food in Turkey: A Pilot Survey*, 2 J. FOOD, AGRIC. & ENV'T 25, 27 (2004).

ty (AKP).[49] They fought and won the 2002 election as prophets of free market capitalism and liberal democracy.[50] Their coalition included almost anyone who still hoped Turks would eat better, speak more freely, express faith traditions in public, and never helplessly watch politicians steal their tax dollars out from under their noses again.[51]

AKP is "'the most open, modern and liberal political movement in Turkey's history,'" and has delivered "a staggering number and scope of democratic reforms."[52] Economically, per capita income doubled from 2002 to 2011.[53] Public service delivery improved, particularly health care, and the country's infrastructure was substantially modernized.[54] Turkey reenvigorated its ties with the east[55]; began EU accession negotiations;[56] and all but came to a peace settlement with Kurdish separatists after forty years of war.[57]

An AKP government might seem ripe for thoughtful regulation of emerging technologies, but no government brings nirvana. For one thing, the "AKP government" disappeared for five months in 2015; a combination of rising authoritarianism,[58] political ambition,[59] and corruption accusations[60] cost AKP its

49. Emre Uslu, *The AKP Has Become a Conservative Party*, TODAY'S ZAMAN (May 30, 2012), http://www.todayszaman.com/columnist/emre-uslu/the-akp-has-become-a-conservative-party_282004.html.

50. Gareth H. Jenkins, *Muslim Democrats in Turkey*, SURVIVAL, Spring 2003, at 45, 54.

51. ZÜRCHER, *supra* note 37, at 305-06.

52. MUSTAFA AKYOL, ISLAM WITHOUT EXTREMES: A MUSLIM CASE FOR LIBERTY 222-23 (2011) (quoting *Newsweek* columnist Fareed Zakaria).

53. *Data: GDP Per Capita*, THE WORLD BANK, http://data.worldbank.org/indicator/NY.GDP.PCAP.CD (last visited Nov. 1, 2015) (Turkey had GDP per capita income of $10,529.60 in 2014).

54. *E.g.*, FRANCK BOUSQUET ET AL., SUPPORTING SOCIAL ACCOUNTABILITY IN THE MIDDLE EAST & NORTH AFRICA: LESSONS LEARNED FROM PAST POLITICAL AND ECONOMIC TRANSITIONS 6-10 (Deborah Davis ed., 2011); Süleyman Sözen, *Recent Administrative Reforms in Turkey: A Preliminary Assessment*, 3 INT'L J. BUS. & SOC. SCI. 168, 169-70 (2012).

55. Ahmet Davutoğlu, *Turkey's Zero-Problems Foreign Policy*, FOREIGN POL'Y (May 20, 2010), http://www.foreignpolicy.com/articles/2010/05/20/turkeys_zero_problems_foreign_policy/.

56. *See Communication on the Precautionary Principle*, *supra* note 14, at 9.

57. Isabel Hunter, *Kurds Commit to Turkish Peace Process as PKK Leader Announces Definitive End to "40-Year-Long Armed Struggle" with the State*, [U.K.] INDEPENDENT (Mar. 22, 2015), http://www.independent.co.uk/news/world/middle-east/kurds-commit-to-turkish-peace-process-as-pkk-leader-announces-definitive-end-to-40yearlong-armed-struggle-with-the-state-10125301.html.

58. Gareth H. Jenkins, *Erdogan's Volatile Authoritarianism: Tactical Ploy or Strategic Vision?*, TURKEY ANALYST (Dec. 5, 2012), http://old.silkroadstudies.org/new/inside/turkey/2012/121205A.html; Zeynep Tufekci, *What Do #occupygezi Protesters Want? My Observations from Gezi Park*, TECHNOSOCIOLOGY.ORG (June 12, 2013), http://www.technosociology.org/?p=1349.

majority in the June 2015 elections, when it surrendered most of its vote margin to the leading Kurdish party, and even though the party came roaring back to take almost fifty percent of the vote in snap elections on November 1, 2015, the political divisiveness that preceded those elections seemed likely to continue.[61]

But Turkey's top priorities will tax any government's resources. The nation's unemployment rate remains stubbornly above ten percent.[62] European Union accession has become an exercise in frustration;[63] several European leaders

59. *See, e.g.*, Markar Esayan, *Why Can't We Make a New Constitution?*, TODAY'S ZAMAN (Nov. 28, 2012), http://www.todayszaman.com/columnists/markar-esayan_299599-why-cant-we-make-a-new-constitution.html.

60. *Corruption in Turkey: The Arab Road*, ECONOMIST (Jan. 4, 2014), http://www.economist.com/news/leaders/21592614-government-recep-tayyip-erdogan-has-grave-questions-answer-arab-road.

61. *Turkey's AKP Makes Strong Comeback, Wins Enough Seats for Single Party Rule*, HURRIYET DAILY NEWS (Nov. 1, 2015), http://www.hurriyetdailynews.com/turkeys-akp-makes-strong-comeback-wins-enough-seats-for-single-party-rule.aspx?pageID=238&nID=90603&NewsCatID=338; Serkan Demirtaş, *Turkey to Vote on Freedoms on Nov. 1*, HURRIYET DAILY NEWS (Oct. 28, 2015), http://www.hurriyetdailynews.com/turkey-to-vote-on-freedoms-on-nov-1.aspx?pageID=449&nID=90412&NewsCatID=429 (describing the November 1, 2015 election as one "for freedom or for further authoritarianism"); Umut Urras, *Ruling Party Loses Majority in Turkey Elections*, AL-JAZEERA (June 8, 2015, 2:25 GMT), http://www.aljazeera.com/news/2015/06/ak-party-leads-turkish-parliamentary-polls-150607161827232.html; *Voting to the Sound of Explosions*, ECONOMIST (Oct. 31, 2015), http://www.economist.com/news/europe/21677227-country-long-admired-combining-democracy-and-islam-election-marred-violence-and; *see also* Mustafa Akyol, *Erdogan Lost a Battle, but Perhaps not the War*, AL-MONITOR (June 15, 2015), http://www.al-monitor.com/pulse/originals/2015/06/turkey-elections-erdogan-lost-a-battle-but-not-war-akp.html#. The Kurdish party, HDP, picked up the mantle of a range of left-wing and minority group causes and won sufficient votes to enter the Grand National Assembly for the first time in June and then again in November. *Turkey's AKP Makes Strong Comeback*, *supra*; *see also* Ishaan Tharoor, *Turkey's Election is a Blow to Erdogan and a Victory for Kurds*, WASH. POST (June 8, 2015), https://www.washingtonpost.com/world/turkeys-erdogan-may-see-ambitions-checked-by-parliamentary-election/2015/06/07/d76db05a-0cf3-11e5-9726-49d6fa26a8c6_story.html. The election occurred in the wake of an October 10, 2015 bombing at a peace rally outside the main Ankara train station. Don Melvin, *At Least 95 Killed in Twin Bombings near Train Station in Turkey's Capital*, CNN.COM (Oct. 10, 2015), http://www.cnn.com/2015/10/10/middleeast/turkey-ankara-bomb-blast/. No one claimed responsibility and roughly the same numbers of Turks blame the PKK, ISIS, President Erdogan and the AKP, and other Kurdish or foreign groups. *Only 25% Believe ISIL Responsible for Ankara Bombings Survey Reveals*, TODAY'S ZAMAN (Oct. 21, 2015, 18:17:50), http://www.todayszaman.com/g20_only-25-percent-believe-isil-responsible-for-ankara-bombings-survey-reveals_402175.html.

62. *Unemployment, Total (% of Total Labor Force)*, THE WORLD BANK, http://data.worldbank.org/indicator/SL.UEM.TOTL.ZS (last visited Jan. 25, 2016).

63. DENIZ DEVERIM ET AL., REGAINING MOMENTUM: TURKEY DURING THE SPANISH EU

have all but said Turkey will never be a member.[64] As of July 2015, Turkey was on the verge of war in Syria.[65] Turks' and Kurds' competing interests in the war against the Islamic State have threatened the peace process with Turkey's Kurds.[66] And the observation that now-President Erdoğan never saw a green space in Turkey on which he did not want to build is fair.[67]

B. Agriculture Powerhouse or the Sick Man Farmer?

Turkish agriculture is another example of an impressive achievement but notable lack of nirvana. Turkey is a major world player in agribusiness.[68] It aspires to be among the top five producers of agriculture products overall by 2023[69] and is already the world's leading producer of hazelnuts and several fruits.[70] Turkish agriculture exports have tripled in the past decade, thanks primarily to markets in the Middle East.[71] Turkey is also the European Union's largest sup-

PRESIDENCY 9 (2010).

64. *See* Nathalie Tocci, *Turkey and the European Union: A Journey Into the Unknown* 2-4 (Brookings Inst. Turkey Proj. Pol'y Pap., no. 5, 2014) (including Angela Merkel, Nicholas Sarkozy and Jean-Claude Juncker); *cf.* Alex Spillius, *Turkey "Will Probably Never Be EU Member,"* DAILY TELEGRAPH (Sept. 23, 2013, 3:48 BST), http://www.telegraph.co.uk/news/worldnews/europe/turkey/10325218/Turkey-will-probably-never-be-EU-member.html (quoting Egemen Bagis, Turkey's chief EU negotiator).

65. *See, e.g.*, *Drawing in the Neighbors*, ECONOMIST (July 4, 2015, 2:48), http://www.economist.com/news/middle-east-and-africa/21656692-turkey-and-jordan-are-considering-setting-up-buffer-zones-war-scorched (describing Turkish and Jordanian plan to set up buffer zones in Syria).

66. *See, e.g.*, Jenna Krajeski, *What Kobani Means for Turkey's Kurds*, NEW YORKER (Nov. 8, 2014), http://www.newyorker.com/news/news-desk/kobani-means-turkeys-kurds; Thomas Seibert, *Turkey Plans to Invade Syria, but to Stop the Kurds, Not ISIS*, DAILY BEAST (June 28, 2015, 1:18 ET), http://www.thedailybeast.com/articles/2015/06/28/turkey-plans-to-send-troops-into-syria-widening-the-war.html.

67. *See generally* Fiachra Gibbons & Lucas Moore, *Turkey's Great Leap Forward Risks Cultural and Environmental Bankruptcy*, GUARDIAN (May 29, 2011, 13:56 EST), http://www.theguardian.co.uk/world/2011/may/29/turkey-nuclear-hydro-power-development. One Turkey watcher's investigation could be read to suggest that corruption at the middle levels of government is connected to extensive construction in Turkey. Claire Berlinski, *The Looming Crisis in Turkey*, THE AM. (Dec. 19, 2008), http://www.american.com/archive/2008/december-12-08/the-looming-crisis-in-turkey.

68. *See* REPUBLIC OF TURKEY PRIME MINISTRY INVESTMENT SUPPORT & PROMOTION AGENCY, FOOD & AGRICULTURE IN TURKEY 8 (2014) [hereinafter FOOD & AGRICULTURE IN TURKEY]; Handan Giray, *Turkish Agriculture at a Glance*, 10 J. FOOD, AGRIC., & ENV'T 292, 294 (2012).

69. FOOD & AGRICULTURE IN TURKEY, *supra* note 68, at 7.

70. STRUCTURAL CHANGES, *supra* note 1, at 11.

71. *See generally Turkish Agricultural Exports Continue to Surge*, INT'L AGRIC. TRADE REP. (Foreign Agric. Serv., Wash., D.C.), Dec. 2014, at 1, 1.

plier of produce and enjoys a significant agricultural trade surplus overall.[72] One silver lining of Turkey's tardy industrial development is that Turkish farmers have converted the nation's pristine soil into a lucrative niche position serving GM-skeptic and organic friendly Europeans.[73]

But not all the news from down on the Turkish farm is so rosy. Agriculture accounts for eight to ten percent per annum of gross domestic product and supports twenty-five percent of the population who lack alternate employment opportunities.[74] High input costs and low yields undercut competitiveness and quality.[75] Subsectors that support vital domestic needs do not satisfy local demand,[76] and the public's complaints about rising food costs are increasingly shrill.[77] Nevertheless, many low-income agriculture workers are underemployed.[78] In the Kurdish east, sheepherding dogs are rare, because men do the work of animals.[79]

Worse, the most deprived are impervious to help. Public and private investors sink more Turkish liras into dairy and livestock than all other agriculture sectors combined, and Turkey also offers more public support to agriculture invest-

72. FOOD & AGRICULTURE IN TURKEY, *supra* note 68, at 5-6; STRUCTURAL CHANGES, *supra* note 1, at 15.

73. *See* Zeynep Özbilge, *An Analysis of Organic Agriculture in Turkey: The Current Situation and Basic Constraints*, 8 J. CENT. EUR. AGRIC. 213, 214-15 (2007).

74. FOOD & AGRICULTURE IN TURKEY, *supra* note 68, at 4; PRIME MINISTRY OF TURKEY, TURKISH AGRICULTURE INDUSTRIAL REPORT 5 (2010); Giray, *supra* note 68, at 292.

75. Furkan Demirdoven, *Higher Input Prices at Home Threaten Food Exports*, TODAY'S ZAMAN (Apr. 7, 2015, 17:32:50), http://www.todayszaman.com/business_higher-input-prices-at-home-threaten-food-exporters_377374.html; *Rising Costs Push Farmers into Poverty or Out of Production*, TODAY'S ZAMAN (Aug. 31, 2014), http://www.todayszaman.com/business_rising-costs-push-farmers-into-poverty-or-out-of-production_357279.html; *see also* Özbilge, *supra* note 73, at 218.

76. *See* Aydin Albayrak, *Agriculture not as Rosy as Gov't Would Have Us Believe*, TODAY'S ZAMAN (May 16, 2015, 17:00), http://www.todayszaman.com/business_agriculture-not-as-rosy-as-govt-would-have-us-believe_380863.html; FOOD & AGRICULTURE IN TURKEY, *supra* note 68, at 39 (presenting ovine/bovine livestock as a top investment opportunity in Turkish agriculture because of the "[l]arge and growing local market with increasing animal product needs"). *Cf.* Özertan & Aerni, *supra* note 9, at 53 (Turkey leads the world in organic cotton production but cannot supply its unbranded clothes manufacturers); Ibrahim Sertioğlu, *Turkey Cotton Annual 2010*, GAIN REP. (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), Apr. 9, 2010, at 2-3, 6-7. (2010).

77. *See, e.g.*, Albayrak, *supra* note 76; *Rising Food Prices on Parliamentary Agenda*, TODAY'S ZAMAN (Sept. 1, 2014), http://www.todayszaman.com/business_rising-food-prices-on-parliamentary-agenda_357398.html.

78. JOHN WIBBERLEY & MARTIN TURNER, RURAL EMPLOYMENT IN THE CONTEXT OF RURAL DEVELOPMENT IN TURKEY: AN OVERVIEW 24 (Agripolicy Rep. no. D12-1, 2006).

79. Michael Thevenin, *Kurdish Transhumance: Pastoral Practices in South-east Turkey*, 1 PASTORALISM: RES. POL'Y & PRAC. 1, 6 (2011).

ment both in the livestock sector and in the east than in any other sector or region.[80] Nevertheless, semi-feudal subsistence and semi-subsistence animal husbandry characterizes eastern agriculture;[81] herders barely make ends meet.[82] Some expensive subsidy and support programs target farmers who sell milk in formal markets and can afford to make efficiency and quality-enhancing capital improvements[83]; they do little for eastern herders who sell product of their hopelessly tiny herds of low-yield native breeds in the streets,[84] lack access to large-scale dairies, and cannot even dream of affording new machines that would entitle them to government support payments.[85] All this in a subsector that normally is hermetically sealed from import competition.[86] But the government has now opened borders to imports; otherwise, Turks might not be eating any red meat at all.[87]

III. A PRECAUTIONARY TALE IN THREE HYPOTHETICALS: THE PRECAUTIONARY PRINCIPLE AND ITS ANTI-ROBIN HOOD EFFECT

Only a crazy person would *wait to prove definitively* that the sky was falling before starting to distribute gas masks, right? How could it be proved? Wait to see "the sky" raining down as everyone choked to death?

By virtue of a technology's newness, the existence, magnitude, and likeli-

80. *See* FOOD & AGRICULTURE IN TURKEY, *supra* note 68, at 14, 34-36, 42-43, 45.

81. *See generally* Hasan Yılmaz, *Policies and Transition Problems of Agriculture in Turkey*, 6 J. APPLIED SCI. 3052 (2006).

82. Esra Maden, *Animal Husbandry in the East Bleeds Due to Livestock Imports*, TODAY'S ZAMAN (Mar. 4, 2013), http://www.todayszaman.com/news-273211-animal-husbandry-in-the-east-bleeds-due-to-livestock-imports.html.

83. DILEK BOSTAN BUDAK, AN ASSESSMENT OF THE COMPETITIVENESS OF THE DAIRY FOOD CHAIN IN TURKEY 17-20 (Agripolicy Rep. no. D2.1, Study 1, 2009); *see also* Erol H. Çakmak, *Evaluation of the Past and Future Agricultural Policies in Turkey: Are They Capable of Sustainability?*, OPTIONS MEDITERANEENNES 155, 158 (CIHEAM Ser. A/No. 52, 2003).

84. Ç.Y. Kaya et al., Presentation at 2nd Network Workshop & Dev. Trends in Small Cattle FarmsThe Cattle Sector in Turkey: Global Picture and Focus on Situation and Perspectives for Small Cattle Farms 5 (July 2007), http://www.eaap.org/docs/newsletters/2007-07/Cattlenetwork 20Proc/Kaya.pdf.

85. Premium payments flow through milk processors to create incentives for ranchers to improve product quality, so the funds never reach the neediest. *See* Taşdan et al., *supra* note 22, at 32; H. Bayram İşik et al., *Factors Affecting Dairy Farmers' Utilization of Agricultural Support in Erzurum, Turkey*, 4 SCI. RES. & ESSAY 1236, 1241 (2009).

86. *See* Sübidey Toğan, *Turkey: Trade Policy Review 2007*, 33 WORLD ECON. 1339, 1355 (2010).

87. *See generally* Samet Serttas, *Turkey Decreases Red Meat Custom Tax and Opens Red Meat Imports*, GAIN REP. (USDA Foreign Agric. Serv./Global Agric. Info. Serv., Wash., D.C.), Sept. 10, 2010, at 1-2; *see also* Sinem Duyum, *Turkey Opens Door to Feeder Cattle Imports*, GAIN REP. NO. TR5012 (USDA Foreign Agric. Serv./Global Agric. Info. Serv., Wash., D.C.), Mar. 5, 2015, at 1.

hood of potential adverse effects may be uncertain. Science can help eliminate the uncertainty,[88] but science cannot resolve normative questions, such as a society's level of risk aversion,[89] who wins or loses in the regulatory process,[90] or what we even consider to be a risk in the first place.[91]

Ulrich Beck describes "risk" as a concept that provides a causal link between current circumstances to *possible* future occurrences or harms: it is a function of "chance and danger" as well as time.[92] "Uncertainty" is "a situation of inadequate information [due to] inexactness, unreliability and border with ignorance."[93] Risk and uncertainty are related: a sense of risk arises from uncertainty; the concept of risk internalizes uncertainty; and to the extent risk is decision-making tool, risk is a "measurable uncertainty" that we believe in and care about.[94]

Risk and uncertainty are distinct. Consider the fictional diet drug, Aspire. Those taking it may have a 0.1 percent chance of heart valve damage.[95] The "0.1 percent" may not be certain, but that Aspire causes some damage may be certain.[96] Perhaps it is actually a 0.11 percent chance. For a blockbuster drug, the

88. *See* Anne Ingeborg Myhr & Terje Traavik, *Genetically Modified (GM) Crops: Precautionary Science and Conflicts of Interests*, 16 J. AGRIC. & ENVTL. ETHICS 227, 235 (2003).

89. Les Levidow, *Precautionary Uncertainty: Regulating GM Crops in Europe*, 31 SOC. STUD. SCI. 842, 851-52 (2001).

90. Sunstein, *supra* note 17, at 1054, 1057.

91. *See* ULRICH BECK, WORLD AT RISK 124-25 (2013).

92. *See id.* at 3 ("Risk represents the perceptual and cognitive schema in accordance with which a society mobilizes itself when it is confronted with the openness, uncertainties and obstructions of a self-created future."); CARLO C. JAEGER ET AL., RISK, UNCERTAINTY AND RATIONAL ACTION 16-17 (2013) (risk is "[a] situation or event in which something of human value (including humans themselves) has been put at stake and where the outcome is uncertain."); *see also* Regulation (EC) No. 178/2002 of the European Parliament and of the Council of 28 January 2002 Laying Down General Principles and Requirements of Food Law, Establishing the European Food Safety Authority and Laying Down Procedures in Matters of Food Safety, 2002 O.J. (L 31), 1 [hereinafter EC Reg. 178/2002] ("'risk' means "a function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard").

93. W.E. Walker et al., *Defining Uncertainty: A Conceptual Basis for Uncertainty Management in Model-Based Decision Support*, 4 INTEGRATED ASSESSMENT 5, 8 (2003) (defining uncertainty as "*any departure from the unachievable ideal of complete determinism*") (emphasis in original)).

94. *See* BECK, *supra* note 91, at 48-49, 53-54, 75-76 (quoting FRANK KNIGHT, RISK, UNCERTAINTY AND PROFIT, 80, 124-25 (1921)); JAEGER ET AL., *supra* note 92, at 17.

95. Aspire is a fictional drug not dissimilar to the appetite suppressant fenfluramine-phentermine ("fen"-"phen").

96. It could depend on many other circumstances – the patient's family's health history, the dosage prescribed or the length of time the patient takes the drug, among many factors. *See generally, e.g.*, James G. Jollis et al., *Fenfluramine and Phentermine and Cardiovascular*

risk of such an error could itself a major public health risk.

Part of what makes risk *feel* risky is uncertainty.[97] A scientific study could observe that the high incidence of heart valve damage in patients taking Aspire is unlikely to occur by chance[98] or is associated with a significantly increased prevalence of some types of heart valve damage[99] but not establish a causal relationship between heart valve damage and Aspire.[100] A patient could freebase Aspire, but it would never injure her heart.[101] The more we would learn about Aspire, the more we might learn about other "risky" drugs or risky conditions it could possibly cure, setting off an explosion of "known risks" and even more uncertainty.[102]

Society regulates risk when people want protection because they *perceive* a causal relationship between something and a future adverse outcome, not when science tells them the causal relationship exists.[103] Uncertainty influences those perceptions.[104] The more we know, the more we realize we do not know, and perhaps the more aware we become that we do not know what we do not know, the more we become aware that we do not know a lot.[105]

Modern society treats risk from emerging technologies as something to

Findings: Effect of Treatment Duration on Prevalence of Valve Abnormalities, 101 CIRCULATION 2071 (2000).

97. *See* L. Frewer et al., *Societal Aspects of Genetically Modified Foods*, 42 FOOD & CHEM. TOXICOLOGY 1181, 1182-84, 1186 (2004).

