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Is financial speculation with agricultural  
commodities harmful or helpful? –  
A literature review of current empirical research

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### *Abstract*

This literature survey comprises 35 empirical studies published between 2010 and 2012 that analyze the influence of financial speculation on the markets for agricultural commodities. According to the current state of research, there is little supporting evidence that the recent increase in financial speculation has caused either a) of the price level, or (b) the price volatility in agricultural markets to rise. Rather, fundamental factors are responsible for this. Therefore, most papers are not in favor of, but *against* (c) erecting market barriers by regulation. Against this background, the public alarm, which claims that financial speculation has detrimental effects and should be forbidden, seems to be a false alarm. Those who are interested in fighting global hunger should take care of fundamental factors and take appropriate measures to keep supply in step with demand, which is likely to rise in the near future.

Key words: Financial speculation, futures market, agricultural commodities, regulation, position limits, transaction tax, volatility, price level

JEL classification: D84, G12, G13, G14, Q13, Q18

### *Kurzfassung*

Dieser Literaturüberblick wertet 35 Forschungsarbeiten aus, die zwischen 2010 und 2012 veröffentlicht wurden und den Einfluss der Finanzspekulation auf die Agrarrohstoffmärkte empirisch untersuchen: Gemäß aktuellem Erkenntnisstand spricht wenig für die Auffassung, dass die Zunahme der Finanzspekulation in den letzten Jahren (a) das Niveau bzw. (b) die Volatilität der Preise für Agrarrohstoffe hat ansteigen lassen. Hierfür waren vielmehr realwirtschaftliche Faktoren verantwortlich. Deshalb sind die wissenschaftlichen Studien mehrheitlich nicht dafür, sondern *dagegen*, (c) regulatorische Marktzutrittsbarrieren zu errichten. Insofern ist der zivilgesellschaftliche Alarm zur Finanzspekulation als *Fehl*-Alarm einzustufen: Wer den Hunger in der Welt wirksam bekämpfen will, muss *realwirtschaftlich* dafür Sorge tragen, dass das Angebot an Nahrungsmitteln mit der auf absehbare Zeit steigenden Nachfrage Schritt halten kann

Schlagwörter: Finanzspekulation, Terminmarkt, Agrarrohstoffe, Regulierung, Positions-Limits, Transaktionssteuer, Volatilität, Preisniveau

JEL-Klassifikation: D84, G12, G13, G14, Q13, Q18



# Is financial speculation with agricultural commodities harmful or helpful? – A literature review of current empirical research

Matthias Georg Will, Sören Prehn, Ingo Pies, Thomas Glauben

## *Introduction*

Several years ago, major index funds started to cultivate long positions on the futures market for agricultural commodities. Are the consequences of this involvement good or bad? Any answer to this question has far-reaching consequences regarding the appropriate regulation of financial markets. A sound answer must follow a consistent theory and, more importantly, must be based on thorough empirical analysis. This is why the insights of academic specialists and the recommendations for regulation made in the relevant economic literature are of particular interest.

The argument set forth in this paper develops in three steps:

- The first section examines current public debate. Here, we outline that civil society organizations are concerned that financial speculation has dramatically driven up price levels for agricultural commodities. Another concern is that financial speculation may have reinforced any fluctuations in this price level, i.e. the volatility of agricultural prices. Critics conclude that financial speculation ought to be restrained through regulation. To that end the introduction of a transaction tax, as well as the setting of position limits, are recommended. In addition, some call for a regulatory prohibition of financial speculation.
- In the second section, the empirical literature available on these issues is reviewed. In total, 35 articles published between 2010 and 2012 will be examined. Ten of these articles were published in peer-reviewed scientific journals. The other 25 studies appeared in high-quality grey literature and cover the current state of research. These studies will be analyzed with respect to three questions: which empirical insights have been revealed about the effect of speculation on: (a) price levels, and (b) price volatility of agricultural commodities? Moreover, what pronouncements do these studies make (c) on issues pertaining to regulation?
- The third section provides a summary of the measures that should be taken to regulate the futures markets for agricultural commodities in view of the current state of research; this section also summarizes the measures that should not be taken. Together with the mainstream of academic literature, we recommend transparency regulations that are intended to increase information efficiency, but we warn against establishing market access barriers. Transaction taxes, position limits and prohibitions in particular involve the risk that, if they are imposed, the functioning of agricultural markets may in fact be impaired rather than improved.

### *1. The public debate*

Over the last ten years new players have emerged on the futures markets for agricultural commodities. Commodity Index Traders (CITs) have become heavily involved, following a business model that advocates holding long positions continuously and rolling them over regularly. Such CITs do not build up inventory levels themselves, but contribute towards hedging agricultural producers against the risk of a drop in prices.