98. *Cf.* Heidi M. Connolly et al., *Valvular Heart Disease Associated with Fenfluramine-Phentermine*, 337 NEW ENG. J. MED. 581, 588 (1997).

99. *Cf.* Julius M. Gardin et al., *Valvular Abnormalities and Cardiovascular Status Following Exposure to Dexfenfluramine or Phentermine/Fenfluramine*, 283 JAMA 1703, 1709 (2000).

100. *Cf.* Connolly et al., *supra* note 98, at 588.

101. Though the chemistry of one half of "fen-phen," fenfluramine, has been shown to be a cause of heart valve damage, *see generally* Joshua D. Hutcheson et al., *Serotonin Receptors and Heart Valve Disease – It Was Meant 2B*, 132 PHARMACOLOGY THERAPEUTICS. 146 (2011), the other half, phentermine, does not appear to have an independent causal relationship with such injuries. *See, e.g.*, Hershel Jick et al., *A Population-Based Study of Appetite-Suppressant Drugs and the Risk of Cardiac-Valve Regurgitation*, 339 N. ENGL. J. MED. 719 (1998).

102. *Cf.* Hutcheson et al., *supra* note 101; Walker et al., *supra* note 93.

103. *See* BECK, *supra* note 91, at 124-25; LENNART SJÖBERG ET AL., EXPLAINING RISK PERCEPTION, AN EVALUATION OF THE PSYCHOMETRIC PARADIGM IN RISK PERCEPTION RESEARCH 8 (2004) ("Risk perception is the subjective assessment of the probability of a specified type of accident happening and how concerned we are with the consequences.").

104. *See* Walker et al., *supra* note 93, at 11-14.

105. *See* BECK, *supra* note 91, at 74-78; *see also* Robert F. Durant & Jerome S. Legge, Jr., *Public Opinion, Risk Perceptions, and Genetically Modified Food Regulatory Policy*, 6 EUR. UNION POL. 181, 193-95 (2005).

manage whether scientists are uncertain about their effects or not.[106] The United Nations and European Union have championed "precaution" as the proper regulatory response to GM foodstuffs.[107] But where additional information breeds more uncertainty, the "need" for precaution never ends.[108] From risk management explodes new, unpredicted, and unintended consequences which until created, were the essence of "uncertain:" unknown, unknowable, or just ignored.[109]

The precautionary principle is less a philosophical principle than a decision-making framework with a robust normative component that may authorize regulation to manage environment and public health risks when the possibility, magnitude, and likelihood of adverse events are uncertain.[110] Application of the principle incorporates the following elements and often produces similar results:[111]

- Burden of proof: Either *de jure* or *de facto*, the jurisdiction almost always puts the burden on the proponent of a new technology or other potentially hazardous activity to prove its safety, usually via a scientific risk assessment process.[112]
- Triggering the authority to regulate: The risk assessment indicates that the combination of the probability of an adverse effect from a new technology or other hazardous activity and the potential magnitude of that effect (a "risk") exceeds a society's tolerance for risk, which "triggers" the authority to regulate manage the risk.
- Choice of risk-management strategy: The strategy to manage the potential risk depends on the society's tolerance for risk and should be proportional to the risk perceived.

This precautionary risk management framework is conceptually distinct

106. *See* BECK, *supra* note 91, at 112.

107. *See, e.g.*, Cartagena Protocol on Biosafety to the Convention on Biological Diversity, Annex III(8)(d), *opened for signature* May 15, 2000, 2226 U.N.T.S. 208 (entered into force Sept. 11, 2003) [hereinafter Cartagena Protocol]; EC Reg. 178/2002, *supra* note 92, art. 7; *see also* BECK, *supra* note 91, at 180 (observing "Eurocentric bias" of international environmental law).

108. BECK, *supra* note 91, at 80. The evidence creating "uncertainty" may merely be "a strategic argument among experts" with other agendas. *See* Levidow, *supra* note 89, at 851-52.

109. *See* BECK, *supra* note 91, at 80.

110. *See* Phillip M. Kannan, *The Precautionary Principle: More Than a Cameo Appearance in United States Environmental Law?*, 31 WM. & MARY ENVTL. L. & POL'Y REV. 409, 416-18 (2007).

111. *See generally* John S. Applegate, *The Prometheus Principle: Using the Precautionary Principle to Harmonize the Regulation of Genetically Modified Organisms*, 9 IND. J. GLOBAL LEGAL STUD. 207, 249-55 (2001).

112. *Communication on the Precautionary Principle*, *supra* note 14, at 21.

from risk-benefit analysis.[113] Risk-benefit analysis seeks to identify levels of regulation that are reasonable or ideally maximize social utility.[114] The precautionary principle seeks to reduce risk below a society's level of risk tolerance, which imposes a normative preference for safety.[115] Risk-benefit analysis may justify very risky activity.[116] The precautionary principle rarely does.[117]

A. Hypothetical One – Risk Versus Benefit: What You See Is All About Where You Stand

Risk-benefit analysis identifies and helps compare reasonable actions to avoid imposing unreasonable risks of harm on foreseeable others.[118] Risk is a combination of the likelihood and magnitude of the foreseen harm.[119] The risk is reasonable if it is greater than the sum of the costs associated with exercising care and the benefits of taking the risk:[120]

Likelihood x Magnitude of Risk > Burdens of care + Benefits of non-regulation.

1. Hypothetical One:

Rob is driving north on Euphoria Street when the light at the looming intersection turns red. Kim's vehicle is approaching from the east on the green light. Rob estimates that if he continues through the intersection, and Kim does nothing, he will plow right into Kim's the driver's side door which would likely result

113. *See* Matthew D. Adler & Eric A. Posner, *Rethinking Cost-Benefit Analysis*, 109 YALE L.J. 165, 194-96 (1999-2000).

114. *See id.* at 196.

115. *See* René von Schomberg, *The Precautionary Principle: Its Use Within Hard and Soft Law*, 3 EUR. J. RISK REG. 147, 147-50 (2012).

116. *See, e.g.*, Adam Thierer, *Technopanics, Threat Inflation, and the Danger of an Information Technology Precautionary Principle*, 14 MINN. J. L. SCI. & TECH. 309, 375 (2013); Philippe Aerni, *Public Policy Responses to Biotechnology* 16-17 (CID Pol. Disc. Pap., 2001).

117. *See* Thierer, *supra* note 116, at 353.

118. DAN B. DOBBS ET AL., THE LAW OF TORTS § 159 (2d ed. 2013); Carl H. Nelson, *Risk Perception, Behavior, and Consumer Response to Genetically Modified Organism*s, 44 AM. BEHAV. SCI. 1371, 1372-73 (2001).

119. *See, e.g.*, EC Reg. 178/2002, *supra* note 92, art. 3(9); Directive 2001/18/EC of the European Parliament and the Council of 12 March 2001 on the Deliberate Release into the Environment of Genetically Modified Organisms and Repealing Council Directive 90/220/EEC, Annex II(c.2)(4), 2001 O.J. (L 106) [hereinafter EC Dir. 2001/18/EC]; *cf.* Cartagena Protocol, *supra* note 107, Annex III (8)(d).

120. *See* United States v. Carroll Towing Co., 159 F.2d 169, 173 (2d Cir. 1947) ("Hand formula"); RESTATEMENT (SECOND) OF TORTS § 291 (1965).

in serious injuries to both.[121]

Rob can only stop in time if he slams on his brakes. The cost of slamming on the brakes is that a vehicle following too closely will almost certainly collide with his vehicle, likely resulting in serious injuries to both drivers. The risk of harm is "likely serious injury" to one driver, and the cost of exercising care is "likely serious injury" to the other driver. It does not matter which injuries are the "risk" and which injuries avoided are the "benefit."

So Rob tries something very risky: he shoves his foot onto the gas pedal in the hope of beating Kim through the intersection so no one gets hit. The risk remains the same: Kim or the other driver being injured. The calculus of exercising care changes by adding uncertainty. How will other drivers react? Has Rob estimated speeds accurately? Can Rob's engine propel his vehicle fast enough? Will a pedestrian pop out of nowhere? But it is possible that the cost of taking-an-unknown-risk-as-a-form-of-exercising-care is lower than almost-certain-serious injuries.[122]

Risk is not a normative concept in risk-benefit analysis. Whether we label it "good" or "bad" depends on whether we are at risk and/or whether we would benefit from not exercising care. Risks and benefits are merely sides of the same coin: what you see is all about where you stand.

2. Hypothetical Two: Magnifying Risk and Discounting Benefits - It's the Politics, Stupid!

The precautionary principle is a public policy decision to prefer public health and environmental safety to the benefits of non-regulation[123] when determining if a risk to public health or the environment is greater than a society's risk tolerance threshold.[124] The precautionary principle does not distinguish between reasonable or unreasonable risks of harm.[125] In fact, a precautionary jurisdiction does not really admit of "reasonable" risks at all, only risks of "potential adverse effects" to "avoid or minimize"[126] in pursuit of a "high level of protection," usu-

121. Rob could slow down, but then he would be caught in the intersection, which demonstrates how difficult it is to make a risk "certain enough" to identify when the precautionary principle would apply while not swallowing all regulatory activity. *See* MARCHANT & MOSSMAN, *supra* note 30, at 30.

122. *See* Indur M. Goklany, *Applying the Precautionary Principle to Genetically Modified Crops* 3 (Weidenbaum Ctr. Working Paper No. PS 157, 2000) (threats of harm that are certain should take precedence over those that do not).

123. *See* von Schomberg, *supra* note 115, at 147-50.

124. This acceptable risk threshold may not necessarily be quantified. *Id.* at 153-54.

125. *See, e.g.*, *id.* at 153 (describing the "natural situation" reference point).

126. *See, e.g.*, Cartagena Protocol, *supra* note 107, art. 10(6); EC Dir. 2001/18/EC, *supra* note 119, Annex II(A) (describing how a proponent of a release should assess risk but not re-

ally for public health and the environment.[127] Therefore, a precautionary jurisdiction demands regulation when risk is more than the society's threshold of acceptable risk[128]:

Magnitude and Likelihood of Harm > Threshold.

Threshold is not a very high hurdle.[129] The principle applies only when the society is averse to the risk in the first place, and it grants authority to regulate where the cause-and-effect relationship between the risky activity and the potential future harm is uncertain.[130] In effect, Threshold varies depending on the quality (certainty) of the preliminary information available for risk assessment, so a jurisdiction may exercise precaution based on evidence that is less definitive or accepted than regulators might otherwise require.[131]

This algebra reveals a paradox: the precautionary principle may often indicate more regulation in the face of less scientifically determinable risk,[132] because it ignores the import of general causation: whether a risk that could cause the harm even exists, which is preliminary to determining the extent of the risk.[133] It is one thing to say that *if* it is possible for a catastrophe to occur, *then* the likelihood of the catastrophe occurring is ten percent.[134] But if it is uncertain that the

quiring information on the benefits of the release).

127. *See, e.g.*, EC Reg. 178/2002, *supra* note 92, at arts. 1, 5; *see also Communication on the Precautionary Principle*, *supra* note 14, at 20 ("The protection of public health should undoubtedly be given greater weight than economic considerations.").

128. Henry I. Miller & Gregory Conko, *The Perils of Precaution: Why Regulators' "Precautionary Principle" is Doing More Harm Than Good*, POL'Y. REV., June/July 2001, at 25, 25, 33.

129. *See, e.g.*, Regulation (EC) No. 1829/2003 of the European Parliament and the Council of 22 September 2003 on Genetically Modified Food and Feed, arts. 1, 2003 O.J. (L 268), 1 [hereinafter EC Reg. 1829/2003]; Biosafety Law, *supra* note 3, art. 3(5).

130. *See* von Schomberg, *supra* note 115, at 147-49.

131. *See id.* at 151-52; *see also* Levidow, *supra* note 89, at 861-64.

132. *See* Noah M. Sachs, *Rescuing the Strong Precautionary Principle from Its Critics*, 2011 U. ILL. L. REV. 1286, 1304. I use "scientifically determined risk" for the measure of risk if more variables are certain, so that I may avoid using "actual risk," which is arguably in the eye of the beholder.

133. *See* Knight v. Kirby Inland Marine, Inc., 482 F.3d 347, 351 (5th Cir. 2007) ("General causation is whether a substance is capable of causing a particular injury or condition in the general population, while specific causation is whether a substance caused a particular individual's injury."). Both must be shown to prove causation in a toxic tort case. *Id.* at 351, 355 (refusing to admit specific causation evidence in the absence of admissible general causation evidence in a toxic tort case); *see also* In re Breast Implant Litigation, 11 F. Supp. 2d 1217, 1224 (D. Colo. 1998); Daubert v. Merrill Dow Pharm., Inc., 509 U.S. 579 (1993).

134. This is the specific causation concept. *See, e.g.*, *Knight*, 482 F.3d at 351.

catastrophe can occur, the likelihood of the catastrophe is ten percent minus a discount for the possibility that the catastrophe could not occur under the circumstances.[135]

The point of the precautionary principle is *not* to discount, but to minimize any damage from risks that do turn out to cause harm.[136] This leads to the second paradox: the precautionary principle may impose more scientifically determinable risk than it eliminates because it assumes that the harm can occur; adopts the highest estimate of the risk; and makes no accounting for benefits (risks to others).[137] Risk could be small or non-existent and risks-as-benefits could be larger.[138]

The final paradox is that for all its focus on science, the precautionary principle is really about society's perception of risk and the expected consequences.[139] Threshold is society's demand for regulation of what it *perceives* to be intolerable risk.[140] Society's demand is a function of scientifically determinable risks or harms only if the public and experts agree, which they often do not.[141] A risk is also perceived to be "riskier" when information about risks and consequences is difficult to process into determinacy.[142] Thus, uncertainty depresses

135. *See, e.g.*, Elmer J. Schaefer, *Uncertainty and the Law of Damages*, 19 WM. & MARY L. REV. 719, 723-24 (1978). This reasoning applies even if, as some risk scholars argue, the potential consequences are the most important variable in determining demand for regulation, because some consequences are not possible, though lesser ones may be.

136. *See, e.g.*, Anne Ingeborg Myhr, *The Role of Precautionary Motivated Science in Addressing Scientific Uncertainties Related to GMOs*, *in* BIOSAFETY FIRST: HOLISTIC APPROACHES TO RISK AND UNCERTAINTY IN GENETIC ENGINEERING AND GENETICALLY MODIFIED ORGANISMS 279, 281-83 (Terje Traavik & Lim Li Ching eds., 2007) (arguing in favor of a "precautionary motivated science" that seeks to avoid Type-II errors); Miller & Conko, *supra* note 128, at 33-35.

137. *See* Kevin Fast, Comment, *A Troubling Precedent: Implementing the Precautionary Principle to Limit the Role of Science in European Decisionmaking*, 41 ENVTL. L. REP. 10520, 10525-26 (2011); Levidow, *supra* note 89, at 844; Sunstein, *supra* note 17, at 1023 (when risk perception is high, regulators have an incentive to focus on extremes to avoid errors resulting in harm); *see also* Paul Slovic & Ellen Peters, *Risk Perception and Affect*, 15 CURRENT DIRS IN PSYCHOL. SCI. 322, 323-24 (2006); Miller & Conko, *supra* note 128, at 27-28.

138. Sunstein, *supra* note 17, at 1037.

139. *See* von Schomberg, *supra* note 115, at 152; SJÖBERG ET AL., *supra* note 103, at 27.

140. *See* Yann Devos et al., *The Interplay Between Societal Concerns and the Regulatory Frame on GM Crops in the European Union*, 5 ENVTL. BIOSAFETY RES. 127, 128 (2006); BECK, *supra* note 91, at 53-54.

141. *See generally, e.g.*, Lucia Savadori et al., *Expert and Public Perception of Risk from Biotechnology*, 24 RISK ANALYSIS 1289 (2004); Ortwin Renn, *Perception of Risks*, 29 GENEVA PAPERS ON RISK & INS. 102, 107-12 (2004).

142. *See* Nelson, *supra* note 118, at 1381-82. The more "information" Europeans have about GM foodstuffs, the more they are uncertain of their views. *See* Durant & Legge, *supra* note 105, at 93-97.

Threshold;[143] regulators consult more extreme views to avoid underestimating Risk; and the evidence then augments one or both of Likelihood or Magnitude.[144] Since Risk is a function of Threshold and Threshold is simply a society's risk perception, precautionary risk assessment collapses into a function of society's non-science-based risk perception.[145] Surely the best way to determine that would be to hold referenda when new technologies emerge.

Consider Hypothetical Two: It is night on a very dark two-lane highway. Rob sees something out of the corner of his eye moving toward the highway; it might be a child who might run into the road! Behind Rob is a motorcycle. Rob slams on the brakes. The motorcyclist collides with Rob, is thrown from the motorcycle and killed. Five seconds later, a deer lopes nonchalantly across the road from the spot where Rob saw something move.

Rob has applied the precautionary principle to make the decision to stop, because his jurisdiction has a low threshold for risk to children. He was uncertain whether there really was a risk, if there was, how likely it was that a harm would result, and what that harm would be.[146] So Rob assumed a child was present; that it would run into the road; and that he would then kill the child.[147] Uncertainty magnified the risk, so it triggered Rob's decision to take precautionary measures by stopping.[148] Thus, precaution redefines uncertainty: an uncertain risk of harm becomes a certain harm.[149] Instead of discounting the risk to the person who may not exist, precautionary analysis discounts the risk to the one who certainly does exist.[150]

So the precautionary principle is also a normative decision about risk distribution.[151] Avoiding the near-certain harm to the motorcyclist is a "benefit of non-regulation" that outweighs the uncertain risk to the uncertain child, but this

143. *See* Nelson, *supra* note 118, at 1374.

144. *See Communication on the Precautionary Principle*, *supra* note 14, at 17; *see also* von Schomberg, *supra* note 115, at 151.

145. *But see* von Schomberg, *supra* note 115, at 156 ("not imaginable that a proper invocation, implementation and application of the precautionary principle would be based solely on a 'perceived' risk").

146. *See Communication on the Precautionary Principle*, *supra* note 14, at 14-15, 20; *see also* Renn, *supra* note 141, at 110.

147. *See, e.g.*, Cartagena Protocol, *supra* note 107, art. 11(8) ("This evaluation [of Magnitude] should assume that such an adverse effect will occur.")

148. *See Communication on the Precautionary Principle*, *supra* note 14, at 17.

149. *Cf.* Levidow, *supra* note 89, at 845-47.

150. *Cf.* Miller & Conko, *supra* note 128, at 32-36; Goklany, *supra* note 122, at 3.

151. Sunstein, *supra* note 17, at 1031. This explains why "socio-economic considerations" must inform precautionary jurisdiction risk assessments. Jose B. Falck-Zepeda, *Socio-Economic Considerations, Article 26.1 of the Cartagena Protocol on Biosafety: What Are the Issues and What Is at Stake*?, 12 AGBIOFORUM 1, 9-10 (2009).

precautionary society placed the burden of the risk onto the motorcyclist; as the European Commission points out: "a society may be willing to pay a higher cost to protect an interest . . . to which it attaches priority."[152]

3. Hypothetical Three: If Your Car Collides with a Motorcyclist You Did Not Know Was There, Does Anyone Get Hurt?

There *are* attractions to the precautionary principle's "power to the people" orientation, but it does not necessarily pick a more satisfying set of winners and losers as other decision trees.[153] Consider Hypothetical Three: Rob does not see a motorcyclist behind him. Well, he saw that flash, but it is gone. So even if Rob was inclined to require better information than something he thought he saw out of the corner of his eye, he cannot perceive either a cost to stopping or a benefit foregone of not taking the precaution of stopping.

Unfortunately, a half-mile earlier, a motorcyclist clad in black leather with a dark helmet over her face pulled onto the roadway behind Rob but forgot to turn her headlamp on. After the collision, Rob remembers, to his horror, that he *had* noticed a flash across the lane behind him in his rear-view mirror.[154] He was just so preoccupied with the child-that-wasn't that he did not give the flash another thought, effectively ignoring the possible benefits to the motorcyclist of not stopping and to society in terms of the contributions she might have made.[155]

When the benefits of non-regulation are unknown or unknowable, the precautionary principle treats them as if they do not exist. *But they do*.[156] Not taking a risk is to take one for someone else, by withholding the possible benefits of that risk. This is pure risk redistribution from the known to the nameless and faceless.

Therefore, the precautionary principle does not merely change the distribution of risk; *a major purpose of the precautionary principle must be to change the distribution of risk*.[157] Precautionary principle proponents may assume "society" will make a better risk distribution than "experts,"[158] but there is no reason

152. *Communication on the Precautionary Principle*, *supra* note 14, at 20.

153. *E.g.*, Matin Qaim, *The Economics of Genetically Modified Crops*, 1 ANN. REV. RES. ECON. 665, 683 (2009).

154. *See* Fast, *supra* note 137, 10525-26.

155. *See* Sunstein, *supra* note 17, at 1034.

156. *See, e.g.*, Goklany, *supra* note 122, at 20-23; Thierer, *supra* note 116, at 362-64.

157. *See also* Sunstein, *supra* note 17, at 1034-35.

158. *See generally*, Latifah Amin et al., *Risk Assessment of Genetically Modified Organisms (GMOs)*, 10 AFR. J. BIOTECHNOLOGY 12418, 12422-24 (2011); David Barling et al., *The Social Aspects of Food Biotechnology: A European View*, 7 ENVTL. TOXICOLOGY & PHARMACOLOGY 85, 91-92 (1999); Aarti Gupta, *Advance Informed Agreement: A Shared Basis for Governing Trade in Genetically Modified Organisms?*, 9 IND. J. GLOBAL LEG. STUD.

to believe that.[159] It assumes what Americans are so sure is a falsehood–that majorities protect the interests of minorities out of the goodness of their hearts–that we took the great precaution of designing our government to avoid that harm.[160]

Kim–yes, the motorcyclist did have a name–was not seen. She was not merely clad in black: Kim was not seen. The poor, disfavored, and disadvantaged will often lose these precautionary risk distribution battles.[161]

The precautionary principle vindicates the majority's perception of an emerging technology's risk and authorizes regulation accordingly. A rich country may be willing to bear any burden or pay any price to avoid the most unlikely or even non-existent environmental and public health risks.[162] If rich countries want to use their wealth that way, it is fine, but it is no way for a cash-strapped and therefore necessarily benefit-maximizing developing country to behave.[163] Unfortunately, Turkey is under pressure to do just that.

IV. SO MUCH WATER, SO CLOSE TO HOME[164]: INFLUENCES ON TURKEY'S

265, 278-80 (2001). Arguments in favor of applying the precautionary principle to GM foodstuffs reveal an inclination to keep poor people poor. *E.g.*, Qaim, *supra* note 153, at 666 (citing others' concern that "GM technology could undermine traditional knowledge systems in developing countries."); ELENITA C. DANO, IMPACTS OF GMOS: PROSPECTS FOR SOCIO-ECONOMIC IMPACT ASSESSMENT 19-20 (2007) ("In the case of herbicide-resistant corn that aims to eliminate the laborious task of weeding, women would be significantly marginalized since weeding is one of their primary tasks in corn cultivation, as for example, in the Philippines."); Özertan & Aerni, *supra* note 9, at 559 (observing that to argue that GM cotton cultivation in Turkey would undermine the organic sector is to prefer a sector that makes a virtue of low-wage, unskilled labor costs).

159. *See* Joel I. Cohen & Robert Paarlberg, *Explaining Restricted Approval and Availability of GM Crops in Developing Countries*, AGBIOTECHNET, Oct. 2002, at 4-5. The NIMBY phenomenon in environmental risk distribution confirms this. *See generally, e.g.*, Susan L. Cutter, *Race, Class and Environmental Justice*, 19 PROGRESS HUM. GEOGRAPHY 111 (1995); *see also* Rae Zimmerman, *Social Equity and Environmental Risk*, 13 RISK ANALYSIS 949 (1993).

160. *See* THE FEDERALIST NO. 10 (James Madison).

161. *See* Paarlberg, *Real Threat*, *supra* note 9, at 249-50; Qaim, *supra* note 153, at 673-74, 682-83; Sakiko Fukuda-Parr & Amy Orr, *GM Crops for Food Security in Africa – the Path Not Yet Taken* 8-11, 17-18 (U.N. Dev. Prog. Working Paper 2012-18, 2012); Goklany, *supra* note 122, at 22-23.

162. MARCHANT & MOSSMAN, *supra* note 30, at 29-30.

163. Robert Paarlberg, *Agrobiotechnology Choices in Developing Countries*, 2 INT'L J. BIOTECHNOLOGY 164, 166 (2000) [hereinafter Paarlberg, *Agrobiotechnology*]; Miller & Conko, *supra* note 128, at 28 (observing Aaron Wildavsky's argument that "[t]o deprive communities of wealth, therefore, is to enhance their risks"); Özertan & Aerni, *supra* note 9, at 555 (discussing Turkish situation).

164. In Raymond Carver's short story, *So Much Water, So Close to Home*, a man travels a long distance to fish even though there is "so much water, so close to home," because the trip

BIOSAFETY REGULATORY REGIME

The precautionary principle is at the root and core of Turkey's Biosafety Law. Turkey is a signatory to the on Environment and Development and the Cartagena Protocol on Biosafety, international agreements to adopt and implement precautionary biosafety regulation,[165] and Turkey received European Union-funded technical assistance to do so.[166] The Biosafety Law is also part of Turkey's effort to harmonize its law with that of the precautionary European Union Member States in the accession process.[167] Turkish biosafety regulation is meaningfully different from the EU's, but the basics are the same.

A. The Rio Declaration and Cartagena Protocol

Many international environment and health agreements have adopted the precautionary principle as a guide development of signatories' domestic law. In 1992, Turkey participated in the "Earth Summit," which adopted the "Rio Declaration on Environment and Development."[168] It states:

> Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.[169]

The precautionary principle made its marquee appearance in world biosafety law in the Cartagena Protocol on Biosafety to the United Nations Convention on Biological Diversity, which Turkey signed in 2000.[170] The Protocol prescribes a precautionary "advance informed agreement" procedure[171] for all "first

liberates him from stultification at home.

165. *Rio Declaration*, *supra* note 13, princ. 15 ("precautionary approach shall be widely applied"); Cartagena Protocol, *supra* note 107, art. XI(8), Annex. III.

166. Turkey received $250,000 from the United Nations Environment Programme (UNEP) to prepare biosafety regulation. Robert Hanson, *Turkey Agricultural Biotechnology Annual Report*, GAIN REP. NO. TU5030 (USDA Foreign Agric. Serv./ Global Info. Network, Wash., D.C.), June 30, 2005, at 3-4. The European Union provides disproportionate funding to the Global Environment Facility, which funds the UNEP. ROBERT PAARLBERG, STARVED FOR SCIENCE: HOW BIOTECHNOLOGY IS BEING KEPT OUT OF AFRICA 127-31 (2009).

167. *See* Yasemin Erkut, *Turkey: Food and Agricultural Import Regulations and Standards – Narrative*, GAIN REP. (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), Dec. 31, 2010, at 2, 8.

168. U.N. Conf. on Env't & Dev., *Report of the United Nations Conference on Environmental Development*, U.N. Doc. A/CONF.151/26 (Vol. IV), ch. II.C (Sept. 28, 1992).

169. *Rio Declaration*, *supra* note 13, princ. 15.

170. Cartagena Protocol, *supra* note 107, Annex III(8)(d); *see also* MARCHANT & MOSSMAN, *supra* note 30, at 7.

171. Aarti Gupta, *Governing Trade in Genetically Modified Organisms: The Cartagena*

transboundary movements [of] living modified organisms (LMO)."[172] A "notifier" submits a thick dossier about the LMO, including a risk assessment report to the importing country to satisfy the notifier's burden of proving the LMO's safety.[173] Precaution is "triggered" if the LMO "may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health,"[174]

When considering the application:

> Lack of scientific certainty due to insufficient relevant scientific information and knowledge regarding the extent of the potential adverse effects of a living modified organism on the conservation and sustainable use of biological diversity in the Party of import, taking also into account risks to human health, shall not prevent that Party from taking a decision as appropriate, with regard to the import of the living modified organism intended for direct use as food or feed, or for processing, in order to avoid or minimize such potential adverse effects.[175]

If the country of import approves the application, it may implement a risk management program.[176] A "Biosafety Clearing-House" provides information about LMOs and regulation.[177]

If the Cartagena Protocol is a declaration of independence by stealth from GM crop producers, the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS) of the World Trade Organization is the producers' revenge against its thinly veiled trade barriers.[178] Consistency with SPS depends on two principles. The first is equivalence: where an exporting country can show that "its [safety] measures achieve the importing Member's appropriate level of sanitary or phytosanitary protection," the importing country must accept it.[179] The

Protocol on Biosafety, ENV'T: SCI. & POL'Y FOR SUSTAINABLE DEV., May 2000, at 27.

172. Cartagena Protocol, *supra* note 107, arts. 7, 11. A "living modified organism" is "any biological entity capable of transferring or replicating genetic material," that also "possesses a novel combination of genetic material obtained through the use of modern biotechnology." *Id.* art. 3(g), (h).

173. *See id.* arts. 11, 15(2), Annex II, III.

174. *Id.* art. 4.

175. *Id.* art. 11(8), Annex III(4).

176. *Id.* art. 16.

177. *Id.* art. 20.

178. *See generally* WTO, *Agreement on the Application of Sanitary and Phytosanitary Measures*, art. 5(3) (Jan. 1, 1995) [hereinafter *SPS Agreement*]; Nicholas Kalaitzandonakes, *Cartagena Protocol: A New Trade Barrier?*, REGULATION, Summer 2006, at 18; Selcan Serdaroğlu, *Trade and Environment at the Crossroads: Evolution of the International Governance of Biosafety*, 1 INT'L J. HUM. & SOC. SCI. 111, 114 (2011).

179. *SPS Agreement*, *supra* note 178, art. 4(1).

second is least restrictive means: favoring risk management techniques that are least burdensome to free trade given the nature and extent of the risk.[180]

Where scientific evidence of risk is uncertain, the provision empowers a member state to regulate, but it imposes both a temporal limit and a duty to continue investigation:[181]

> [A] Member may provisionally adopt sanitary or phytosanitary measures on the basis of available pertinent information, including that from the relevant international organizations as well as from sanitary or phytosanitary measures applied by other Members. In such circumstances, Members shall seek to obtain the additional information necessary for a more objective assessment of risk and review the sanitary or phytosanitary measure accordingly within a reasonable period of time.[182]

The European Union proved the limits of the World Trade Organization's tolerance for de facto bans on importation of GMOs the hard way.[183] Some think Turkey could be headed the same way.[184]

B. European Union

The European Union is the precautionary principle's most aggressive proponent for environmental, health, and food safety regulation.[185] Its GM foodstuffs regulation is "widely viewed as the most stringent system in the world."[186] Both the Treaty of Rome and the Maastricht Treaty (formally the Treaty on European Union) set a low risk threshold and mandate precaution to maintain "*a high level of protection*" for the environment[187] and the Treaty of Rome sets the same standard for health and safety.[188]

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180. *Id.* art. 5(7).

181. *Id.*

182. *Id.*

183. *See, e.g.*, Robert L. Howse & Henrick Horn, *European Communities–Measures Affecting the Approval and Marketing of Biotech Products*, 8 WORLD TRADE REV. 49, 52-56 (2009).

184. *See* BROOKES, *supra* note 4, at 34.

185. *See, e.g.*, JOYCE TAIT, RISK GOVERNANCE OF GENETICALLY MODIFIED CROPS IN EUROPE: DECISION NODES AND INCUBATION PERIODS IN GENERATING A RISK GOVERNANCE DEFICIT 1 (2009); Özertan & Aerni, *supra* note 9, at 554.

186. DAVID BAULCOMBE ET AL., GM SCIENCE UPDATE: A REPORT TO THE COUNCIL FOR SCIENCE AND TECHNOLOGY 36 (2014).

187. Treaty Establishing the European Community, arts. 95 (3), 174(2) Mar. 25, 1957 (emphasis added) [hereinafter Treaty of Rome]; Treaty on European Union, art. 130r(2), Feb. 7, 1992 (emphasis added).

188. Treaty of Rome, *supra* note 187, arts. 95 (3), 174 (1).

Until 2003, the European Union regulated GM foods and unprocessed animal feed separately via a decentralized and contentious advance informed agreement process.[189] The process did not work: no competent authority's risk assessment ever satisfied all member states, as the process essentially required.[190] A business-friendly European Commission reined in the precautionary trend briefly,[191] but after the bovine spongiform encephalopathy and other food crises of the 1990s, five member states imposed a de facto moratorium on GMO approvals until the European Community beefed up its food safety regulations;[192] a step a World Trade Organization panel eventually found violated the World Trade Agreement.[193]

In 2002 and 2003, the European Community adopted a comprehensive, precautionary package of food and feed, and shifted its regulatory priorities from trade facilitation to food safety.[194] European leaders also hoped the package would restore confidence in European regulators' competence to protect citizens from adulterated foods.[195] Unfortunately, precautionary regulation does not seem to have that effect.[196]

189. *See, e.g.*, Council Directive (No. 90/220/EEC) of 23 April 1990 on the Deliberate Release in to the Environment of Genetically Modified Organisms, 1990 O.J. (L 117), 15 [hereinafter EEC Counc. Dir. 90/220] (discussing the deliberate release into the environment of genetically modified organisms); Regulation (EC) No. 258/97 of the European Parliament and of the Council of 27 January 1997 Concerning Novel Foods and Novel Food Ingredients, 1997 O.J. (L 43)(EC), 1 [hereinafter EC Reg. 258/97] (concerning novel foods and novel food ingredients); *see also* EUR. COMM'N DIR. GEN. FOR HEALTH & CONSUMERS, EVALUATION OF THE EU LEGISLATIVE FRAMEWORK IN THE FIELD OF GM FOOD AND FEED 6-9 (2010).

190. *See* EEC Counc. Dir. 90/220, *supra* note 189, art. 16.

191. *See* EC Reg. 258/97, *supra* note 189, arts. 1(2)(a), 9(2); *Growth, Competitiveness, Employment: The Challenges and Ways Forward into the 21st Century*, at 103-09, COM (1993) 700 final (Dec. 5, 1993); Falk Daviter, *Framing Biotechnology Policy in the European Union* 18 (ARENA Working Paper No. 5, 2012).

192. Daviter, *supra* note 191, at 15-23; Tim Knowles & Richard Moody, *European Food Scares and Their Impact on EU Food Policy*, 109 BRIT. FOOD J. 43, 55 (2007); Bernd M.S. van der Meulen, *The EU Regulatory Approach to GM Foods*, 16 KAN. J. L. & PUB. POL'Y 286, 316-17 (2007) [hereinafter *EU Regulatory Approach*].

193. Panel Report, *Reports Out on Biotech Disputes*, WT/DS291/R (Sept. 29, 2006).

194. *See* EC Reg., 178/2002, *supra* note 92; EC Dir. 2001/18/EC, *supra* note 119; *see also* EC Reg. 1829/2003, *supra* note 129, pmbl. ¶ 9, art. 1 (incorporating "new principles" of EC Dir. 2001/18/EC and "new framework for risk assessment" of EC Reg. 178/2002, *supra* note 92); *see also* Bernd M.S. van der Meulen et al., *Structural Precaution: The Application of Premarket Approval Schemes in EU Food Legislation*, 67 FOOD & DRUG L.J. 453 (2012) [hereinafter *Structural Precaution*].

195. *EU Regulatory Approach*, *supra* note 192, at 297-98.

196. Peter M. Wiedemann et al., *The Impacts of Precautionary Measures and the Disclosure of Scientific Uncertainty on EMF Risk Perception and Trust*, 9 J. RISK RES. 361, 368-69 (2006).

European Commission Regulation 178/2002 is an umbrella of general principles and processes for European Union food and feed law.[197] It establishes an advance informed approval process in which the notifier must also prove the foodstuff's safety before import or marketing.[198] It also establishes a "uniform basis throughout the Community for the use of" the precautionary principle[199] to achieve:

> *[A] high level of protection of human life and health* and the protection of consumers' interests, including fair practices in food trade, taking account of, where appropriate, the protection of animal health and welfare, plant health and the environment.[200]

To achieve the requisite high level of protection, the regulation adopts the following uniform statement of the precautionary principle:

> In specific circumstances where, following an assessment of available information, the possibility of harmful effects on health is identified but scientific uncertainty persists, provisional risk management measures necessary to ensure the high level of health protection chosen in the Community may be adopted, pending further scientific information for a more comprehensive risk assessment.[201]

So European Union GM foodstuffs regulation is doubly precautionary. First, it is "structurally precautionary," because it applies to all GM foodstuffs.[202] Then, it may authorize additional precaution during the approval process.[203] This widely used approach is counterintuitive: if the people have decided on precautionary regulation for a broad class such as novel food approvals, regulators should be able to skip immediately to risk management.[204]

In the European Union, the precautionary principle defies specification and imposes a high cost of regulatory uncertainty on proponents of GM foodstuffs. European courts have held that the evidence necessary to trigger precautionary

197. EC Reg.178/2002, *supra* note 92, art. 1.

198. *See id.* art. 11; EC Dir. 2001/18/EC, *supra* note 119, art. 4(1); EC Reg. 1829/2003, *supra* note 129, art. 16(2).

199. *Id.* pmbl. ¶ 20.

200. *Id.* art. 5(1) (emphasis added).

201. *Id.* art. 7(1).

202. *Structural Precaution*, *supra* note 194, at 455.

203. EC Reg. 1829/2003, *supra* note 129, art. 16(2); *see also* von Schomberg, *supra* note 115, at 147.

204. *Structural Precaution*, *supra* note 194, at 457-59. Case-by-case review does provide a veneer of compliance with the WTA, which supports the conclusion that the process is perception-driven. *Cf. id.* at 468-69; *SPS Agreement*, *supra* note 178, at art. 5(1).

regulation may be low where the public's interest in safety is high.[205] Temporary regulation may not require any evidence of risk![206]

The low or no-threshold rule is powerful. "Safeguard clauses" permit member states to take precautionary measures if information emerges providing reasons to suspect that otherwise approved feed is unsafe[207] or is "likely to constitute a serious risk to human health, animal health or the environment" and cannot otherwise be contained in emergencies.[208] GM-hostile member states can and do use these "temporary" safeguards to impose long-term de facto bans of GM foodstuffs with no scientific justification.[209]

GM food and feed must also comply with technical precautions.[210] European Commission Directive 2001/18 provides environmental safety standards and notification procedures for the release or market placement of all GMOs.[211]

205. *See, e.g.*, Case C-236/01, Monsanto Agricoltura Italie v. Presidenza del Consiglio dei Ministri, 2003 E.C.R. I-8166, ¶ 137 ("The enormous importance of human health as the object of legal protection accordingly lowers the threshold for triggering action by a State or the Community."); *see also* MARCHANT & MOSSMAN, *supra* note 30, at 31-33 (discussing *Monsanto Agricultura Italie* and cases concerning "alleged" or "potential" risks).

206. *Cf., e.g.*, MARCHANT & MOSSMAN, *supra* note 30, at 50-52 (discussing Case C-13/99, Pfizer Animal Health SA v. Council of European Union, 2002 E.C.R. II-3305 (2002) (Ct. of 1st Instance) and Case T-70/99, Alpharma Inc. v. Council of European Union, 2002 E.C.R. II-3495 (Ct. of 1st Instance)); Case C-343/09, Afton Chemical Ltd. v. Sec'y of State for Transp., 2010 E.C.R. I-7027 (Advocate General) ("It must be possible to take protective measures without first carrying out a comprehensive risk assessment in every individual case. The anticipated damage might already have occurred while such an assessment was being carried out."); Fast, *supra* note 137, at 10524-26 (discussing flaws in the *Afton Chemical* reasoning).

207. EC Reg. 178/2002, *supra* note 92, art. 15(5).

208. *Id.* arts. 53(1), 54.

209. CLIVE JAMES, GLOBAL STATUS OF COMMERCIALIZED BIOTECH/GM CROPS 194-95, 201-02 (Int'l Serv. for the Acquisition of Agri-Biotech Apps Brief 43-2011, 2011). The European Commission does not support these "temporary bans" and has fought them with success. *See, e.g.*, Case C-121/07, Comm'n v. France, 2008 E.C.R. 1-09159, ¶ 90 (ordering France to pay €10 million after failing to comply with prior ruling to lift a ban on GM foodstuffs); *Scientific Opinion on a Request from the European Commission Related to the Safeguard Clause Notified by Greece on Genetically Modified Maize MON 810 According to Article 23 of Directive 2001/18/EC*, 10 EFSA J. 2877, at 1, 2 (2012).

210. EC Reg. 1829/2003, *supra* note 129, art. 17(5); EC Dir. 2001/18/EC, *supra* note 119, art. 4(1).

211. *See* EC Dir. 2001/18/EC, *supra* note 119, arts. 4(2), 13. A "genetically modified organism" is "an organism . . . in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination." *Id.* at art. 2(2). Import of GM feed is "placing on the market" or "making available to third parties, whether for payment or free of charge." *Id.* at art. 2(4). In 2015, the European Parliament and Council amended the directive to permit Member States to ban cultivation of GM crops. Directive (EU) 2015/412 of the European Parliament and of the Council of 11 March 2015 Amending Directive 2001/18/EC as Regards to the Possibility for the Member States to Restrict or Prohibit the

European Commission Regulation 1829/2003 applies exclusively to GM food and feed.[212] Safety is the ultimate standard for placing a food or feed on the market.[213]

Regulation 178/2002 mandates that "food law shall be based on risk analysis,"[214] a multi-step process[215] informed by "available scientific evidence."[216] The analysis starts with a scientific risk assessment[217] of a "hazard" in the food or feed "*with the potential to cause an adverse health effect.*"[218] The assessment should "not [] discount any potential adverse effect on the basis that it is unlikely to occur."[219] The estimate of risk from the hazard is "the likelihood of the adverse effect occurring and the magnitude of the consequences if it occurs."[220] Taking into account a proposed risk management strategy, the assessment determines the overall risk of the feed.[221]

The risk assessment outcome rests as much on policy as science.[222] For example, the definition of hazard is having the "potential" to cause harm. "Potential" could mean that the hazard is capable of causing harm but does not always do so.[223] "Potential" could also mean that the hazard's very capability to cause

Cultivation of Genetically Modified Organisms (GMOs) in Their Territory, 2015 O.J. (L 68), 1.

212. EC Reg. 1829/2003, *supra* note 129, art 1(b). The regulation does not apply to products from animals fed with GM feed. *Id.* pmbl. 16,

213. EC Reg. 178/2002, *supra* note 92, arts. 14(1), 15(1). Feed is unsafe "if it is considered to: have an adverse effect on human or animal health; [or] make the food derived from food-producing animals unsafe for human consumption." *Id.* arts. 15(2), 16(1). Feed *is* safe if it complies with regulations of the Member State where it circulates. *Id.* art. 15(4), (6). The same applies to imports. *Id.* art. 11.

214. *Id.* art. 6(1).

215. *Id.* art. 3(10). "Risk analysis" is "a process consisting of thee interconnected components: risk assessment, risk management and risk communication." *Id.*

216. *Id.* art. 6(2).

217. *Id.* art. 3(11) (emphasis added). "Risk assessment" is "a scientifically based process consisting of four steps: hazard identification, hazard characterization, exposure assessment and risk characterization." *Id.*

218. *Id.* art. 3(4).

219. EC Dir. 2001/18/EC, *supra* note 119, Annex II(C)(2)(1) (incorporated into EC Reg. 1829/2003, *supra* note 129, art. 17(5)(a)).

220. EC Dir. 2001/18/EC, *supra* note 119, Annex II(C)(2)(4).

221. *Id.* Annex II(C)(2)(6).

222. *See* Devos et al., *supra* note 140, at 128; Levidow, *supra* note 89, at 842-43; *see also* Eur. Food Safety Auth., *Guidance for Risk Assessment of Food and Feed from Genetically Modified Plants*, 9 EFSA J. 2150, at 7 (2011) [hereinafter *Guidance for Risk Assessment of Food and Feed*].

223. The EFSA's definition uses the words "capable of." *Guidance For Risk Assessment of Food and Feed*, *supra* note 222, at 6.

harm is uncertain.[224] Or it could mean both. The purpose of precaution is to avoid erring on the side of harm when facing uncertainty, so the category of "potential" hazards must include those we may not be sure cause the harm.[225]

On the other hand, uncertainty about the hazard's capability of causing the harm decreases the "likelihood" of the harm, and so risk calculus should account for it.[226] If not, risk assessment magnifies the risk so it is more likely to exceed the public's perception-driven risk tolerance threshold.[227] But the threshold indicates the public's perception-driven decision to tolerate the scientifically determinable risk: the public's perception might have been informed by benefits of non-regulation.[228] Magnifying the risk to exceed the threshold ignores what precautionary principle proponents claim is the public's right to choose.[229]

In theory, risk management should account for costs of regulation and benefits of non-regulation at some point,[230] but European GM foodstuffs regulation decisions appear not to do so.[231] If they did, European Union approval and eventual marketing of a GM foodstuff might not be so far out of reach for most food businesses.[232] The opaque agency-level procedures are full of traps for the unwary: the unsurprising offspring of Europe's "double precautionary" system.[233]

224. *See* Knight v. Kirby Inland Marine, Inc., 482 F.3d 347, 351 (5th Cir. 2007); *infra* text and notes at 95-102, 123-35.

225. *See supra* text and notes at 142-52; Eur. Food Safety Auth., *Guidance on the Environmental Risk Assessment of Genetically Modified Plants*, 8 EFSA J. 1879, at 34-35 (2010) [hereinafter *Guidance on the Environmental Risk Assessment*] ("[A]n ERA is only as good as our state of scientific knowledge at the time it was conducted. Thus . . . ERAs are required to identify areas of uncertainty or risk which relate to areas outside current knowledge and the limited scope of the ERA.").