This recent development has caused some to suspect that CITs may be causally responsible for the dramatic price events of 2007/8, 2010/1 and 2012. In view of global food riots, numerous representatives who either study the agricultural markets or are themselves active on them have voiced the opinion that the financial speculation on agricultural commodities undertaken by CITs may have caused the dramatic increase in food prices that has particularly affected people living in extreme poverty. Since then, financial speculation with agricultural commodities has become the focus of public attention and criticism.<sup>1</sup>

((1)) One of the leading protagonists of this international debate is the American Michael W. Masters. He is a hedge fund manager, but also set up the civil society organization "Better Markets", which lobbies politicians on the issue of stricter financial market regulation. Very early on and using attention-grabbing language, Masters advanced a certain hypothesis in congressional hearings in the United States. This "Masters hypothesis" – it is now even called this in academic literature – holds CITs responsible for the extreme price events. From an analytical perspective, the Masters hypothesis weaves together the following five arguments:

1. Financial speculation increased excessively.
2. Excessive financial speculation has led to adverse developments on the futures market.
3. These adverse developments spread from the futures market to the spot market.
4. Extreme food price increases, and consequently hunger, are not caused within the real economy; instead, they are the adverse result of financial speculation.
5. Thus, financial speculation must be reigned in dramatically or even prohibited.

It is not hard to find proof for Masters' arguments to culminate in a genuine call for prohibition. On March 25, 2010, for instance, he gave the following assessment in front of the "Commodities Future Trading Commission" in the United States:

"Active and passive speculators are two very different animals, and to understand the distinctions between the two is to appreciate the extent of the threat posed by passive speculators. Active speculators add beneficial liquidity to the market by buying and selling futures contracts with the goal of turning a profit. In contrast, passive speculators drain liquidity by buying and holding large quantities of futures contracts – basically acting as consumers who never actually take delivery of goods. Passive speculators "invest" in a commodity or basket of commodities (such as an index), and continuously roll their position, as part of a long-term portfolio diversification strategy. This strategy is completely blind to the supply and demand realities in the market. As such, passive speculators not only undermine, but actually destroy the price discovery function of the market and make way for the formation of speculative bubbles.

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<sup>1</sup> The following comments are based on Pies (2012).

Passive speculators are an invasive species that will continue to damage the markets until they are eradicated."<sup>2</sup>

((2)) This Masters hypothesis quickly found prominent advocates. To prove this, two sources suffice:

- In September 2010, Olivier de Schutter, in his capacity as UN Special Rapporteur on the Right to Food, issued a statement in which he advanced the following view: "A significant contributory cause of the price spike was speculation by institutional investors who did not have any expertise or interest in agricultural commodities, and who invested in commodities index funds because other financial markets had dried up, or in order to hedge speculative bets made on those markets."<sup>3</sup>
- On June 5, 2011, UNCTAD jointly published a study, together with the Viennese Chamber of Labor (*Arbeiterkammer Wien*), which contained, among others, the following recommendations on the regulation of the futures markets for agricultural commodities:<sup>4</sup>
  - One, to introduce strict position limits to reign in the speculation volume.
  - Two, to prevent banks from building up their own positions on the futures and spot markets for agricultural commodities.

((3)) However, in June 2010 at the latest, the public had become aware of the fact that some researchers were certainly skeptical of the Masters hypothesis, and may even have opposed it. At the time, the OECD published a discussion paper by Irwin and Sanders that caused a huge stir internationally. In it, the authors list, in great detail, theoretical deliberations and empirical evidence against the Masters hypothesis. Based on their own analyses and on recent studies published in academic journals, they reached the following conclusion.

"[T]he weight of evidence clearly suggests that increased index fund activity in 2006-08 did not cause a bubble in commodity futures prices."<sup>5</sup>

((4)) Just a few days later, on June 30, 2010, David Frenk, an employee of the "Better Markets" organization and therefore a close associate of Michael W. Masters, published a ten-page commentary on the Irwin and Sanders' OECD discussion paper on the Internet.<sup>6</sup> His verdict was crushing. Raising several objections, he came to the remarkable view that "the study and its findings can be disregarded ... The overall analysis is superficial and easily refuted by looking at some basic facts."<sup>7</sup> Instead of taking the academic findings seriously, he recommended that his readers rely merely on what they can see for themselves. After all, the temporal coincidence of rising financial speculation and rising agricultural commodities prices is, in his view, sufficient evidence that there is no getting away from the Masters hypothesis.<sup>8</sup>

((5)) In the meantime, twelve civil society organizations, some of which are very well known, formed an alliance in Germany. These organizations expressly adopt David Frenk's view, and are engaging in a joint publicity campaign against financial speculation with agricultural commodities.