226. *See supra* text and notes at 142-52; *see also Guidance for Risk Assessment of Food and Feed*, *supra* note 222, at 31.

227. *Cf.* EC Reg. 178/2002, *supra* note 92, art. 3(11) (defining "risk assessment" in part as a "scientifically based process").

228. *See* Joan Costa-Font & Elias Mossialos, *Are Perceptions of 'Risks' and 'Benefits?' of Genetically Modified Food (In)dependent?*, 18 FOOD QUALITY & PREFERENCE 173, 180-81 (2007).

229. *See, e.g.*, von Schomberg, *supra* note 115, at 147-49.

230. *See Communication on the Precautionary Principle*, *supra* note 14, at 19. "Risk management" is the process of "weighing policy alternatives in consultation with interested parties, considering risk assessment and other legitimate factors, and, if need be, selecting appropriate prevention and control options." *Id.*; EC Reg. 178/2002, *supra* note 92, art. 3(11).

231. EUR. ACAD. SCI. ADVISORY COUNCIL, POL'Y REP. 21, PLANTING THE FUTURE: OPPORTUNITIES AND CHALLENGES FOR USING CROP GENETIC IMPROVEMENT TECHNOLOGIES FOR SUSTAINABLE AGRICULTURE 27-28 (2013) [hereinafter PLANTING THE FUTURE]; BAULCOMBE ET AL., *supra* note 186, at 32-33.

232. *See Structural Precaution*, *supra* note 194, at 459-60.

233. *See supra* Part II.B.

Uncertainty regarding receiving approval stifles research, innovation, and competitiveness of domestic producers,[234] so multinationals that can absorb regulatory costs are cornering the market on Europe's high-tech agriculture future.[235] Europeans may think they are protecting sustainable agriculture, but more farmers could stay more comfortably in business if they cultivated GM crops.[236] Even where cultivation is legal, additional regulation gobbles up the profits.[237] European scientists actually worry about the continent's future food security if its GMO regulation does not change.[238]

Regulators are under no pressure to change:[239] European consumers' experiences of GMO regulatory costs and the benefits of non-regulation are that there are none of either. The rich can afford to pay for emerging technology regulation; consumers may neither notice nor care that food is slightly more expensive than it has to be and may or may not wonder why.[240] Farmers "in other places" and Monsanto lose profits[241] but Europeans are content to subsidize domestic agriculture.[242]

The biggest cost to consumers in theory is the *delay* of current benefits of

234. *See Structural Precaution*, *supra* note 194, at 459-64; *see also* PLANTING THE FUTURE, *supra* note 231, at 37-38.

235. PLANTING THE FUTURE, *supra* note 231, at 38; *cf.* BAULCOMBE ET AL., *supra* note 186, at 3 (explaining that some multinational companies have even ceased their research efforts of GM crops in Europe due to the "stringent regulation" and "inefficient approval process").

236. EUROPABIO, APPROVALS OF GMOS IN THE EUROPEAN UNION 20 (2011).

237. Qaim, *supra* note 153, at 683-84 (discussing costs of required co-existence, traceability and labeling regulations).

238. PLANTING THE FUTURE, *supra* note 231, at 37.

239. *See Guidance on the Environmental Risk Assessment*, *supra* note 225, at 10. Benefits are not considered at the risk assessment stage; they are "out of the remit of the EFSA mandate." *Id.* European courts do not demand risk-risk or risk-benefit analyses when reviewing agency action. MARCHANT & MOSSMAN, *supra* note 30, at 52-54; *cf.* EC Reg. 178/2002, *supra* note 92, art. 5; *Communication on the Precautionary Principle*, *supra* note 14, at 19-20 (criticizing cost-benefit analysis for public health regulation).

240. Europeans have no point of reference for comparison. *See* Klaus G. Grunert, *Food Quality and Safety: Consumer Perception and Demand*, 32 EUR. REV. OF AGRIC. ECON. 369, 384-85 (2005). Many citizens of developed countries make food purchase choices based on price but not with precision, "on a general assumption that in this product category, prices are usually so low that it does not matter." *Id.* at 348. Europeans living below the poverty level, however, face "very severe food choice restrictions because of economic constraints." Nicole Darmon et al., *A Cost Constraint Alone Has Adverse Effects on Food Selection and Nutrient Density: An Analysis of Human Diets by Linear Programming*, 132 J. NUTRITION 3764, 3769 (2002).

241. *See, e.g.*, PAARLBERG, *supra* note 166, at 164.

242. EUR. COMM'N DIR.-GEN. FOR COMMUNICATIONS, SPECIAL EUROBAROMETER: EUROPEANS, AGRICULTURE AND THE COMMON AGRICULTURAL POLICY 21-22 (2014).

non-regulation.[243] It is considerable: mere approval of an event takes, on average, four years in the European Union,[244] and while fifty feed events are authorized,[245] seventy-four are on the waiting list.[246] But to the "average Jacques" or "Jeanne" doing the weekly shop, the incremental benefit of GM products delayed on the way to market compared to readily available substitutes is pretty small.[247] GM maize is a lot like non-GM maize: it may be cheaper and healthier, but by how much?[248] And if that changes, Europeans are only a regulatory adjustment away from new law (or so a wealthy society reasons).[249]

"Future benefits" of a thriving GM foodstuffs sector can sound very ephemeral and inapposite to citizens of developed nations.[250] Most tangible benefits of GM foodstuffs do accrue to developing countries, because they get the largest marginal benefit from lower input costs, higher yields, and lower prices.[251] Any investment citizens of developed countries might make in understanding GM foodstuffs seems misplaced.[252] GM foodstuffs might "solve" hunger and malnutrition and European export sales might help less developed countries but not if GM seeds cause an environmental catastrophe.[253]

243. Nelson, *supra* note 118, at 1374.

244. This is twice as long as in the United States. EUROPABIO, *supra* note 236, at 11.

245. *EU Register of Authorised GMOs*, EUR. COMM'N, ec.europa.eu/food/dyna/gm_register/index_en.cfm (last visited Jan. 25, 2016) (8 cotton, 29 maize, 2 microorganisms, 2 oilseed rape, 1 swede-rape, 7 soybean, 1 sugar beet).

246. EUROPABIO , *supra* note 236, at 9. This backlog of unapproved events, many of which are approved elsewhere, means that even non-GM shipments with trace contamination of unapproved events may be turned away at the border and doom many approvals of stacked events. EUROPABIO, FAILURES OF THE EU AUTHORISATION SYSTEM FOR GMOS – CAUSES, IMPACTS AND SOLUTIONS 3 (2013); *see also* A. De Schrijver et al., *Risk Assessment of GM Stacked Events Obtained from Crosses Between GM Events*, 18 TRENDS IN FOOD SCI. & TECH. 101, 101-03 (2006).

247. Nelson, *supra* note 118, at 1373-74; *see also* Qaim, *supra* note 153, at 681.

248. *See, e.g.*, Frewer et al., *supra* note 97, at 1187-88 (discussion of consumer values, monetary, & non-monetary).

249. *See generally* Paarlberg, *Agrobiotechnology*, *supra* note 163, at 166.

250. *E.g.*, EUROPABIO, *supra* note 236, at 20 (competitiveness and innovation); PLANTING THE FUTURE, *supra* note 231, at 29, 35 (inconsistency of sophisticated applications); Miller & Conko, *supra* note 128, at 32-33 (avoiding toxic fungus called *Fusarium*); Thierer, *supra* note 116, at 332 (resilience theory). The "second generation" of GM traits will add more consumer value such as nutrition, but they may not appeal more to citizens of developed nations who already have access to cheap foods with those attributes. PAARLBERG, *supra* note 166, at 653-59.

251. *E.g.*, Paarlberg, *Agrobiotechnology*, *supra* note 163, at 165-68; Qaim, *supra* note 153, at 671 (yield effects due to location).

252. *See* Costa-Font & Mossialos, *supra* note 228, at 179.

253. *See, e.g.*, GEORGE GASKELL ET AL., EUROPEANS AND BIOTECHNOLOGY IN 2010: WINDS OF CHANGE? 135-36 (Dir.-Gen. for Res. Sci. in Soc. & Food, Agric., & Fisheries &

The second precaution in Europe's double precautionary system operates so that European officials never meaningfully consider the one factor that apparently does matter to Europe's public: the affirmative *benefits* of GM foodstuffs.[254] Failure to see benefits is the primary factor influencing Europeans' preference for precautionary GM foodstuffs regulation.[255] People often neglect the probability of negative *outcomes* of risky things which they consider beneficial or good and magnify the risk or negative consequences of risky things they do not.[256] If there is no reward, why risk?

But then a decision model designed to compare the popular risk threshold to scientifically determinable risk should account for scientifically determinable *benefits* of non-regulation in the risk assessment step. Benefits of non-regulation are just risks from a different perspective.[257] Decreasing scientifically determinable risk sometimes mandates less regulation or non-regulation of individual events, even if the risk tolerance threshold is low. So again, precaution inflates risk and renders scientifically determinable risk irrelevant. Perhaps it was anyway: if Europe sees no benefits to GM foodstuffs, its effective risk tolerance threshold must approach zero.

Therefore, even though the Commission's science advisors deny that GM foodstuffs pose health risks and wonder if the uncertainty that may once have justified "rigid, cautious, technology-specific regulation" is past,[258] the European Union maintains strong precautionary regulation.[259] Years ago, the European Union mobilized for "total regulation" of GM foodstuffs.[260] Total regulation is easy: just ban them. And so for all intents and purposes, they did.

V. YOU EAT WHAT YOU ARE: TURKEY'S BIOSAFETY LAW

Turkey has a foot in both the west and the east and also spans both developed and developing nations. Turkey's Biosafety Law regulates as if the nation is European but Turks produce much of their daily bread as though they are Mid-

Biotechnology. No. EUR24537, 2010) [hereinafter EUROBAROMETER 2010].

254. GEORGE GASKELL ET AL., GM FOODS AND THE MISPERCEPTION OF RISK PERCEPTION 22 (2004); EUROBAROMETER 2010, *supra* note 253, at 36, 113.

255. *See* EUROBAROMETER 2010, *supra* note 253, at 19, 22; *see also* Costa-Font & Mossialos, *supra* note 228, at 179.

256. Slovic & Peters, *supra* note 137, at 323; *see* Sunstein, *supra* note 17, at 1040.

257. Sunstein, *supra* note 17, at 1040.

258. PLANTING THE FUTURE, *supra* note 231, at 27.

259. *Id.* at 5, 25, 28-29; *see also, e.g.*, Frédéric Simon, *Anne Glover, Europe's Chief Science Adviser Faces Anti-GMO, Anti-Tech Politics*, GENETIC LITERACY PROJECT (June 3, 2014), http://www.geneticliteracyproject.org/2014/06/03/anne-glover-europes-chief-science-adviser-faces-anti-gmo-anti-tech-politics/.

260. *See generally* PLANTING THE FUTURE, *supra* note 231.

dle Eastern.[261] They need GM feed regulation which will inject new life in the animal husbandry sector, resolve nutrition deficits, and help stabilize the East.[262] The Biosafety Law fits Turkey like a borrowed suit, and it will take a democratization growth experience for Turkish for the tailor to come calling.

A. Turkey's Biosafety Law

Turkey regulates the import of GM animal feed via the 2010 Biosafety Law, which imposes an advance informed agreement process prior to shipment, and two additional regulations, which provide details of the approval process as well as procedures and standards for use at the point of entry.[263] The Law also creates a "Biosafety Board" chosen by multiple government ministries.[264] The Board evaluates and either approves or denies applications[265] based on reports from scientific committees of experts.[266]

Turkey's Biosafety Law and its regulations are stricter than the European Union's.[267] The law bans "[p]roducing genetically modified plants and animals"

261. *Compare Communication to the European Parliament and the Council on the European Innovation Partnership Agricultural Productivity and Sustainability*, at 5, COM (2000) 79 final (Feb. 29, 2012) (agriculture accounts for 3.5 percent of GVA and 7.6 percent of employment in the EU-27), *with* STRUCTURAL CHANGES, *supra* note 1, at 15 (in 2011, 8.1 percent of Turkey's GDP and 23.2 percent of employment were in agriculture), *and* Jomana Jihad Qaddour, *Syria, Agriculture and the World: A Country Study on the Role of International Trade and the Agriculture Sector in the Syrian Arab Republic* 2 (CITA Working Paper No. 3-2011) (in the mid-2000s, 25 percent of Syrian output was in agriculture-related sectors and 30 percent of employment was in agriculture), *and* Aida Ariabod & Hamed Ghasemi Tabasi, *The Role of Agriculture in Iran's Economic Development*, 4 ARCHIVES OF APPLIED SCI. RES. 2365 (2012) (in the mid-2000s, 16 percent of Iranian GNP and 22 percent of employment were in agriculture).

262. *See infra* Part VI.

263. Biosafety Law, *supra* note 3, art. 5. *See generally* Mehmet Artemel, *Turkish Legislation on GMOs and the Biosafety Council Takes Effect*, J. INTELL. PROP. L. & PRAC. (Jan. 20, 2011), http://jiplp.blogspot.com/2011/01/turkish-legislation-on-gmos-and.html.

264. Biosafety Law, *supra* note 3, art. 9(2). It must include two "representatives of universities" and one representative of "professional organizations," *Id.*, but public employees dominate the Board. Yasemin Erkut, *2013 Turkey Agricultural Biotechnology Annual*, GAIN REP. (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), July, 16, 2013, at 2 [*Turkey Biotechnology Annual 2013*].

265. Biosafety Law, *supra* note 3, art. 9(1), 11(ç).

266. *Id.* art. 12.

267. *Turkey Biotechnology Annual 2013*, *supra* note 264, at 6. The European Union permits cultivation of GM crops, *see, e.g.*, EC Reg. 178/2001, *supra* note 92, Annex IIIB(F)(5), but Turkey does not. Yasemin Erkut, *2012 Turkey Agricultural Biotechnology Annual*, GAIN REP. (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), July 13, 2012, at 2 [hereinafter *Turkey Biotechnology Annual 2012]*.

in Turkey.[268] Any product containing more than the Ministry of Food, Agriculture and Livestock's (MINFAL) 0.9 percent GMO threshold level must bear a label.[269] To ensure traceability, importers must maintain records for twenty years.[270] The Board has a low-level presence threshold (0.1 percent) for unapproved events in imported feed material.[271]

The Turkish GMO approval process tracks the European Union's. Applicants bear the burden of proving product safety and must submit thick dossiers of information to support the risk analysis process,[272] including a scientific risk assessment,[273] a socio-economic evaluation[274] and risk management plan.[275] Regulators must reject an application if:

(a) It threatens human, animal or plant health, the environment and biological diversity.

(b) It undermines the freedom of choice of the producers and consumers.

(c) It disrupts the ecological equilibrium of the environment and of the ecosystem.

(d) If there is a risk of GMO propagating itself or its characteristics in the environment.

(e) It endangers the sustainability of biological diversity.

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268. Biosafety Law, *supra* note 3, art. 5(1)(c).

269. *Id.* art. 7(4); *Turkey Biotechnology Annual 2012*, *supra* note 267, at 5. The government has also announced but not implemented a labeling scheme for animal products fed with GM feed. *GMO Labels for Products Coming*, HURRIYET DAILY NEWS (Apr. 18, 2012), http://www.hurriyetdailynews.com/gmo-labels-for-products-coming.aspx?pageID=238&nID=18685&NewsCatID=373.

270. Biosafety Law, *supra* note 3, art. 7(3).

271. *Turkey Biotechnology Annual 2012*, *supra* note 267, at 5-6.

272. Biosafety Law, *supra* note 3, arts. 3(1)-(2), 4 (requiring applicants to pay for evaluations).

273. *Id.* art. 4(2). "Risk assessment" means "[t]he four stage process of identification, determinations of attributes, identification of risk elements, and evaluation through scientific methods such as tests, analyses and trials of risks or risk sources that GMOs and products thereof may pose to animal, human and plant health, biological diversity and the environment." *Id.* art. 2(ü).

274. *Id.* art. 4(3). A "socio-economic evaluation" is an "[e]valuation and studies (evaluated before the decision made on the application) that are based on science to find out the effects and socio-economic cost that are related to the environmental release of GMO and products thereof to biodiversity, to the user and the to the farmer." *Id.* art. 2(z).

275. *Id.* art. 4(4). "Risk management" is "[t]he process of assessing, choosing and implementing suitable alternative prevention and control options in consultation with interested parties, considering risk assessment and other legal factors to ensure that the GMOs and products thereof are used and handled in accordance with the purposes and rules established on the basis of risk assessment results." *Id.* art. 2(y). The applicant must also implement the plan. *Id.* art. 4(4).

(f) If applicant does not have sufficient technical capacity to implement the measures to ensure biosafety.[276]

Turkey is a chaotic biosafety regulator. Until 2009, it did not specifically regulate the import of transgenic food or feed at all.[277] That year Turkey promulgated a regulation for immediate implementation,[278] which the Council of State overturned and then reinstated in less than a year.[279] Regulators amended it numerous times; it even provoked a feed price spike before the Biosafety Law and its accompanying regulations superseded it a year later.[280]

The post-Biosafety Law upheaval was a nightmare for Turkish feed producers. Anticipating hoarding and price instability, regulators pushed three soybean events through a "simplified" approval procedure before the law took effect,[281] but criminal penalties for non-compliance with ambiguous provisions frightened even Monsanto away.[282] Just to stay in business, the Turkish Feed Millers Association had to submit the applications for the three European Union-approved soybean events from information available online.[283]

Then, within months after the law took effect, the Biosafety Board canceled all but three new GMO approvals, and feed producers ran low on corn and soy ingredients.[284] Domestic farmers could not keep up with the demand.[285] Hoard-

276. *Id.* art. 3(5).

277. Rachel Nelson, *New Turkish Regulation Blocks Imports of Biotech Food and Feed*, GAIN REP. TU9042 (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), Oct. 28, 2009, at 2.

278. *See* Ibrahim Sirtioğlu, *Turkey Oilseeds and Products Update*, GAIN REP. (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), Sept. 30, 2010, at 2 [hereinafter *Turkey Oilseeds and Products Update 2010*]. For an unofficial translation of the original version of the regulation, *see* Nelson, *supra* note 277. For an unofficial translation of the regulation as of July 2010, *see* Yasemin Erkut, *Turkey Biotechnology Report 2010*, GAIN REP. (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), July 15, 2010, at 7 [hereinafter *Turkey Biotechnology Report 2010*].

279. In essence, the Council of State first held that the government lacked the power to promulgate the regulation in the absence of legislation enacted by the Turkish Parliament, but then reversed itself on appeal. *Turkey Biotechnology Report 2010*, *supra* note 278, at 6.

280. *See id.* at 4.

281. *Turkey Biotechnology Annual 2012*, *supra* note 267, at 3.

282. *See id*; Biosafety Law, *supra* note 3, arts. 14, 15.

283. *Turkey Biotechnology Annual 2012*, *supra* note 267, at 3.

284. Anatolia News Agency, *Animal Food Producers Might Suffer Due to Bio-Safety Law*, HURRIYET DAILY NEWS (Dec. 12, 2010, 12:00), http://www.hurriyetdailynews.com/default.aspx?pageid=438&n=animal-food-producers-might-suffer-due-to-bio-safety-law-2010-12-12.

285. *Id.*; BROOKES, *supra* note 4, at 38-39, 43-44; *Turkey Biotechnology Report 2010*, *supra* note 278, at 4.

ing disrupted supply lines.[286] The Turkish Feed Millers Association still submits applications itself; no exporting company will do so.[287] The Board's socio-economic reports sometimes recommend that any products from animals fed from GM feed should be labeled[288]–and that events should be approved for shorter periods than the law prescribes in order to meet immediate needs without a long-term commitment.[289] As recently as 2013, the Biosafety Board was punitively revoking approvals with no notice.[290]

Chaos is one thing; implementation of regulations so arbitrary it chills trade is something else.[291] In Turkey, port officials receive the internal directives which explain how to interpret regulations, but importers and exporters do not.[292] New regulations and procedures come out of nowhere; Turkish officials may not understand them; governments may have to vouch for individual exporters' products; testing methodologies to ensure compliance may not exist; offending shipments en route are not grandfathered; then overnight, the frustrating regulations disappear and something new takes their place.[293] During the 2009-2010 transitional period, confusion was so rife that local importers took significant financial hits.[294] Delays unloading products due to testing and customs clearance

286. *See* BROOKES, *supra* note 4, at 36-37.

287. *See Turkey Biotechnology Annual 2012*, *supra* note 267, at 3. Recently, the Turkish Poultry Meat Producers and Breeders Association submitted dossiers for approval of thirty-eight traits for feed use. Nergiz Ozbag, *Association Submits Applications for 38 Biotech Traits*, GAIN REP. NO. TR5027 (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), June 5, 2015, at 2.

288. Turkish law does not yet require this. Biosafety Law, *supra* note 3, art. 7(4).

289. *See* Samet Serttas, *Turkey Grain and Feed Annual 2012*, GAIN REP. (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), May 11, 2012, at 24 [hereinafter *Turkey Grain and Feed Annual 2012*].

290. *See* Hacer Boyacioğlu, *Biosecurity Board Suspends Entry of 26 GMOs to Turkey*, HURRIYET DAILY NEWS (April 27, 2013), http://www.hurriyetdailynews.com/biosecurity-board-suspends-entry-of-26-gmos-to-turkey.aspx?pageID=238&nID=45743&NewsCatID=341.

291. *See, e.g.*, FOREIGN MARKET ACCESS REPORT, *supra* note 5, at 7-8 (concerning experience of Chinese exporters to Turkey).

292. *Turkey Biotechnology Report 2010*, *supra* note 278, at 3; *see, e.g.*, Jess Paulson, *Exports to Turkey Disrupted by New Biotech Enzyme Requirement*, GAIN REP. No. TR40406, (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), Nov. 24, 2014, at 2.

293. For example, many nations' exporters were blindsided by an October 2014 requirement that their governments attest that products using enzymes or microorganisms are free from genetically engineered enzymes or organisms that Turkish officials could not even explain and for which no testing methodology exists. Paulson, *supra* note 292. Turkey then rescinded part of the requirement six months later. *See* Jess Paulson, *Turkey Stops Requiring Biotech-Free Enzyme Certificate*, GAIN REP. NO. TR5020 (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), May 11, 2015, at 2.

294. *Id.*

cost importers forty-seven million dollars for 2010-11.[295] These problems have not been meaningfully resolved.

The most costly and, for importers, scary disruptions of the Turkish feed supply have arisen from the no-tolerance rules for food and low-tolerance rules for feed for any unapproved events.[296] Turkey does not permit applications to approve events without prior approval in the country of production.[297] It is therefore almost impossible for exporters from GM-friendly countries to avoid trace amounts of unapproved events from turning up in their other feed products when they arrive at Turkish ports.[298] If shipments inadvertently exceed the tolerance threshold and are turned away, the Turkish feed supply chain is disrupted and feed prices increase.[299]

Violators may also face criminal charges with up to twelve-year prison sentences, and the law sweeps both broadly and ambiguously in defining a violator.[300] Importers are definitely on the hook, because Turkey enforces the law; businesspeople get arrested; and so far 150 individuals and companies have ended up in major court cases on frightening-sounding charges such as "biological terror."[301] Exporters are taking few chances[302]: the law has chilled even non-GM

295. BROOKES, *supra* note 4, at 38.

296. *See Turkey Biotechnology Annual 2013*, *supra* note 264, at 5. The Global Agriculture Information Network of the USDA interprets "unapproved events" to be events for which applications have been submitted in Turkey but no decision has been made; if this interpretation is correct, it would certainly chill making applications. *See id.* at 4.

297. Biosafety Law, *supra* note 3, art. 3(8); *see also* Peter Nowicki, et al., *Introduction*, *in* STUDY ON THE IMPLICATIONS OF ASYNCHRONOUS GMO APPROVALS FOR EU IMPORTS OF ANIMAL FEED PRODUCTS 11, 11 (Peter Nowicki ed. 2010).

298. *See* Fratini Vergano, *Turkey's 0% Tolerance Threshold for Imports of Food and Feed of GMO Content is Raising Concerns within International Business Community*, TRADE PERSPECTIVES, Dec. 2, 2011, at 6, 6, http://fratinivergano.eu/tradeperspectives2011/issueNo.22.pdf; *see also* Biosafety Law, *supra* note 3, art. 3(8) (assigning to MINFAL the duty and authority to set "threshold values for GMOs and products . . . by taking the Board's decision into consideration"); ROEL JONGENEEL ET AL., EFFECTS OF ASYNCHRONOUS GMO APPROVAL – GENERAL ANALYTICAL FRAMEWORK 30 (2010).

299. *See* Fratini Vergano, *supra* note 298; Peter Nowicki, *Conclusions of the Study*, *in* STUDY ON THE IMPLICATIONS OF ASYNCHRONOUS GMO APPROVALS FOR EU IMPORTS OF ANIMAL FEED PRODUCTS 140, 143, 145 (2010).

300. Biosafety Law, *supra* note 3, art. 15 (mandating prison sentences of five to twelve years for "those who import, produce and release genetically modified plants or animals into the environment, contrary to the rule of this law" and mandating prison sentences of three to seven years and judicial fines of up to five thousand days for "those who import or process . . . put on the market, sell, and hand over for the purposes in areas other than the ones indicated on the import permit or buy for trading purposes, accept, transport or hold by knowing this attributes of products.").

301. *See Turkey Biotechnology Annual 2015*, *supra* note 4, at 9. In April 2013, customs

exports from countries that have approved events Turkey has not, as well as jacked up feed and feed ingredient prices in Turkey.[303]

On May 29, 2014, the government responded to American entreaties with a regulation establishing a 0.9 percent threshold for unintended and unapproved traits; products at and below the threshold may be considered "contaminated."[304] The regulation does not clarify whether feed containing unapproved traits below the contamination threshold but above the low tolerance threshold can be marketed in Turkey.[305] Will the new regulation put GM foods on every dinner table in Turkey, as anti-GM activists say, or will it just protect conscientious importers from prosecution, as the government says?[306] For now, consumer and industry groups plan to challenge the regulation in court.[307]

officials arrested several Turkish food company executives after claiming they had detected trace GMOs in 21,000 tons of American rice at the border, even though the United States does not produce GM rice nor is it traded in the international market. Rich Keller, *Turkey Arrests Rice Importers Claiming GMOs*, AG PROFESSIONAL (Apr. 12, 2013, 8:54 EDT), http://www.agprofessional.com/news/Turkey-arrests-rice-importers-claiming-GMOs-202687831.html. Scientists at Istanbul Technical University later stated that the test results were invalid. *Test on GMO Rice Inadequate and "Technically Invalid," University Says*, HURRIYET DAILY NEWS (May 8, 2013), http://www.hurriyetdailynews.com/test-on-gmo-rice-inadequate-and-technically-invalid-university-says.aspx?pageID=238&nID=46522&NewsCatID=341 [hereinafter *Test on GMO Rice Inadequate*].

302. *See Turkey Biotechnology Annual 2015*, *supra* note 4, at 9; *Turkey Biotechnology Annual 2013*, *supra* note 264, at 3.

303. Turkey tests every American wheat shipment. Samet Serttas, *2014 Turkey Grain and Feed Update*, GAIN REP. NO. TR4003 (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), Jan. 30, 2014, at 1, 7. Not coincidentally, the USDA has predicted Americans will stop exporting wheat to Turkey. *Id.* at 7.

304. Nergiz Ozbag, *2014 Turkey Agricultural Biotechnology Annual*, GAIN REP. NO. TR4024, (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), July 15, 2014, at 4 [hereinafter *Turkey Biotechnology Annual 2014*].

305. *Id.* at 8.

306. *Compare Regulation Change Signals Allowing GM Foods, Gov't Denies It*, TODAY'S ZAMAN (May 29, 2014, 18:32:22), http://www.todayszaman.com/news-349101-regulation-change-signals-allowing-gm-foods-govt-denies-it.html [hereinafter *Regulation Change*] (quoting activists and reporting that "the amendment is equivalent to allowing the sale and production of GM foods"), *with* Hacer Boyacioğlu, *Allowance for GMO-Contaminated Food Sparks Safety Concerns*, HURRIYET DAILY NEWS (May 30, 2014), http://www.hurriyetdailynews.com/ allowance-for-gmo-contaminated-food-sparks-safety-concerns.aspx?pageID=238&nID=67171&NewsCatID=373 (quoting government officials).

307. *Regulation Change*, *supra* note 306. The precautionary principle does provide support for the antagonists' argument, because the threshold may not be based on science if the threshold is simply equivalent to Turkey's labeling threshold. *See Turkey Biotechnology Annual 2014*, *supra* note 304, at 7. On the other hand, as long as the products will not enter Turkey, precaution is not indicated. MINFAL has the discretion to take precautionary measures

The ambiguities are more than confusing or lacking transparency: the Biosafety Law invites arbitrary enforcement. The law extends to this breathtaking invitation to MINFAL:

> With a view to protecting human, animal plant health, the environment and biological diversity the Ministry is authorized [to] *adopt precautionary measures and all sorts of dispositions* regarding the products coming under the present Law such as total or partial recall, expropriation, returning the product to its origin, temporary suspension of the activities, disposal of the product, prohibition of supply to the market, trade and processing.[308]

The predictable result: in late 2014, Turkey rejected several shipments of distiller's dried grains with soluble, an energy and protein supplement for animal feed, after detecting unapproved GM events.[309] One market disruption led to another and another: a shipment bypassed Turkey for an alternate buyer, and the U.S. Grains Council notified members that Turks would likely reject other shipments.[310] The U.S. Grains Council believes Turkish companies that do not import DDGS are jockeying for a market advantage over those that do,[311] precisely the sort of market manipulation that broad regulation demanding enforcement discretion almost inevitably produces.[312] Again, American industry leaders and government officials are working to reopen Turkish ports to an American product.[313]

The impetus for arbitrary enforcement may sometimes go beyond invitation as well. Customs is considered to be among the most corrupt public services in Turkey,[314] and government ministers have already interfered on behalf of food company executives arrested for violating Turkey's zero-tolerance policy for unapproved traits.[315] University scientists, notably absent from the public discus-

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to keep GM foodstuffs out of Turkey and set its own thresholds for that purpose. *See, e.g.*, Biosafety Law, *supra* note 3, art. 8(1)(h)(4).

308. Biosafety Law, *supra* note 3, art. 8(1)(h)(4).

309. *Turkey's Biosafety Laws Restrict U.S. DDGS Shipments*, *supra* note 6.

310. *Id.*

311. *Id.*

312. *See, e.g.*, CAMPBELL R. MCCONNELL ET AL., ECONOMICS: PRINCIPLES, PROBLEMS AND POLICIES 852 (20th ed., 2015); MURRAY L. WEIDENBAUM, BUSINESS, GOVERNMENT, AND THE PUBLIC 306 (4th ed. 1990).

313. *Turkey's Biosafety Laws Restrict U.S. DDGS Shipments*, *supra* note 6.

314. Muhittin Acar & Uğur Emek, *Building a Clean Government in Turkey: Pillars, Perils and Prospects*, 49 CRIME L. SOC. CHANGE 185, 186 (2008).

315. Government ministers allegedly intervened on behalf of the importers with the court and came under fire for possible corruption and other misuse of power. *Wiretap Reveals Ministers' Attempts to Cover Up GMO Investigation*, TODAY'S ZAMAN (July 31, 2013, 18:21:00), http://www.todayszaman.com/national_wiretap-reveals-ministers-attempts-to-cover-up-gmo-

sion about GM foodstuffs, have begun to criticize regulators' tests and methods.[316]

As closed as Turkey may have appeared to GM feed products, the Turkish Council of State has made it more so based on the precautionary principle. In late 2011, the Republic of Turkey Council of State[317] temporarily halted importation of GM products,[318] because the government did not order a complete ban on antibiotic resistance genes pursuant to the precautionary principle.[319] In December 2013, the Council of State cited failure to apply the precautionary principle when it cancelled import of two Monsanto corn varieties for GM feed,[320] though

investigation_322420.html [hereinafter *Wiretap Reveals*]; *Three Ministers Allegedly Attempt to Cover up GMO Rice Scandal*, TODAY'S ZAMAN (July 30, 2013, 17:59:00), http://www.todayszaman.com/news-322309-3-ministers-allegedly-attempt-to-cover-up-gmo-rice-scandal.html. According to a Greenpeace representative, the investigation began not as a result of routine testing but an anonymous tip. *Minister Says No Risk as 7 Arrested in Rice Investigation*, TODAY'S ZAMAN (Apr. 10, 2013, 17:43:00), http://www.todayszaman.com/business_minister-says-no-risk-as-7-arrested-in-rice-investigation_312280.html. The episode eventually merged into a larger illegal wiretapping and smuggling scandal. *See 22 Detainees Referred to Court for Arrest in Mersin-Based Operation*, TODAY'S ZAMAN (June 4, 2015, 18:04:12), http://www.todayszaman.com/anasayfa_22-detainees-referred-to-court-for-arrest-in-mersin-based-operation_383192.html. That in this case both or either of the intervention or investigation may have been justified only underscores the challenges the Turkish GMO import regulatory system faces. *Test on GMO Rice Inadequate*, *supra* note 301. Then, in March 2015, Turkish police arrested *Tarif* newspaper journalist Mehmet Baransu related to articles he wrote that brought the cover-up to light. Burak Çan, *Coup Trial Launched into Arrested Journalist Baransu's Reports on GM Rice*, TODAY'S ZAMAN (Oct. 5, 2015, 18:01:54), http://www.todayszaman.com/national_coup-trial-launched-into-arrested-journalist-baransus-reports-on-gm-rice_400688.html. A month before the November 2015 elections, prosecutors brought charges against Baransu for attempting to launch a coup against the government. *Id.*

316. *E.g.*, *Turkish Biosafety Laws Must Align with EU, Professors Say*, WATTAGNET.COM (Apr. 29, 2014), http://www.wattagnet.com/Turkish_biosafety_laws_must_align_with_EU__professors_say.html (citing problems accessing animal feed specifically); *Test on GMO Rice Inadequate*, *supra* note 301.

317. The Council of State is the highest Turkish judicial body for review of administrative decisions.

318. *Turkey to Temporarily Halt GMO Food Imports*, WORLDBULLETIN.NET (Feb. 7, 2012, 16:20), http://www.world bulletin.net/haber/85479/turkey-to-temporarily-halt-gmo-food-imports.

319. According to the Council of State, the government violated the Turkish Constitution and Cartagena Protocol on Biosafety to the Convention on Biological Diversity. *Turkey Amended Regulation on Genetically Modified Organisms ("GMOs") for Antibiotic Resistance Genes ("ARG")*, SONGÜL & ÜNÜVAR (Mar. 13, 2012), http://www.songul.av.tr/?news=turkey-amended-the-communique-on-gmos-for-antibiotic-resistance-genes.

320. *Turkish State Council Cancels Import*, *supra* note 12.

it later reversed itself as to one.[321] Anti-GM activist groups called the decision "the end of the road regarding GMOs" in Turkey,[322] but Turkish feed millers have not surrendered yet.[323]

B. You Eat What You Are: The Turkish National Experience and GM Foodstuff Regulation

Turkey is the most hostile of all European countries to GM foodstuffs and perhaps the most ill-informed. Crafting a regulatory scheme that maximizes the benefits of GM feed without offending Turks' tolerance for risk would be a growth experience in democratization. But instead, Turkey is implementing European policy, not a truly Turkish policy developed with intent by Turks, whose capacity to forego benefits is much more limited than that of their neighbors to the west.[324]

1. Turks' Attitudes to Genetically Modified Foodstuffs: Risks, Costs and Benefits

The European Commission's 2010 Eurobarometer survey of Europeans' attitudes to biotechnology applications revealed that Turks were the most hostile to GM foodstuffs: a mere 6.8 percent indicated any support for GM foods whatsoever.[325] Turks were also among the most dubious about GM foods' safety. Truth: Turks simply do not like anything about GM foods. They consider GM foods unsafe,[326] "un-Islamic,"[327] and unnatural.[328]

321. *Turkey's High Court Reverses Decision*, *supra* note 2, at 2.

322. *Id.* (quoting Greenpeace Mediterranean Food and Agricultural Campaign Leader Tarik Nejat Dinç).

323. Nergiz Ozbag, *Biosafety Board Publishes List of Biotech Applications*, GAIN REP. NO. TR5030 (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), June 16, 2015, at 2.

324. Eva Dobos & Artemis Karaali, *Capacity Building in Agricultural Biotechnology in Turkey*, 19 FOOD REV INT'L 437, 440 (2003); Erbaş, *supra* note 28, at 5; *see also* Cohen & Paarlberg, *supra* note 159, at 4 ("Only where affluent or cosmopolitan communities in developing countries enjoy close cultural or institutional ties to Europe . . . have food safety fears linked to GM become a serious political issue in the developing world.").

325. EUROBAROMETER 2010, *supra* note 253, at 40.

326. *Id.* at 135-36 (more than sixty percent).

327. *Genetically Modified Corn Regulation Sows Seeds of Discontent*, TODAY'S ZAMAN (Jan. 15, 2012, 11:20:00), http://www.todayszaman.com/news-268587-genetically-modified-corn-regulation-sows-seeds-of-discontent.html; *see also* Latifah Amin & Jamaluddin Md. Jahi, *Ethical Aspects of Genetically Modified Organisms Release into the Environment*, 5 MALAYSIAN J. ENVTL. MGMT. 99, 104-06 (2004).

328. EUROBAROMETER 2010, *supra* note 253, at 135. *Cf.* Lennart Sjöberg, *Factors in Risk Perception*, 20 RISK ANAL. 1, 5 (2000) ("unnaturalism" increasingly important reason to op-

Turks endured their own food scares in the 1990s and 2000s and observed their neighbors'.[329] Sensationalized media coverage provided vivid images and questionable information about food safety.[330] They increased Turks' anxiety about food quality[331] and crowded out long-standing, serious public health risks such as inadequate meat and milk consumption.[332]

Turks are in denial about the benefits of GM foodstuffs.[333] By astonishingly large numbers, they do not believe GM foodstuffs are good for the Turkish economy, competitiveness, farmers' profits, or rural conditions.[334] They do not support further development.[335] Essentially almost no Turks perceive benefits to developing countries from GMOs, a devastating indictment.[336]

Nor does the cost of precautionary GM foodstuffs regulation seem to appear on Turks' radar screens.[337] Import regulations of GM feed have raised food prices, depressed nutritional intake, and exacerbated chronic public health risks.[338] They have cost jobs and pushed some farmers into bankruptcy.[339] These

pose GM foodstuffs).

329. *See* Knowles & Moody, *supra* note 192, at 55-57; Sayed H. Saghaian et al., *Dynamics of Price Transmission in the Presence of a Major Food Safety Shock: Impact of H5N1 Avian Influenza on the Turkish Poultry Sector*, 40 J. AGRIC. & APPLIED ECON. 1015, 1016-19 (2008).

330. Basaran et al., *supra* note 48, at 26; Bulent Miran & Sedef Akgungor, *The Effect of Mad Cow (BSE) Scare on Beef Demand and Sales Loss, The Case of Izmir*, 29 TURK. J. VET. ANIM. SCI. 225, 226 (2005).

331. Z.K. Bektas et al., *Consumer Awareness for Food Safety in Turkey*, 17 BULGARIAN J. AGRIC. SCI. 470, 470-71, 475 (2011); Miran & Akgungor, *supra* note 330, at 229; *see also* Frewer et al., *supra* note 97, at 1189 (distrust of GM in UK due lack of control over exposure).

332. See Sevgi Ineci, *Qualitative Aspects of the Turkish Experience on the Adaptation of Agricultural and Agro-Industrial Acquis*, *in* THE DESIGN OF A ROAD MAP FOR AGRICULTURAL LIBERALIZATION IN THE EURO-MEDITERRANEAN REGION: THE NEED FOR PRIORITISATION 41, 51-52 (2007). People tend to focus attention on familiar risks rather than those most likely to cause harm. Sunstein, *supra* note 17, at 1041-44.

333. *Cf.* Nesibe Hicret Soy, *Unions Warn Customers of Unhealthy Produce in Markets*, TODAY'S ZAMAN (Apr. 29, 2014), www.todayszaman.com/news-346489-unions-warn-customers-of-unhealthy-produce-in-markets.html (noting Turkish produce exports were being returned for containing too much pesticide residue).

334. *See* EUROBAROMETER 2010, *supra* note 253, at 134-36; Özdemir Oğuz, *Attitudes of Consumers Toward the Effects of Genetically Modified Organisms, GMO: The Example of Turkey*, 7 J. FOOD, AGRIC. & ENV'T 160, 162 (2009).

335. *See* EUROBAROMETER 2010, *supra* note 253, at 134-36; Oğuz, *supra* note 334, at 162.

336. Only 10.9 percent totally agreed. EUROBAROMETER 2010, *supra* note 253, at 134-36; *see also* Oğuz, *supra* note 334, at 162.

337. *See, e.g.*, Maden, *supra* note 82.

338. *See infra* Part VI.B.

339. *See, e.g.*, Maden, *supra* note 82.

costs are most profound for low- and middle-income families.[340] Unlike Europeans, Turks cannot simply absorb these costs.[341]

Instead, Turks perceive risks from GM foodstuffs that dwarf those of their European neighbors.[342] Along with their resounding rejection of GM foodstuffs' safety as food, huge numbers also believe GM food is harmful to the environment.[343] They fear damage to Turkey's exceptional biodiversity if scientists are wrong about safety.[344] Turks' extreme perceptions have probably undermined their capacity to perceive benefits from GM foodstuffs.[345]

Turks do perceive socio-economic risks from GM food production similar to those of other developing countries.[346] "All" agree that Turkey cannot afford to lose its European export markets[347] and must protect its labor-intensive organic foods sector that provides a livelihood for otherwise unemployable farm workers.[348] Turkey probably lacks the regulatory and industrial capacity to implement the sophisticated coexistence programs to maintain their non-GM products' purity and comply with European labeling requirements.[349]

340. *See* Gamze Aydin & Osman Kiliç, *Factors Affecting Consumers' Awareness of Food Safety: A Case Study in the Urban Area of Samsun Province in Turkey*, 8 RES. J. APPLIED SCI. 330, 333 (2013); Îsmail Şentürk, *Willingness to Pay for Genetically Modified Foods in Turkey: An Ordered Probit Analysis*, 8 EMPIRICAL ECON. LETTERS 431, 437 (2009).

341. *See* Miller & Conko, *supra* note 128, at 28.

342. *See* EUROBAROMETER 2010, *supra* note 253, at 134−36.

343. *Id.* at 136.

344. *See, e.g.*, Baran & Yılmaz, *supra* note 33, at 57.

345. *See generally* Slovic & Peters, *supra* note 137, at 323.

346. *See, e.g.*, Oğuz, *supra* note 334, at 163 (economic dependency); Basaran et al., *supra* note 48, at 27 (noting countries fear of becoming GMO test sites); Erbaş, *supra* note 28, at 13 (exploitation by multinationals); Giuseppe A. Veltri & Ahmet K. Suerdem, *Worldviews and Discursive Construction of GMO-Related Risk Perceptions in Turkey*, 22 PUB. UNDERSTANDING OF SCI. 137, 149-50 (viability of small farmers, erosion of cultural and ethical values).

347. Cohen & Paarlberg, *supra* note 159, at 5. *But see* Mauro Vigani, The Political Economy of Food Standards: GMOs Regulation and Trade 80, 97-98, 100-01, 133 (Academic year 2009/2010) (on file with Universita Degli Studi Di Milano).

348. *See* Özertan & Aerni, *supra* note 9, at 559.

349. *See, e.g.*, Margaret Rosso Grossman, *The Coexistence of GM and Other Crops in the European Union*, 16 KAN. J.L. & PUB. POL'Y 324, 370-90 (2007) (describing coexistence regulations from EU countries). *But see* Gemma Masip et al., *Paradoxical EU Agricultural Policies on Genetically Engineered Crops*, 18 TRENDS IN PLANT SCI. 312, 317 (2013) ("[T]he practical effect of [European coexistence policies] has been to allow member states to impose arbitrarily large minimum distances between conventional and GE crops so that GE agriculture is effectively prevented unless farmers agree to surround their crops with large areas of uncultivated land or risk litigation from surrounding farms."). *See generally* Justo Corti Varela, *Coexistence of Genetically Modified, Conventional and Organic Products in the European Market: State of the Art Report*, 1 EUR. J. RISK REG. 63 (2010). Coexistence pro-

Turkish leaders know Turks are in denial over the benefits of GM foodstuffs, especially as to the impact on Turkey's economy and economic development.[350] They accommodate some liberalization,[351] but the demand for regulation is too high to ignore.[352] That demand may be overstated.[353] Someone is buying GM foods in Turkey–or thinks she is–because sources say so,[354] and in general Turkish households are very price-sensitive when choosing products on store shelves.[355] But Turks do not see the benefits of more targeted regulation today and for the long term, better conditions for self-governance if they want to make changes.

2. Calling All Citizen-Stakeholders!

A more nuanced GM foodstuffs policy would face many hurdles on the way to implementation. Turkey lacks the "open, informed and democratic" regulatory process involving all "potentially affected parties" that precautionary principle proponents admire.[356] Not only are Turks uninformed about the potential of

grams would rely for success on extensive recordkeeping by the eighteen percent of Turkish farm workers who are illiterate, *see* WIBBERLEY & TURNER, *supra* note 78, at 24, as well as official monitoring of technical requirements that medium-income countries are less able to afford. Mauro Vigani, *GMO Standards, Endogenous Policy and the Market for Information*, *in* 306/2012 LICOS CENTRE FOR INSTITUTIONS AND ECONOMIC PERFORMANCE 7, 97 (2012).

350. *See* Veltri & Suerdem, *supra* note 346, at 149−50 (neo-Islamists and neo-liberals view GMOs as "a controversial issue that represents major economic benefits but also some risks" that can be mitigated with regulation).

351. For example, Turkey's new contamination regulation seems to have been an effort to accommodate American GM foodstuffs exporters' concerns about criminal prosecution. *See* Boyacioğlu, *supra* note 306 (quoting government officials); Fratini Vergano, *supra* note 298, at 8.

352. Demand for risk mitigation is a function of expected consequences, not probabilities. SJÖBERG ET AL., *supra* note 103, at 27.

353. Food from animals raised on GM feed need not be labeled in the European Union. *See* EC Reg. 1829/2003, *supra* note 129, pmbl. 16.

354. *E.g.*, Aydin & Kiliç, *supra* note 340, at 333 (twenty-seven percent of study subjects would purchase GM foods if cheaper). The number could be quite large. Apparently there is a "Bradley Effect" associated with GM foods. A recent major study shows that European consumers may tell researchers in surveys that they will not purchase GM foods, but they actually do routinely, sometimes without knowledge and also sometimes knowing but not caring that they are doing so. *See generally* Vivian Moses, *European Consumers and GM Foods*, 93 J. BIOTECH., COMPUTATIONAL BIOLOGY & BIONANOTECH. 277 (2012).

355. Cuma Akbay et al., *Household Food Consumption in Turkey*, 34 EUR. REV. OF AGRIC. ECON. 209, 226 (2007).

356. *The Wingspread Consensus Statement on the Precautionary Principle*, SCI. & ENVTL. HEALTH NETWORK (2008), http://www.sehn.org/wing.html; *see also* EC Reg. 178/2002, *supra* note 92, art. 9; Cartagena Protocol, *supra* note 107, art. 23.

GM foodstuffs, but Turkey does not enjoy the culture and civil institutions that are the essence of true self-government, such as those that serves to educate, ensure inclusiveness, promote citizen responsibility, and create trust in policy implementation.[357]

When prospective science teachers are out of their depth talking about biotechnology issues,[358] the general public's facility with the issues is likely to be low.[359] Turks have the least substantive knowledge and engagement with GM foodstuffs in Europe.[360] The number of study participants who respond "undecided" and "I don't know" to questions about GM foodstuffs[361] reveals an astonishing knowledge deficit that, if remedied, might adjust public opinion.[362]

Those who might fill this knowledge gap do exist, but they are not heard. Turkey lacks an influential, independent opinion-making class.[363] The Turkish

357. Oğuz, *supra* note 334, at 164.

358. *See, e.g.*, Emine Selcen Darcin & Lütfullah Türkmen, *A Study of Prospective Turkish Science Teachers' Knowledge at the Popular Biotechnological Issues*, 7 ASIA-PAC. FORUM. ON SCI. LEARNING & TEACHING 1, 7 (2006).

359. *See, e.g.*, Hayriye Esra Akyüz & Mehmet Akyüz, *Determination of Knowledge on the Academic Staff Concerning Genetically Modified Organisms (GMOs)*, 40 HACETTEPE J. BIOLOGY & CHEMISTRY 377, 378 (2012) (majority of consumers are relatively uninformed about biotechnology); Aydin & Kilic, *supra* note 340, at 334 (likelihood of buying low-priced GM foods correlated negatively with awareness food safety); Erbaş, *supra* note 28, at 8-9 (two-thirds of urban and rural participants had never heard of GMOs); Burcu Cabuk Özer et al., *Turkish Preschool Staff's Opinions About Hormones, Additives and Genetically Modified Foods*, 1 PROCEDIA SOC. & BEHAV. SCI. 1734, 1743 (2009) (most preschool staff study participants said they had personally purchased GM products, because they confused foods with hormones and foods with GM organisms); Hakan Tekedere et al., *Analysis of Training Needs of Health Services School of Higher Vocational Education Students on Genetically Modified Organisms*, 8 J. TURK. SCI. ED. 157, 159 (2011) (majority of health services student participants said their knowledge of GMOs was insufficient); Muhammet Üsak et al., *High School and University Students' Knowledge and Attitudes Regarding Biotechnology: A Turkish Experience*, 37 BIOCHEMISTRY & MOLECULAR BIOL. EDUC. 123, 129 (2009) (seventy percent of university student participants believe there are dangerous chemicals in GM organisms).

360. *See* EUROBAROMETER 2010, *supra* note 253, at 134.

361. *E.g.*, Oğuz, *supra* note 334, at 162 (one-third undecided); EUROBAROMETER 2010, *supra* note 253, at 134.

362. Lower educational attainment and income are associated with willingness to purchase GM foodstuffs in Turkey. *See, e.g.*, Aydin & Kiliç, *supra* note 340, at 334; Şentürk, *supra* note 340, at 437. But knowledge and/or education level are positively correlated with acceptance of GM foodstuffs. *See, e.g.*, Basaran et al., *supra* note 48, at 26 (most familiar with GM foodstuffs were most supportive); *see also* Oğuz, *supra* note 334, at 162. Even if Turks became more ambivalent as they became more knowledgeable, the increased ambivalence would constitute an increase in support. *Cf.* Durant & Legge, *supra* note 105, at 196 (uncertainty about GM foods increases with knowledge).

363. *See, e.g.*, Özge Genç, *Enhancing the Policy Impact of Democracy Research: The Case of the Turkish Economic and Social Studies Foundation TESEV Democratization Pro-*

science community has been absent from public conversation,[364] though studies of Turkish attitudes to GM foods suggest the scientists might be quite influential if they showed up.[365] Think tanks and civil society organizations do have some policy influence, but they remain on the fringe of the public conversation.[366] Instead, Greenpeace, GDO Hayır, other anti-GM non-governmental organizations and the uninformed GM-skeptical media began to fill the vacuum in 2004.[367] They took center stage when the government adopted the 2009 regulation.[368] Mostly they have spread disinformation[369] and stoked the Turkish public's fear of nonexistent risks[370] with creative, well-publicized events,[371] but they have provided no messages about benefits.[372]

The biggest challenge is that Turkey lacks a culture, experience, or mediat-

gram, *in* DEMOCRACY THINK TANKS IN ACTION: TRANSLATING RESEARCH INTO POLICY IN YOUNG AND EMERGING DEMOCRACIES 99, 101 (Nat'l Endowment For Democracy 2013).

364. *Turkey Biotechnology Annual 2014*, *supra* note 304, at 9 ("Too few experts have been willing to face the public scrutiny of NGO campaigns and media derision."); Dobos & Karaali, *supra* note 324, at 441-42 (scientists consider it "beneath a good scientist's dignity" to appear in an "entertainment media.").

365. *See* Basaran et al., *supra* note 48, at 26-27; Arzu Cagri Mehmetoğlu, *Preferences of Turkish People for Irradiated, GM or Organic Foods*, 5 J. FOOD, AGRIC. & ENV'T. 74, 76 (2007).

366. *See generally* Genç, *supra* note 363, at 99-106.

367. *See* Izabela Ewa Buraczewska, Monsters in Mind: A Case Study on Turkish Resistance Against Genetically Modified Organisms 38, 52-57 (2005) (unpublished M.A. dissertation, Univ. of Oslo/Istanbul Technical Univ.) (on file with UiO: DUO vitenarkiv), www.duc.uic.no/bistream/handle/10852/17760/30984.pdf?sequence=1&isAllowed-1; Dobos & Karaali, *supra* note 324, at 442. The popular media is the dominant source of information about GMOs in Turkey. *See, e.g.*, Basaran et al., *supra* note 48, at 25-26; Mehmetoğlu, *supra* note 365, at 76-77 (university students); Bektas et al., *supra* note 331, 472 (seventy-five percent of participants were informed about food safety from television); Özer et al., *supra* note 359, at 1739 (preschool staff); Tekedere et al., *supra* note 359, at 158 (health services vocational education students).

368. Veltri & Suerdem, *supra* note 346, at 146-47.

369. When the Ministry of Agriculture established a threshold level of 0.9 percent for unapproved GM "contaminants" in order to limit the number of criminal prosecutions for trace contamination, GDO Hayır issued a statement, "the changes will bring the GMO issue 'to a most dangerous level'" and were "'a clear manifestation that GM foods will find their way to our tables starting today.'" *Regulation Change*, *supra* note 306.

370. Most Turks assume GMOs are carcinogenic. *Turkey Biotechnology Annual 2014*, *supra* note 304, at 8; *see also* İraz Haspolat Kaya, *Alteration of Attitude Toward GM-Foods of Urban Consumer Depending Geographical Regions in Turkey*, 1 INT'L J. CHEMICAL, ENVTL. & BIOLOGICAL SCI. 47, 51 (2013); *cf.* Barbara Casassus, *Study Linking GM Maize to Rat Tumors is Retracted*, NATURE (Nov. 28, 2013), http://www.nature.com/news/study-linking-gm-maize-to-rat-tumours-is-retracted-1.14268.

371. *See* Buraczewska, *supra* note 367, at 57-59.

372. *Turkey Biotechnology Annual 2015*, *supra* note 4, at 9.

ing infrastructure for citizen participation in governance.[373] It does not seem to have occurred to Turks, their politicians, or the paternalistic state apparatus that the people have a role in public policy decisions between elections.[374] The Turkish Constitution places roadblocks in the way of creative citizen politics[375] in order to choke both Islamist and Kurdish political participation.[376] Opposition parties and mediating institutions are weak,[377] and the chasm between secularist and Islamist is so vast that Turkish politics is almost a "winner-take-all" affair.[378] Decentralized, province-by-province regulation of GM foodstuffs would meet constitutional resistance.[379]

As a result, many with the greatest stake in the outcome are simply not at the table.[380] The Ministry of Agriculture, large farmers, multinational companies, and international organizations have generally dominated Turkish agricultural biotechnology policy,[381] while consumer organizations and NGOs have muscled in recently.[382] Small farmers and rural residents who believe they would benefit fi-

373. Sözen, *supra* note 54, at 171-72; Erbaş, *supra* note 28, at 4-5 ("[T]he state does not care about public or citizen interest.").

374. *See, e.g.*, Ahmet Arabaci, *Explaining Transformation of Turkish Civil Society in the EU Accession Process*, 10 INSIGHT TURKEY, no. 2, 2008, at 77, 80-83.

375. *See generally* Ergun Özbudun, *Turkey's Search for a New Constitution*, 14 INSIGHT TURKEY, no. 1, 2012, at 39, 39-41 (2012).

376. *See* ANGEL RABASA & F. STEPHEN LARRABEE, THE RISE OF POLITICAL ISLAM IN TURKEY 40-47, 49-50 (2008) (documenting closures of Islamic political parties); NICOLE F. WATTS, ACTIVISTS IN OFFICE: KURDISH POLITICS AND PROTEST IN TURKEY 5-6, 42-43, 51-52, 69-70, 80-81, 97-99, 112-13, 121 (2010) (documenting closures of Kurdish political parties); Özbudun, *supra* note 355, at 41-43 (describing party closures and other tutelary means of checking popular governance).

377. For example, imams are "civil servants" in Turkey. Orhan Kemal Cenğiz, *Who Owns Turkey's Mosques*, AL-MONITOR (May 20, 2013), http://www.al-monitor.com/pulse/originals/2013/05/turkey-mosque-ownership.html; *see also* Oliver Johnson, *Religion and Politics in Turkey: To Talk or Not to Talk*, WASH. REV. TURKISH & EURASIAN AFF, (Oct. 2010), http://www.thewashingtonreview.org/articles/religion-and-politics-in-turkey-to-talk-or-not-to-talk.html.

378. *See* Acar & Emek, *supra* note 314, at 194.

379. *See* CONST. OF THE REPUBLIC OF TURKEY, Oct. 18, 1982, arts. 123/1-2, 127/5; *see also* Ali Ülüsoy, *The Place of Regulation Within the Public Law in Turkey*, *in* THE POLITICAL ECONOMY OF REGULATION IN TURKEY 17 (Tamer Aetin & Fuat Oğuz eds., 2011).

380. *See* Erbaş, *supra* note 28, at 13 (Turkish food policy "is decided from above without public participation").

381. Aydin et al., *supra* note 33, at 12-13; *see, e.g.*, DRAFT NATIONAL BIOSAFETY FRAMEWORK FOR REPUBLIC OF TURKEY 2-18 (UNEP 2005); *see also* Dobos & Karaali, *supra* note 324, at 441.

382. Erbaş, *supra* note 28, at 13; *see* Zeynep Özlem Ükskül Engin, Genetically Modified Organisms and Turkish Legislation, Presentation at 25th IVR World Congress, Law Science & Technology, Paper Ser. C, No. 065/2012, at 14 (2012).

nancially from GM foodstuffs are neither informed nor heard.[383] Low to medium-income Turks who have been the primary consumers of GM foods are also voiceless.[384] Residents of Eastern Anatolia, who hold the most moderate views in the country towards genetic technology,[385] and might be those who benefit most,[386] have the least political power.[387]

3. Social and Informational Source Trust

The fact that Turks simply do not trust regulatory institutions,[388] information sources[389] or GM foodstuffs' large corporation proponents[390] also does not bode well for more nuanced regulation of GM foodstuffs in Turkey. Lack of trust probably contributes to negative attitudes about GM foodstuffs,[391] because for all this regulation, "evidence" says GMOs are slipping into the food supply anyway.[392] Such a lack of control over one's food distorts risk-benefit perceptions.[393] Ironically, lack of trust in regulatory agencies–even where corruption is

383. Erbaş, *supra* note 28, at 11, 13; Özertan & Aerni, *supra* note 9, at 569; *see also* Cohen & Paarlberg, *supra* note 28, at 1575 (views of smallholders farmers who are most of the producers are missed during the regulatory process, so regulators may not understand their needs).

384. GM foods are an inferior good in Turkey; *see* Şentürk, *supra* note 340, at 437.

385. *See* Kaya, *supra* note 370, at 49.

386. *See infra* Part VI.C.

387. *See, e.g.*, Mustafa Sönmez*, Turkish Economy: From Growth to Stagnation, Increase in Social Disparity*, *in* UNION OF SE. ANATOLIA REG'L. MUNS & DIYARBAKIR METROS MUN., EASTERN AND SOUTHEASTERN ANATOLIA: SOCIO-ECONOMIC PROBLEMS & RECOMMENDED SOLUTIONS 8-9, 17-18 (2008).

388. Oğuz, *supra* note 334, at 162, 164 (also observing that Turks retain greater respect for state control than citizens of other countries). Turks are more optimistic about regulation to limit adverse effects of GMOs than about GMOs' safety, but they are "suspicious" about the state's ability to implement appropriate regulation. *Id.* at 162.

389. Basaran et al., *supra* note 48, at 26 (sixty-five percent of Turks did not believe information on food packages).

390. Halil Kizilaslan & Nuray Kizilaslan, *Analysis of the Effects of Genetically Modified Organisms on Consumers in Tokat Province of Turkey*, 6 J. FOOD, AGRIC. & ENV'T 33, 36 (2008).

391. *See* Frewer et al., *supra* note 97, at 1188-89; Michael Siegrist, *The Influence of Trust and Perceptions of Risks and Benefits on the Acceptance of Gene Technology*, 20 RISK ANALYSIS 195, 196, 202 (2000).

392. *E.g.*, *Infant Formula Withdrawn from Market with Suspect of GMO*, HURRIYET DAILY NEWS (May 27, 2014), http://www.hurriyetdailynews.com/infant-formula-withdrawn-from-market-with-suspect-of-gmo.aspx?pageID=238&nID=67039&NewsCatID=341. The Biosafety Law absolutely forbids GMOs in baby food. Biosafety Law, *supra* note 3, art 2(5)(1)(d); *see also* Boyacioğlu, *supra* note 290.

393. *See* SJÖBERG ET AL., *supra* note 103, at 9, 26.

a cause–also tends to increase demand for regulation in transition economies.[394]

The Turkish public's skepticism may be justified. Turkey still struggles to provide the infrastructure and know-how to implement highly technical health and safety regulatory schemes.[395] Biosafety is an example. The Biosafety Board is supposed to be independent of the government,[396] but academic scientists play a secondary role to government officials.[397] Critics claim the board enjoys a *ménage a trois* with the government and agribusiness,[398] and the Ministry of Customs and Trade, which enforces import regulations on the ground, lacks public respect for its integrity.[399] Recent GM food scandals cloak both public officials and businesspeople in the appearance of impropriety.[400]

More independence may not be the answer. Courts view independent regulatory agencies as an unconstitutional threat to Turkish democracy and the unitary state.[401] Suspicion remains that some state agents are not accountable to the government and people.[402] Turks also question whether truly independent agencies are accountable to elected leaders or international lenders.[403] These dynamics might even mandate more control from elected officials, not less.[404] Of course, some governments may also want to keep their fingers in all the pies to facilitate the Muslim version of "bringing home the pork."[405]

394. *See* Philippe Aghion et al., *Regulation and Distrust,* 125 Q. J. ECON. 1015, 1031, 1036 (2010).

395. *See, e.g.*, Turan Atilğan, *Environmental Regulations in the European Union and Their Effects on the Turkish Textile Industry*, FIBRES & TEXTILES IN E. EUR., Apr.-June 2007, at 8, 13; Özertan & Aerni, *supra* note 9, at 565.

396. Biosafety Law, *supra* note 3, arts. 9(2), 11(1)(a)-(c).

397. In essence, the government chooses the Biosafety Board members and the Board then chooses the numerous members of scientific committees that do the real work. *See id.* art. 9(2), 12; *see* Engin, *supra* note 382, at 14.

398. Engin, *supra* note 382, at 14. These three groups are essential to end corruption. Acar & Emek, *supra* note 314, at 200.

399. Acar & Emek, *supra* note 314, at 186.

400. *Turkey Oilseeds and Products Update 2010*, *supra* note 278, at 2; *Wiretap Reveals*, *supra* note 315.

401. Ülüsoy, *supra* note 379, at 20; *see also* CONST. OF THE REPUBLIC OF TURKEY, Oct. 18, 1982, art. 123.

402. Sözen, *supra* note 54, at 172; *see also* Peter M. Sandman et al., *Agency Communication, Community Outrage, and Perception of Risk: Three Simulation Experiments*, 13 RISK ANALYSIS 585, 595-96 (1993), www.psandman.com/articles/simulate.htm (agency secrecy increases risk perception).

403. *See generally* E. Ünal Zenginobuz, *On Regulatory Agencies in Turkey and Their Independence*, 9 TURKISH STUD. 475, 499-500 (2008).

404. Sözen, *supra* note 54, at 172.

405. A. Halis Akder, *Policy Formation in the Process of Implementing Agricultural Reform in Turkey*, 6 INT'L. J. AGRIC. RES., GOV., & ECOLOGY 514, 522-23 (2007); Tamer Çetin

Without the capacity to regulate with the precision of scalpel, Turkey takes refuge with other underdeveloped nations in the regulatory response of the meat cleaver: permit as few imports and uses as possible.[406] As a result, Turkey diverts regulatory resources from more productive health and safety priorities[407] and misses the unknown opportunities foregone.

VI. NO RISK, NO REWARD: IT'S ALL ABOUT THE FEED!!!

Always playing it safe is very costly. Taking a risk can reap large rewards:[408] harnessing emerging technologies to improve economic development and public health.[409] Risks are not even so scary when there are tangible benefits to be had.[410]

"Benefits" of GM foodstuffs can seem ephemeral and irrelevant in the moment,[411] but this is not so for Turkey and GM feed. Turkey is foregoing tangible, identifiable, "opportunity benefits" of taking some risks on GM: a shot in the arm to the meat and milk products subsector; decreasing the historically high rates of anemia and iron deficiency; and stability in the animal husbandry-dependent Kurkish Eastern Anatolia region while hope for peace endures but religious and ethnic violence threatens next door and from within.

A. The First Order Opportunities: It's All About the Feed

It is all about the feed in Turkish cattle and dairy farming: "The target in dairy cattle farming is to produce sufficient milk to cover the costs of animal feed and generate a farm profit."[412] Most Turkish beef and milk is raised on traditional farms that are inefficient and produce poor quality meat. Output is low compared to European neighbors.[413] To be more productive and efficient, Turkish

& Feridun Yılmaz, *Transition to the Regulatory State in Turkey: Lessons from Energy*, 44 J. ECON. ISSUES 393, 394-97, 400 (2010).

406. *See* Paarlberg, *Agrobiotechnology*, *supra* note 163, at 170-72.

407. *See* Sunstein, *supra* note 17, at 1052-54 (2003); *cf.* Miller & Conko, *supra* note 128, at 34.

408. Sunstein, *supra* note 17, at 1051-52.

409. *Id.* at 1049-54.

410. *See generally* Slovic & Peters, *supra* note 137, at 323.

411. *Cf.* EUROPABIO, *supra* note 236, at 20 (competitiveness and innovation); PLANTING THE FUTURE, *supra* note 231, at 35 (sophisticated applications); Thierer, *supra* note 116, at 311; Miller & Conko, *supra* note 128, at 32 (regulators rarely consider benefits of the technology).

412. Özhan Elmaz et al., *Current Trends in Dairy Cattle Farming in the Mediterranean Region of Turkey*, 41 OUTLOOK ON AGRIC. 133, 133 (2012).

413. Mehmet Emin Erçakar et al., *The Role and Importance of Agriculture in Turkey's Development*, 30 EUR. J. SOC. SCI. 474, 477 (2012).

farmers need lower-priced and higher-quality feed at the right times.[414] GM producers can provide it.[415]

What farmers feed their animals depends on how much feed costs and what feed is available when. Feed is roughly sixty-to-seventy percent of an intensive Turkish animal husbandry operation's variable cost.[416] Use of more expensive mixed and compound inputs is also a primary determinant of a farm's productivity and efficiency,[417] but Turkish animal husbanders are very input price-sensitive.[418] Different feed types, nutritional mixes, and amounts are also more advantageous at different moments in the fattening and milking cycles.[419] Without consistent, predictable, and timely access to the right feeds, productivity and efficiency decline.

Turkey's Biosafety Law has exacerbated shocks in the beef and milk industries by inflating feed prices and disrupting access. In Turkey, when animal feed prices rise faster than farm-gate milk prices, retail milk prices may rise but red meat prices skyrocket.[420] Six years ago, worldwide feed prices reached record

414. *See, e.g.*, T. Binici et al., *Assessing Production Efficiency of Dairy Farms in Burdur Province*, Turkey, 107 J. AGRIC. & RURAL DEV. IN TROPICS & SUBTROPICS 1, 7-8 (2006); Frank Fuller et al., *Farm-Level Feed Demand in Turkey* 14-15 (Center. For Agric. & Rural Dev., Working Paper No. 99-WP 226, 1999); Taşdan et al., *supra* note 22, at 9.

415. Animals raised on transgenic feed, accounted for 44 percent of the value of Turkish agricultural output in 2000. EUR. COMM'N DIR.-GEN. FOR AGRIC., AGRICULTURAL SITUATION IN THE CANDIDATE COUNTRIES, COUNTRY REPORT: TURKEY 6 (2003), http://ec.europa.eu/agriculture/external/enlarge/publi/countryrep/turkey.pdf.

416. Güneş et al., *supra* note 23, at 1329.

417. *See, e.g.*, Duygu Aktürk et al., *The Factors Affecting Milk Production and Milk Production Cost: Çanakkale Case – Biga*, 16 KAFKAS UNIV. VET. FAK. DERG. 329, 334 (2010); *see* Selli et al., *supra* note 21, at 110.

418. *See* Fuller et al., *supra* note 414, at 9. Turks do cut costs by substituting forage and pasturing, but pastures are overgrazed, and few Turks sow forage crops. Engin Tan et al., *Grassland and Forage Crop Cultivation in Turkish Agriculture*, 12 ANADOLU J. AARI. 100, 101-02, 104 (2002).

419. *See generally* Beth Wheeler, *Guidelines for Feeding Dairy Cows*, http://www.fao.org/prods/gap/database/gap/files/1334_GUIDELINES_FOR_FEEDING_DAIRY_COWS.HTM (last visited Jan. 25, 2016); KATHERINE F. KNOWLTON & JILL M. NELSON, WORLD OF DAIRY CATTLE NUTRITION 18-21 (Kelly F. Dunkles ed. 2003); EBLEX BETTER RETURNS PROG., BEEF BRP MANUAL NO. 7, FEEDING GROWING AND FINISHING CATTLE FOR BETTER RETURNS 5 (2008).

420. Most Turkish cattle are dual-purpose animals, so feed and farm-gate and retail milk and meat prices are all functions of each other. *See* Gökhan Özertan et al., *Beef and Milk Price Links in Turkey*, 33 ECON. BULL. 2607, 2615 (2013) [hereinafter Özertan et al., *Beef and Milk Price Links*]; Gökhan Özertan et al., *Red Meat Price Spikes in Turkey* 3-4, 6-7 (Working Paper, 2012), http://www.artuklu.edu.tr/Upload/iibf/Redmeat_Turkey_0113.pdf [hereinafter Özertan et al., *Red Meat Price Spikes*]. When feed prices are relatively low or dropping, milk production is high or rising. SARP KALKAN & HÜSEYIN EKREM CÜNEDIOĞLU, HOW MUST THE

levels and provoked a mass slaughter of Turkish cattle. Red meat prices skyrocketed, from which the industry has never recovered.[421] Turkish feed prices spiked again after Turkey promulgated the 2009 regulation.[422] Perhaps not coincidentally, Turkish red meat prices again rose thirty percent between January 2013 and 2015,[423] and as much as thirty percent of the meat consumed in Turkey is smuggled in from abroad.[424] Turks are enduring an extended "red meat crisis" that neither the agriculture sector nor the government has been unable to abate.[425]

INCREASE IN MEAT PRICES BE INTERPRETED? 2 (TEPAV Pol'y Note, June 2010). When feed prices rise faster than farm-gate milk prices, farmers divert production from milk to meat by mass slaughter of cows which take years to replace. *Id.* Meat prices decline but rise again when the market glut dissipates and there are insufficient animals to satisfy both milk and meat demand. *Id.* at 3.

421. Özertan et al., *Red Meat Price Spikes*, *supra* note 420, at 2; Özertan et al., *Beef and Milk Price Links*, *supra* note 420, at 2615. In 2009-2010, red meat prices spiked by forty percent, so the government lowered tariffs on beef. Gökhan Özertan et al., *Red Meat Price Spike in Turkey During 2009-2010*, at 11, 13, 14 (2012), http://www.ifama.org/files/conf/2012/549.pdf, [hereinafter Özertan, *Red Meat Price Spike 2009-2010*]. Feed prices rose in response to market pressures from the Biosafety Law. *See, e.g.*, Ibrahim Sirtioğlu, *Oilseeds and Products Update*, GAIN REP. (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), July 6, 2011, at 2. Meat prices never declined, but farm-gate milk prices stayed low. *See* Maden, *supra* note 82; *see also* Sevtap Guler Gümüş et al., *Are the Marketing Margins of Poor Livestock Farms in Rural Areas Adequate for the Sustainability of Livestock Farming? An Example from Rural Turkey*, 9 J. ANIMAL & VETERINARY ADVANCES 643, 647 (2010). So slaughtering continues. Ali Aslan Kiliç, *Turkey Faces Specter of Slaughtering Milk Cows*, TODAY'S ZAMAN (Feb. 8, 2011, 17:56:00), http://www.todayszaman.com/ news-234864-turkey-faces-specter-of-slaughtering-milk-cows.html; Ayden Albayrak, *Livestock Industry Welcomes New Gov't Incentive Package*, TODAY'S ZAMAN (Apr. 12, 2012, 13:24:00), http://www.todayszaman.com/news-277223-livestock-industry-welcomes-new-govt-incentive-package.html.

422. *See* Samet Serttas, *2014 Turkey Grain and Feed Annual*, GAIN REP. TR4009 (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), Mar. 28, 2014, at 8 [hereinafter *Turkey Grain and Feed Annual 2014*].

423. *Turkey May Revisit Red Meat Price Crisis*, TODAY'S ZAMAN (Feb. 25, 2015, 15:47:47), http://www.todayszaman.com/business_turkey-may-revisit-red-meat-price-crisis_373596.html.

424. Burak Coşan & Dinçer Gökce, *Turkey Comes Across Biggest Smuggling Case to Date*, HURRIYET DAILY NEWS (Nov. 11, 2014), http://www.hurriyetdailynews.com/turkey-comes-across-biggest-smuggling-case-to-date-.aspx?pageID=238&nID=74143&NewsCatID=344.

425. Turks now pay a premium for small quantities of non-GM corn from regional neighbors. Samet Serttas, *2010 Turkey Livestock Products Report*, GAIN Rep. (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), May 5, 2010, at 16 [hereinafter *Turkey Livestock Products Report 2010*]. The government did import fodder, *Surge in Feed Prices Threaten Red Meat Shortage*, TODAY'S ZAMAN (Jan. 7, 2013, 15:50:00), http://www.todayszaman.com/business_surge-in-feed-prices-threaten-red-meat-shortage_303353.html, and offered an early slaughter premium. *State's Price Intervention*

The Turkish government assures potential foreign investors that "[l]arge-scale fodder production and compound feed production are clear opportunities."[426]

Implementation of the Biosafety Law also disrupts availability of the "right" feed at the right times. Turkish feed producers and farmers struggled to adapt to lower quality substitutes for transgenic corn and soybeans, which also had the indignity of increasing the cost of dairy feed by 10-20 percent and cattle feed by 5 percent.[427] Disruption of feed ingredient supply from constant regulatory change led to high-cost contingency stock holding.[428] The DDSG crackdown can hardly be helping.[429]

Turkey is certainly enduring first order costs of its GM feed regulation. Unfortunately, the livestock products sector is also very unhealthy for both man and beast.[430]

B. Second Order Opportunities: A Fist to the Gut of Leading Public Health Issues

Price-sensitive Turkish consumers do not buy all that much milk or red meat anyway, because they cannot afford those products even in the best of times.[431] Unsurprisingly, all remaining micro-deficiencies in the Turkish diet

Irks Turkish Meat Sector, HURRIYET DAILY NEWS (Aug. 14, 2013), http://www.hurriyetdailynews.com/states-price-intervention-irks-turkish-meat-sector.aspx?pageID=238&nID=52484&NewsCatID=344. There are few short term solutions, because if feed prices decline farmers will tend to shift to milk production. *See* KALKAN & CÜNEDIOĞLU, *supra* note 420, at 3, 4. They will produce little if feed prices stay high.

426. FOOD & AGRICULTURE IN TURKEY, *supra* note 68, at 12, 38, 42.

427. *See* BROOKES, *supra* note 4, at 44; *see also Turkey Grain and Feed Annual 2012*, *supra* note 289, at 24-26.

428. BROOKES, *supra* note 4, at 44.

429. *See supra* text and notes at 311-13.

430. According to the USDA, "the livestock sector is also beset with animal health and public health problems." *Turkey Livestock Products Report 2010*, *supra* note 425, at 4.

431. Güneş et al., *supra* note 23, at 1332; M. Kamil Dilek et al., *Red Meat, White Meat and Seafood Consumption Patterns in Turke*y, 10 J. ANIMAL & VETERINARY ADVANCES. 858, 860 (2011); Sema Gun et al., *Dairy Sector in the Crises: The Case of Turkey*, 9 J. ANIMAL & VET. ADV. 429, 434 (2010); *see also* Akbay et al., *supra* note 355, at 219, 226. Farm-gate milk prices are too low for farmers to produce milk versus meat profitably, but retail prices are too high because the distribution chain from farm to fork or glass in Turkey is long, inefficient, and oligopolistic. *See* BUDAK, *supra* note 83, at 28; M.O. Azabagaoğlu, *Determination of Dairy Farmers' Existing Structure in Turkey and Analysis of Emerging Issues in Production*, 50 AGRIC. ECON.–CZECH 255, 258 (2004); Gümüş et al., *supra* note 421, at 648; Özertan et al., *Red Meat Price Spikes*, *supra* note 420, at 3-4, 6-7. When feed prices are relatively low or dropping, milk production is high or rising. KALKAN & CÜNEDIOĞLU, *supra* note 420, at

arise from inadequate consumption of milk and meat.[432] Red meat is a luxury good in Turkey: only half of the population eats it as much as once a month.[433] Per capita milk and dairy consumption is also low compared to other European countries.[434] Total amounts of milk produced and consumed are actually declining,[435] and worse, milk prices seem to be rising.[436] Small increases in either product's retail price could have an almost immediate negative effect on production of quality feed.[437]

Therefore, perpetually inflated feed prices do not only threaten farmers' livelihoods, but they aggravate health conditions caused by low consumption of red meat and packed milk.[438] Historically, anemia and iron deficiency in children, pregnant women, and mothers of child-bearing age are among the most important nutritional problems in Turkey;[439] iron deficiency in children, especially girls, is the most common micro-nutrition deficiency in the country.[440] Turkey's anemia rates remain stubbornly higher than those of European neighbors.[441] Both conditions are most prevalent among the Turkish poor, who eat little to no red meat.[442]

17. Some of the dislocation is due to privatization in the 1990s. Sertaç Gönenç & Erkan Rehber, *Privatization in Agro-Food Sector: The Case of Turkish Dairy Industry*, 109 BRIT. FOOD J. 661, 666-70 (2007).

432. ALEJANDRO LORCA & RAFAEL DE ARCE, THE DESIGN OF A ROAD MAP FOR AGRICULTURAL LIBERALIZATION IN THE EURO-MEDITERRANEAN REGION: THE NEED FOR PRIORITISATION 52 (AGREEM – UAM Res. No. FEM31-03, 2007).

433. Dilek et al., *supra* note 431 (monthly survey from 2003-06 of 51,900 households).

434. U.N. FOOD & AGRIC. ORG., OVERVIEW OF THE TURKISH DAIRY SECTOR WITHIN THE FRAMEWORK OF EU-ACCESSION 6 (2007).

435. Gönenç & Rehber, *supra* note 431, at 669 (consumer prices of milk have increased); Azabagaoğlu, *supra* note 431, at 258.

436. *Food Prices High in Turkey Amid 5-Year Global Low*, TODAY'S ZAMAN (May 8, 2015, 15:20:17), http://www.todayszaman.com/business_food-prices-high-in-turkey-amid-5-year-global-low_380164.html.

437. Güneş et al., *supra* note 23, at 1332.

438. *See* Leyla Karaoğlu et al., *The Prevalence of Nutritional Anemia in Pregnancy in an East Anatolian Province, Turkey*, 10 BMC PUB. HEALTH. 329, 337 (2010) (associating low intake of red meat with anemia).

439. Gulden Pekcan & Nilgun Karaagaoğlu, *State of Nutrition in Turkey*, 14 NUTRITION & HEALTH 41, 46 (2000); *see also* Karaoğlu et al., *supra* note 438, at 336 (reporting high rates of anemia but not iron deficiency).

440. Y. Keskin et al., *supra* note 24, at 68-69. The same is true throughout the developing world. *Id.* at 64.

441. Karaoğlu et al., *supra* note 438, at 337; Metin Kilinç et al., *Anaemia and Iron-Deficiency Anaemia in South-East Anatolia*, 69 EUR. J. HAEMATOLOGY 280, 282 (2002).

442. Keskin et al., *supra* note 24, at 67-69 (boys of lower socio-economic status had the highest rates of iron deficiency and the lowest red meat consumption of the study population); Kilinç et al., *supra* note 441, at 282 ("meat can rarely be afforded" in the low-income Eastern

Anemia and iron deficiency have a big impact on children's life outcomes and families' economic statuses. In Turkey, anemia contributes to twenty percent of maternal deaths and leads to premature births, low birth weight, and infant death.[443] It lowers women's productivity and impairs child intellectual development.[444] Recommended solutions include anything to promote red meat consumption.[445] Turkey's high anemia and iron deficiency rates are an opportunity foregone due to Turkey's precautionary GMO import regulations.

High animal prices also perpetuate the "street milk" phenomenon,[446] a bustling, unregulated, untaxed, informal, and illegal milk processing and distribution sector[447] for eighty percent of Turkish milk product consumption.[448] Street milk is cheap, unpacked, "uncontrolled, unpasteurized and low quality milk," often delivered to the customer's front door.[449]

On the one hand, the government would love to get rid of this entire subsector and invest in incentive programs and distribution infrastructure to divert farmers' sales to the large processing plants.[450] On the other, the informal sector is how most dairy farmers get the price, market, and transportation to remain in business and sell milk consumers can afford.[451] Most do not produce milk of the

Anatolian subject community).

443. Karaoğlu et al., *supra* note 438, at 329.

444. *Id.*

445. Keskin et al., *supra* note 24, at 70.

446. *See* OVERVIEW OF THE TURKISH DAIRY SECTOR, *supra* note 434, at 9.

447. *Id.* at 5, 27, 28. Istanbul street milk sellers wear uniforms and have a union. *Id.* at 28, 52. Small farmers who do not sell milk directly to consumers or street milk distributors sell to "mandras," small dairy processing companies that make yoghurt and low-quality white cheese. *Id.* at 19, 30, 57. Mandras primarily sell to bakkals, small, traditional grocery stores, and eateries in local communities. *Id.* at 34.

448. *Id.* at 28-30; Nevin Demirbaş et al., *Practices in Milk Collection Centres for Quality Milk Production: A Case from the Aegean Region of Turkey*, 3 NEW MEDIT. 21, 26 (2009).

449. It is partly skimmed, often intentionally adulterated with water and contains high rates of bacteria, somatic cells, and antibiotics. OVERVIEW OF THE TURKISH DAIRY SECTOR, *supra* note 434, at 28-29, 66.

450. Demirbaş et al., *supra* note 448, at 26; Cenğiz Sayin et al., *The Roles of Milk Collection Centers in Milk Distribution Channels in Turkey: A Case Study of Antalya*, 6 AFR. J. AGRIC. RES. 174, 179 (2011).

451. *See* Bulent Erğonul, *Meat Consumption and Buying Behaviors of Consumers Living in Manisa City Center, Turkey*, 10 J. ANIMAL & VETERINARY ADVANCES 286, 288 (2011); OVERVIEW OF THE TURKISH DAIRY SECTOR, *supra* note 434, at 420-21; Meral Üzünoz & Yosar Akçay, *A Case Study of Probit Model Analysis of Factors Affecting Consumption of Packed and Unpacked Milk in Turkey*, 2012 ECON. RES. INT'L 1, 4-5; Sevtap Guler Gümüş et al., *Are the Marketing Margins of Poor Livestock Farms in Rural Areas Adequate for the Sustainability of Livestock Farming? An Example from Rural Turkey*, 9 J. ANIMAL & VETERINARY ADVANCES 643, 647 (2010); Taşdan et al., *Turkish Dairy Sector Analysis*, *supra* note 22, at 9, 38.

quality large processors can accept or meet the government's quality standards anyway.[452] As incomes rise, the informal sector will decline and Turks' quality milk consumption will rise,[453] but the accompanying shift from labor-intensive informal sector processors to machine-intensive large processors may also increase rural employment.[454]

Low consumption of red meat and unhygienic milk create serious public health hazards in Turkey that could be significantly mitigated if it opened its borders to GM feed.[455] Failure to consider the benefits of importing GM-producing countries' feed robs Turks of the public health improvements that cheaper and more regular supplies of quality animal feed could provide.

C. Third Order Opportunity Costs: "Peace and Prosperity" . . . in Eastern Anatolia[456]

Animal husbandry is big business in Turkey, but it is even bigger business in Eastern Anatolia. Three-quarters of North and Middle Eastern Anatolia's agricultural output comes from livestock and animal products.[457] Two-thirds work in subsistence or semi-subsistence agriculture on land they do not own,[458] which have become tragedies of the commons.[459] Seasonal agricultural employment can be the primary source of income in whole villages.[460] The region contains the poorest provinces in Turkey,[461] and unemployment rates are the highest in the nation.[462]

452. Demirbaş et al., *supra* note 448, at 22; OVERVIEW OF THE TURKISH DAIRY SECTOR, *supra* note 434, at 23-25, 66-67 (mandras).

453. Kaya et al., *supra* note 84, at 11; *see* OVERVIEW OF THE TURKISH DAIRY SECTOR, *supra* note 434, at 20-24.

454. *See* Taşdan et al., *supra* note 22, at 9, 19; OVERVIEW OF THE TURKISH DAIRY, *supra* note 434, at 70 (calling mandras, street sellers and other middlemen in the milk processing industry "an oversized employment system").

455. *See generally* Taşdan et al., *supra* note 22, at 9, 15.

456. This article refers to areas known as "Eastern Anatolia," "Northern Anatolia" and "South Eastern Anatolia" as "Eastern Anatolia" unless another specification is made.

457. EUR. COMM'N DIR.-GEN. FOR AGRIC., *supra* note 416, at 6, 9-10.

458. Richard Rousseau, *Contributing Factors to Less Than Equitable Social and Economic Development in Eastern Turkey*, CESRAN INT'L (Mar. 31, 2014), http://cesran.org/contributing-factors-to-less-than-equitable-social-and-economic-development-in-eastern-turkey.html.

459. Yılmaz, *supra* note 81, at 3054; Selli et al., *supra* note 21, at 105, 110; OVERVIEW OF THE TURKISH DAIRY SECTOR, *supra* note 434, at 54 (describing a publicly owned farm approximately the size of Belgium near a Kurdish town).

460. Özertan & Aerni, *supra* note 9, at 568.

461. ÖZHAN, *supra* note 25, at 5-6.

462. *Turkish Kurdistan Has Highest Unemployment Rate in Turkey*, BAS NEWS (Mar. 20,

When the meat and milk sectors take a hit, people here feel it more.[463] A major challenge: access to enough affordable, quality feed, and especially quality feed for prices farmers can afford.[464] Eastern Anatolian stock breeders must have commercial feed, and they must have it at specific times: long, harsh winters demand they feed animals in barns longer than others in Turkey.[465]

Many of the ills that arise from high feed prices and supply disruption are magnified in Eastern Anatolia. Herds are smaller and of less productive breeds.[466] There are essentially no high volume milk processors.[467] Produce is of lower quality;[468] therefore, meat and fluid milk served to locals is of particularly low quality.[469] Because of their small farms and informal sector participation, farmers are also less likely to take advantage of government farm programs.[470] Anemia rates are higher.[471] More farmers are leaving the business to uncertain employment elsewhere.[472] Fewer children attend school here than anywhere else in Turkey;[473] improved school attendance rates have been a second-order benefit

2014, 22:58), http://www.basnews.com/en/economy/2014/03/20/turkish-kurdistan-has-highest-unemployment-rate-in-turkey/ (21.1 percent compared to 9-10 percent in the nation overall). In Southeastern Anatolia, the unemployment rate is usually 30-35 percent. Şah Ismail Bedirhanoğlu, *The Impact of the Crisis in Syria on the Economy of Southeast Anatolia*, PERSPECTIVES, Aug. 5, 2014, at 28, 28, http://www.tr.boell.org/de/2014/06/16/impact-crisis-Syria-economy-southeast-anatolia.

463. *See* Taşdan et al., *supra* note 22, at 9, 36; Selli et al., *supra* note 21, at 100-14.

464. *See* Taşdan et al., *supra* note 22, at 9, 37, 42; Selli et al., *supra* note 21, at 105, 110 (citing statistics for the GAP region, a significant portion of Southeastern Anatolia).

465. *Surge in Feed Prices*, *supra* note 425.

466. *See* Ibrahim Yıdırım, *A Comparison of Profitability and Economic Efficiencies Between Native and Culture-Breed Cattle Fattening Farms in Eastern Part of Turke*y, 9 PAK. J. BIOLOGICAL SCI. 1061, 1065-66 (2006).

467. Taşdan et al., *supra* note 22, at 9, 44-45.

468. Selli et al., *supra* note 21, at 107 (describing primitive, unhygienic slaughter houses in the GAP region).

469. Street milk and mandras products dominate retail food sales even more so than in the west. *See* OVERVIEW OF THE TURKISH DAIRY SECTOR, *supra* note 434, at 29; Kaya et al., *supra*, note 84, at 11.

470. *See, e.g.*, Çakmak, *supra* note 83, at 159-60. Most government supports are targeted to improving breeds and risk-free regions. İşik et al., *supra* note 85, at 1237. Some programs require that farmers be in the commercial sector and a member of a cooperative. *Id.* at 1240-41.

471. *Cf.* Karaoğlu et al., *supra* note 438, at 336.

472. Now they compete with even more desperate Syrian refugees. OSMAN BAHDIR DINÇER ET AL., TURKEY AND SYRIAN REFUGEES: THE LIMITS OF HOSPITALITY 25-26 (2013); *Turkish Kurdistan Has Highest Unemployment Rate*, *supra* note 463.

473. *See* ÖZHAN, *supra* note 25, at 6 (GAP region). In the mid-1990s, fewer than seventy-five percent of Kurdish and Arab boys were enrolled in school, and fewer than fifty percent of Kurdish girls and fifty-five percent of Arab girls were enrolled. *See* MURAT KIRDAR,

of GM seed use elsewhere.[474]

The stakes are also higher in this large, troubled region cut off geographically and culturally from mainstream Turkish society.[475] The Kurdish people that dominate Eastern Anatolia are the largest ethnic group in the world without a national home.[476] The Ottoman Empire had melded all ethnic groups in Anatolia together while preserving their cultural identities,[477] but the Turkish state aggressively imposed Turkish nationalism, and Turkish leaders who ruthlessly repressed Kurdish cultural aspirations equally ruthlessly drove Turks and Kurds apart.[478] From 1978 until 2013, the armed Kurdistan Workers Party (PKK) waged a bloody war for a separate Kurdish state, and the Turkish army responded "without quarter" to this existential threat to the unified Turkish state.[479] More than forty thousand died in the resulting violence.[480] Solving "the Kurdish question" dwarfs any other domestic policy priority on the Turkish radar screen.

Animal husbandry in Eastern Anatolia is in the midst of a major market

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EXPLAINING ETHNIC DISPARITIES IN SCHOOL ENROLLMENT IN TURKEY 1 (2007).

474. Rousseau, *supra* note 458; *see* GLOBAL ENV'T. FAC. EVALUATION OFF., EVALUATION. REP. NO. 60, GEF COUNTRY PORTFOLIO EVALUATION: TURKEY (1992-2009) 16 (2010); *see also* J.L. KARIHALOO & P.A. KUMAR, BT. COTTON IN INDIA: A STATUS REPORT 19 (2d ed. 2009); Todd Michael Lane, *Left Out In the Cold: Economic Discrimination of Turkey's Kurdish Minority*, 14 ANNALES UNIVERSITATIS APULENSIS 297, 304-05 (Ser. Historica 2010) (discussing 2007 study of Indicus Analyticus).

475. *See, e.g.*, Will Day, *Politics of Poverty in Turkey's Southeast*, 38 MIDDLE EAST REP. (Summ. 2008), http://www.merip.org/mer/mer247/politics-poverty-turkeys-southeast.

476. Fifteen million Kurds live in Turkey. U.S. DEP'T. OF STATE, TURKEY 2013 HUMAN RIGHTS REPORT 44 (2014). Both Iraq and Syria contain what have become semi-autonomous Kurdish provinces, and a critical mass of Kurds also reside in Iran. *The Time of the Kurds*, COUNC. ON FOREIGN RELATIONS, http://www.cfr.org/middle-east-and-north-africa/time-kurds/p36547#!/ (last visited Nov. 1, 2015).

477. AHMAD, *supra* note 36, at 78.

478. METIN HEPER, THE STATE AND KURDS IN TURKEY: THE QUESTION OF ASSIMILATION 111, 134-36 (2007) (noting nationalist leaders had been unwilling to respond to the basic needs of Kurds). Merely using the Kurdish language in private conversation has been banned in the past. *Id.* at 316.

479. *See, e.g.*, STEPHEN KINZER, CRESCENT AND STAR: TURKEY BETWEEN TWO WORLDS 117-120 (rev. ed. 2008); *see also* ZÜRCHER, *supra* note 37, at 321-22. The Kurdistan Workers Party's separatist aims violate the Turkish Constitution. *See, e.g.*, CONST. OF THE REPUBLIC OF TURKEY, Oct. 18, 1982, arts. 3 ("The Turkish State, with its territory and nation, is an indivisible entity."), 5 ("The fundamental aims and duties of the State are: to safeguard . . . the indivisibility of the country"). Even the Kurds' demands to use their own language could be seen as having constitutional implications. *Id.* art. 3 ("[The Turkish State's] language is Turkish.").

480. *Turkey Kurds: PKK Chief Ocalan Calls for Ceasefire*, BBC NEWS (Mar. 21, 2013), http://www.bbc.com/news/world-europe-21874427.

correction in favor of larger, more efficient cattle farmers and diversification,[481] but the government cannot just leave Eastern farmers to their fates: Eastern Anatolia is at risk of destabilization.[482] The government *was* and may yet still be on the knife's edge of a comprehensive peace deal with the PKK.[483] The south-central and southeastern provinces are groaning from the social and economic burdens of hosting almost two million Syrian and Iraqi refugees.[484] Turkey is

481. *See, e.g.*, Halil Kizilaslan et al., *Development Direction of Stockbreeding Sector in Turkey (Tokat City Example)*, 17 BULG. J. AGRIC. SCI. 204-205 (2011); Kaya et al., *supra* note 84, at 11-12; ÖZHAN, *supra* note 25, at 2, 4 (describing the "GAP Project," a huge irrigation and hydroelectricity project that may curb unemployment); Ercan Ayboga, *Turkey's GAP and Its Impact in the Region*, KURDISH HERALD, Sept. 2009, at 10; Selli et al., *supra* note 21, at 106-07 (the region is producing only forty six percent of local demand for feed).

482. *See, e.g.*, Carol Morello, *Refugee Wave from Syria and Iraq now a "Mega Crisis," U.N. Official Says*, WASH. POST (Nov. 17, 2014), https://www.washingtonpost.com/world/national-security/refugee-wave-from-syria-and-iraq-now-a-mega-crisis-un-official-says/2014/11/17/ebc5ee50-6eab-11e4-893f-1.

483. *See* Constanze Letsch, *Is Turkey Returning to Civil War*, MIDDLE EAST ONLINE (Oct. 5, 2015), http://www.middle-east-online.com/english/?id=73516; Ayla Albayrak, *Clashes Damp Hopes for Turkey's Kurds*, WALL ST. J. (Oct. 28, 2015, 8:37 p.m. ET), http://www.wsj.com/articles/turkeys-mood-hardens-on-kurdish-party-1446069527; *The Peace Process is Reaching a Dead End*, DEUTSCHE WELLE (Apr. 23, 2014), http://www.dw.de/the-peace-process-is-reaching-a-dead-end/a-17582262; Isabel Hunter, *Kurds Commit to Turkish Peace Process as PKK Leader Announces Definitive End to "40-Year-Long Armed Struggle" with the State*, [U.K.] INDEPENDENT (Mar 22, 2015), http://www.independent.co.uk/news/world/middle-east/kurds-commit-to-turkish-peace-process-as-pkk-leader-announces-definitive-end-to-40yearlong-armed-struggle-with-the-state-10125301.html.

484. *See* OYTUN ORHAN & SABIHA SENYÜCEL GÜNDOĞAR, EFFECTS OF THE SYRIAN REFUGEES ON TURKEY 14-20 (ORSAM Rep. no. 195, Jan. 2015) (describing rising inflation, divorce rates, rents; pressure on public and private services; fears of unemployment and terrorism; massive demographic change such as majority Turkic communities becoming majority Arab and majority Alewite communities becoming majority Sunni). The "population of concern" fleeing the Syrian civil war in Turkey had topped two million as of October 2015, U.N. High Comm'n Refugees, *Turkey*, SYRIA REGIONAL REFUGEE RESPONSE INTER-AGENCY INFO. SHARING PORTAL, http://www.data.unhcr.org/syrianrefugees/country.php? id=224 (last visited Jan. 25, 2016), which is approximately 200,000 more refugees and asylum seekers than the UNHCR anticipated for the entirety of 2015. *See* U.N. High Comm'n Refugees, *Turkey: 2015 UNHCR Country Operations Profile*, UNHCR, http://www.unhcr.org/pages/49e48e0fa7f.html (last visited Oct. 31, 2015). Most of the Syrian refugee camps and those in urban centers are on the Southern border with Syria in the south-central and southeastern regions of Turkey. *See* ORHAN & GUNDOGAR, *supra*, at 14-15. Some also come from the area around Iraq's Mount Sinjar where in August 2014, Islamic State trapped 40,000 Kurds and Yazidis, another group prevalent in eastern Turkey at odds with Kurdish and Muslim neighbors. U.N. High Comm'n Refugees, *Sharp Increase in Iraqi Refugees Fleeing ISIS into Jordan and Turkey*, BRIEFING NOTES (Sept. 23, 2014), http://www.unhcr.org/54214cfe9.html; Idan Barir, *The Yazidis: Traumatic Memory and Be-*

trying to balance what it sees as serious security threats from both the Islamic State and Syrian Kurds,[485] and it may yet engage in military action in Syria, which borders the southeastern provinces.[486]

And the government is not abandoning eastern cattle farmers to their fates, though it faces many challenges. The Turkish government actively promotes the Southeastern region as ripe for foreign investment.[487] Despite unrest, Turkey is pushing ahead with the massive Southeastern Anatolia Project, one of the "most ambitious regional development projects ever attempted in the world," that includes major irrigation, hydroelectricity and socioeconomic initiatives.[488] It is also importing breeding cattle for Eastern farmers which should increase farm productivity.[489] But farmers must have something to feed their new stock.[490]

So 2014 was an inauspicious moment for rain and snowfall to drop by forty percent in Eastern Anatolia, imperiling two years of grain supplies and grasslands for eastern animal husbanders.[491] Livestock farmers took financial hits purchasing imported feed and the quality of available locally grown inputs was low.[492]

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trayal, 8 TEL AVIV NOTES, Sept. 10, 2014, at 1, 3-5, *available at* http://www.dayan.org/yezidis-traumatic-memory-and-betrayal.

485. *See* Derva Kap, *EU and Turkey's Attitudes Toward the Fight Against the ISIS and Foreign Fighters*, RESEARCHTURKEY (Apr. 2015), http://researchturkey.org/eu-and-turkeys-attitudes-towards-the-fight-against-the-isis-and-foreign-fighters/.

486. Thomas Seibert, *Turkey Plans to Invade Syria, but to Stop the Kurds, Not ISIS*, DAILY BEAST (June 28, 2015, 1:18 ET), http://www.thedailybeast.com/articles/2015/06/28/turkey-plans-to-send-troops-into-syria-widening-the-war.html (describing a possible two-front military action, one against ISIS and the other to create a buffer zone for refugees and to thwart Syrian Kurds' national ambitions).

487. FOOD & AGRICULTURE IN TURKEY, *supra* note 68, at 11-12.

488. *See* Gulen Elmas Arslan & Ilkay Pulan, *Economic and Social Impacts of South East Anatolia Project Gap and Beyond*, 3 J. REG. DEV. & PLANNING, 19, 31-32 (2014).

489. *See* Sinem Duyum, *Turkish Tender for 1500 Breeding Bulls*, GAIN REP. (USDA Foreign Agric. Serv./Global Agric. Info. Serv., Wash., D.C.), June 1, 2015, at 2; *Turkey Grain and Feed Annual 2014*, *supra* note 422, at 15; *see also* Yıdırım, *supra* note 466, at 1066.

490. *See* Selli et al., *supra* note 21, at 106-07 (the region is producing only forty-six percent of local demand for feed); Kubilay Karabina, *2015 Turkey Grain and Feed Annual*, GAIN REP. NO. TR5016 (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), Mar. 30 2015, at 13-18 [hereinafter *Turkey Grain and Feed Annual 2015*] (explaining that the impact of Biosafety Law on the local feed market is higher prices and insufficient compound feed to meet demand). *Cf.* Ibrahim Sertioğlu, *2014 Turkey Oilseeds and Products Annual*, GAIN REP. TR4008 (USDA Foreign Agric. Serv./Global Info. Network, Wash., D.C.), Mar. 26, 2014, at 8 [hereinafter *Turkey Oilseeds and Products Annual 2014*] (reporting a small amount of soy planting in the GAP region).

491. *See, e.g.*, *Turkey Grain and Feed Annual 2015*, *supra* note 490, at 5, 7, 10; Rami Zurak, *The Fatal Synergy of War and Drought in the Eastern Mediterranean*, 4 J. AGRIC., FOOD SYS. & COMMUNITY DEV., Wint. 2013-14, at 9, 10.

492. *See Turkey to Import More Wheat for Feed as Drought Persists*, THE POULTRY SITE

Southeastern Anatolia had become one of the nation's major producers of wheat and other grains, but even when times are better, farmers and millers only produce half of the region's feed needs.[493] Some farmers plan to cultivate other crops in future.[494] Droughts in Turkey – including in the east – are likely to become more frequent phenomena.[495] Perhaps few remember the potential foreseen in the 1990s for agricultural biotechnology in this region.[496]

Eastern cattle breeders and milk producers badly need cheaper and more reliable sources of feed of the type that GM producing nations can provide: both to stay in business and also quell the potential for unrest at a sensitive time. The longer-term regional drought may have provoked the violence in Syria, and ISIS is alarming.[497] The huge refugee migration into struggling Eastern Anatolia provinces is unlikely to abate soon.[498] Local residents resent the competition for jobs in times when they feel pushed off their land.[499] One wonders how long peace can endure.[500]

VII. CONCLUSION: QUESTION: COULD THERE BE A FOURTH ORDER EFFECT? ANSWER: IS THE TURKEY HALAL??

The hidden opportunity costs of Turkey's biosafety policies would raise questions even if Turks would have weighed the risks and benefits and accepted

(Mar. 13, 2014), http://www.thepoultrysite.com/poultrynews/31743/turkey-to-import-more-wheat-for-feed-as-drought-persists/; *Turkey Grain and Feed Annual 2015*, *supra* note 490, at 5. The Biosafety Law itself increases the costs of even non-GM imported animal feed, but during this period, the Turkish lira fell against the U.S. dollar as well. *Turkey to Import More Wheat*, *supra* note 492; *see also* Firat Baran, *Farmers Face Drought Following an Arid Season*, SES TURKIYE (Mar. 14, 2014), Turkey.setimes.com/en_GB/articles/ses/articles/features/departments/economy/2014/03/14/feature-01.

493. Selli et al., *supra* note 21, at 106-07.

494. *See, e.g.*, Karabina, *supra* note 492, at 7.

495. LEVENT KURNAZ, DROUGHT IN TURKEY 9 (IPC-Mercator Pol. Br., April 2014).

496. *See generally* N. Gozukirmizi & I. Demir, *Agricultural Biotechnology in Turkey*, BIOTECHNOLOGY & BIOTECHNOLOGICAL EQUIPMENT, Mar. 9, 1995, at 61, 64.

497. *See* Zurak, *supra* note 491, at 9, 10; *supra* authorities cited note 484.

498. *See supra* text and note 484.

499. *See, e.g.*, DINÇER ET AL., *supra* note 472, at 26; *Turkish Kurdistan Has Highest Unemployment Rate*, *supra* note 472.

500. *See* Tulin Daloğlu, *Diyarbakir: Microcosm for Turkey's Kurdish Question*, AL-MONITOR: TURKEY PULSE (Apr. 23, 2014), http://www.al-monitor.com/pulse/originals/2014/04/turkey-kurds-dyarbakir-peace-process-pkk-politics-economy.html (quoting respected local resident as saying, "[t]he region's underdeveloped nature created an easy excuse for people to go up the mountains and join the PKK, but this was not the whole story.").

them after meaningful public deliberation, but they did not.[501] Turkey would receive substantial, concrete, and perhaps immediate second and third order benefits of more broadminded import regulation of GM animal feed. For a nation that seeks to be among the top ten economies in the world by 2023, it would do well to consider a "fourth order opportunity": Turkey's potential in the international halal food marketplace.

Muslim dietary law internalizes two requirements: observant Muslims eat foods that are *halal* and foods that are *tayyib*.[502] Halal foods are permitted for human consumption; haram foods are prohibited.[503] Tayyib foods are "pure, wholesome and safe," which conceptualizes "the means and methods of food production, distribution, preparation, and sale of food that must conform to the Islamic concept of justice and fairness."[504] Shari'a also prescribes certain forms of animal slaughter and prayers at death.[505] Muslims are willing to pay a premium price for guaranteed halal and tayyib meat.[506] Knowing the food came from a Muslim butcher in a Muslim country may provide consumer confidence.[507]

Turks would love to lead in the Muslim world's $1.2-2 trillion halal food

501. Erbaş, *supra* note 28, at 10-12.

502. LODHI, *supra* note 20, at 19, 49.

503. *Id.* at 16-17. All of these are Haram:

Swine or pork and its by-products;
Carrion or improperly slaughtered halal animals;
Animals killed in the name of anyone other than Allah;
Carnivorous animals with fangs such as lions, dogs, wolves, or tigers;
Birds of prey such as falcons, eagles or owls;
Snakes;
Domesticated donkeys, mules and elephants;
Pests such as rats and scorpions;
Insects including locusts;
Blood and blood by-products;
Alcohol and intoxicants of all kinds;
All poisonous plants and poisonous aquatic animals (unless the poison is removed before consumption);
Food which is contaminated with any of the products mentioned above.

504. *Id.* at 49-50. Tayyib also internalizes ethics of fair trade and organic food production. *Id.*

505. *Id.* at 88-95.

506. Mohammed Ibrahim, *Consumer Willingness to Pay a Premium for Halal Goat Meat: A Case from Atlanta, Georgia*, 42 J. FOOD DISTRIBUTION RES. 72, 74 (2011); *see also* S. Romi Mukherjee, *Global Halal: Meat, Money, and Religion*, 5 RELIGIONS 22, 23 (2014) ("Halal is a matter of 'trust.'").

507. *See* LODHI, *supra* note 20, at 52. Muslim butchers are preferred for animal slaughter, though other people of the book may do so and the product maintain its halal character.

market.[508] But Turkey did not even have a halal certification program, absolutely essential element to succeed in this market, until 2011.[509] Turks may hope you think otherwise, but organic is not halal even if it captures many of the characteristics of tayyib.[510]

Turkey could position itself as a halal red meat producer. It has muscled its way onto the halal poultry industry's stage.[511] With its Mediterranean coast and historic Muslim sites, Turkey is moving up the "alternative" tourism rankings.[512] But none of the world's largest halal red meat producers are majority Muslim nations, and the leaders all unashamedly use GM feed.[513] Turkey will not be competitive without some way of cutting producers' costs.[514]

Again, GM feed could help. Many influential Islamic scholars consider GM foods halal.[515] Europe, already Turkey's best agriculture products market, has a large Muslim population, and the European Union does not require "the products obtained from animals fed with genetically modified feed" to go through its rigid approval requirements or bear a label.[516] European Muslims might even pay a price premium for a guaranteed halal product from a Muslim

508. Betül Akkaya Demirbaş & Merve Tunçel, *Turkey Eyes Greater Share of Pie in Global Halal Market*, TODAY'S ZAMAN (May 8, 2011, 12:57:00), http://www.todayszaman.com/news-243160-turkey-eyes-greater-share-of-pie-in-global-Halal-market.html. Turkey itself is the second largest food market in the Muslim world. *FAO: Turkey Poised to Be Key Halal Food Exporter*, TODAY'S ZAMAN (Jan. 19, 2014, 00:00:00), http://www.todayszaman.com/news-336959-fao-turkey-poised-to-be-key-Halal-food-exporter.html.

509. *Turkish Companies Eye*, *supra* note 20; Şaban Gündüz, *Turkey Misses Out on $2.1 Trillion Halal Market*, TODAY'S ZAMAN (Sept. 25, 2007, 20:47:00), http://www.todayszaman.com/business_turkey-misses-out-on-21-trillion-halal-market_123036.html.

510. It may be, but that would be coincidental. LODHI, *supra* note 20, at 48-50.

511. *India and Turkey: Competitive Advantages Impact Global Trade*, LIVESTOCK & POULTRY: WORLD MARKETS & TRADE (USDA Foreign Agric. Serv., Wash., D.C.), Apr. 2015, at 1, 1.

512. Dorian Jones, *Turkey Sets Its Sights on $126-Billion Islamic Tourism Market*, EURASIANET (Oct. 19, 2012, 1:02 P.M.), http://www.eurasianet.org/node/66077. In 2013, the Turkish Standards Institution has also instituted a halal certification for restaurants, markets and hotel dining facilities. *Food-Serving Facilities to Obtain Halal Certificates*, HURRIYET DAILY NEWS (Feb. 11, 2013), http://www.hurriyetdailynews.com/food-serving-facilities-to-obtain-halal-certificates.aspx?pageID=238&nID=40845&NewsCatID=349.

513. *India and Turkey*, *supra* note 511.

514. *See* Selli et al., *supra* note 21, at 105, 110.

515. *See* Ebrahim Moosa, *Genetically Modified Foods and Muslim Ethics*, *in* ACCEPTABLE GENES? RELIGIOUS TRADITIONS AND GENETICALLY MODIFIED FOODS 135, 142-46 (Conrad G. Brunk & Harold Coward eds., 2009).

516. EC Reg. 1829/2003, *supra* note 129, pmbl. 16.

country even if Turks cannot always afford to pay for meat at home.[517] Modernizing the red meat sector to compete internationally would be very hard, but when the work is about following a strategic plan as opposed to a road to nowhere, it inspires greater optimism.

Of the three Abrahamic faiths, Islam offers the most direct insight into the ethical theological questions that arise from GM foodstuffs: a hadith in which the Prophet actually sees two men grafting different species of date palm seedlings![518] He suggests that it might be better if these farmers did not engage in this practice, and they dutifully take his advice.[519]

But the story continues. The crop fails. The farmers explain to Mohammed that the calamity is a result of their taking his advice about grafting.[520] Mohammed is taken aback; he has no expertise as to agriculture and is surprised the men would take his offhand advice so seriously.[521] He explains that his statements about moral and spiritual issues are authoritative, but he also has his own personal opinions about other matters that lack such authority.[522] "You are more knowledgeable in the affairs of your world," he points out.[523] The hadith's wisdom is not that genetic modification of plants is halal, of course, but that the proper use of revealed truth and its authority is different in different fields.[524]

Duke Professor Ebrahim Moosa sorts Muslim commentators into two groups: one that generally supports GMOs and considers GMOs to be a "manageable risk" and another that takes a "precautionary view."[525] Reminiscent of the secular cleavages, the "manageable risk" group applies a risk-benefit analysis: if GM foodstuffs do more good than harm, or at least if the harms are not yet known or can be mitigated, GM foodstuffs are halal,[526] subconsciously accepting that the risks are not high.[527] The "precautionary view" rejects legalism for an-

517. *See Halal Certification Is Now Considered — A Certification for Quality*, WORLD HALAL COUNCIL, http:www.worldhalalcouncil.com/about-us (last visited Oct. 31, 2015).

518. Moosa, *supra* note 515, at 138.

519. *Id.*

520. *Id.*

521. *Id.* Professionally, Mohammed was a merchant, not a farmer.

522. *Id.*

523. *Id.*

524. Moosa's interpretation of the hadith is the message of Vatican II's *Decree on the Apostolate of Lay People*, *in* VATICAN COUNCIL II, VOL. 1: THE CONCILIAR AND POST CONCILIAR DOCUMENTS 766 (Reverend Austin Flannery rev. ed., 1998).

525. Moosa, *supra* note 515, at 142-48.

526. *Id.* at 142-46.

527. *Id.* at 145 (for example, quoting Mufti Massod Haswan Hasni and Mufti Nisir Ali, "Unless the harm of a thing is known categorically or by means of a dominant probability, one cannot designate a permissible thing to be prohibited on a mere apprehension of harm. However, if out of precaution one refuses to partake of such foods, then that is the exercise of

other thin theological theory informed more by preconceived views of GMOs' safety and the politics of science rather than the Koran.[528] That value set magnifies perceived risks and discount potential benefits.

So the Muslim ethical debate over GM foods and feed captures the contours of the western, secular public policy debate about appropriate regulation. Surely by now Turks are used to such parallels and consistencies. To navigate them and translate them for others must be the essence of what it is to be a bridge from east to west.

one's choice."); INTERNATIONAL WORKSHOP FOR ISLAMIC SCHOLARS, note 18, at 53; *cf.* WORLD HALAL FORUM, GENETICALLY MODIFIED (GM) CROPS & HALAL WORKSHOP REPORT 19 (2010) (quoting resolution that "Biotech crops and products have undergone intensive food and environmental safety tests and are acceptable in the Islamic world as Halal, provided the sources are Halal.").

528. Moosa, *supra* note 515, at 146-48. Moosa delicately describes one frequent interpretation of the Koran against "altering of nature" as "very modern." *Id.*