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<sup>2</sup> Masters (2010; p. 5).

<sup>3</sup> de Schutter (2010; p. 8, highlighted in the original).

<sup>4</sup> Cf. UNCTAD and Arbeiterkammer Wien (2011; p. 52).

<sup>5</sup> Irwin and Sanders (2010; p. 1, H.i.O.).

<sup>6</sup> Cf. Frenk (2010).

<sup>7</sup> Frenk (2010; p. 1).

<sup>8</sup> Cf. Frenk (2010; p. 10).

To render their calls for regulation and prohibition even more powerful, these civil society organizations have commissioned reports of their own. In these reports David Frenk, alongside Michael W. Masters, assumes the mantle of the leading authority for those who criticize speculation:

- The report for Oxfam Germany, which spans more than 50 pages, contains no less than five references to political statements made by Michael Masters and the organization he established, "Better Markets"<sup>9</sup>. The report simultaneously calls for a "prohibition of index funds on the agricultural commodities markets or at least for an introduction of particularly strict position limits for this category of trader as a whole"<sup>10</sup>.
- The report drawn up on behalf of Misereor may not explicitly refer to the Masters hypothesis or to David Frenk's response to the critics of said hypothesis, but it does so implicitly and very clearly. The report contains the following statement: "As the analysis below shows, the key influence of speculation on the price development of basic foodstuffs in developing countries can hardly be denied. Speculators, in particular, may repeatedly proclaim not only the »innocence«, but also the productive effect of speculation. However, a modicum of knowledge as regards the functioning of the financial markets is sufficient to demystify such claims."<sup>11</sup>
- The report drawn up on behalf of foodwatch is mainly based on interviews the author carried out with speculation critics such as David Frenk.<sup>12</sup> The 85-page report expressly adopts the Masters hypothesis, relying on the authority of Masters' employee at "Better Markets", David Frenk. Moreover, in the report Frenk is elevated to the status of principal witness:<sup>13</sup> the foodwatch report cites and adopts David Frenk's view that the Irwin and Sanders OECD study of 2010, in particular, as well as the research findings they compiled, are not worthy of consideration.<sup>14</sup> Simultaneously, the report claims that an "academic assessment"<sup>15</sup> of the data furnishes "overwhelming evidence"<sup>16</sup> for the claim "that speculation with foodstuffs on the commodities markets drives up prices and causes hunger"<sup>17</sup>.

In this series of publications from civil society organizations, the 100-plus page report commissioned by German Agro Action (*Welthungerhilfe*) constitutes an exception, at least to a certain extent. Masters' arguments are again referred to extensively,<sup>18</sup> but first of all, this is the only report to have been compiled by an academic. Sec-

<sup>9</sup> Cf. Hachfeld, Pohl and Wiggerthale's 77 entry strong bibliography (2012; p. 56 et seq.).

<sup>10</sup> Hachfeld, Pohl and Wiggerthale (2012; p. 10, own translation).

<sup>11</sup> Müller (2011; p. 3, own translation).

<sup>12</sup> Cf. Schumann's acknowledgements (2011; p. 86).

<sup>13</sup> Cf. Schumann (2011; p. 42, p. 44 and particularly p. 52).

<sup>14</sup> Schumann (2011; p. 52, own translation): "After having read the [OECD] study, the economist David Frenk, who was himself a trader on the futures market in the past and is now a well-regarded analyst of the commodities markets, came to the conclusion that this study uses 'a statistical method which is not at all suited to the data in question' and that its findings can be 'easily refuted by some simple facts'."

<sup>15</sup> Schumann (2011; Thesis 8, p. 8, own translation).

<sup>16</sup> Schumann (2011; Preface, p. 4, own translation).

<sup>17</sup> Schumann (2011; Preface, p. 4, own translation).

<sup>18</sup> Cf. Bass (2011; p. 46, endnote 38, p. 101, endnote 41, p. 101 and endnote 79, p. 104).



ondly, this report explicitly distances itself from the calls for regulation made by German Agro Action, which had commissioned the report.<sup>19</sup>

((6)) Other academics also objected to these civil society organizations' calls for regulation. For example, within a few months, in three publicly documented disputes, Thilo Bode – who, as head of foodwatch, holds the view that banks are "hunger-makers" and that financial speculation needs to be "prohibited" – time and again had to listen to the holders of economics chairs telling him that the arguments he uses to explain agricultural prices do not tally with current research, and that state-of-the-art academic findings are diametrically opposed to his call for prohibition.<sup>20</sup> Nevertheless, the civil society organizations which jointly run a campaign against financial speculation are steadfast in their claim that their arguments are supported by academic evidence.<sup>21</sup>

((7)) Against this background, this study endeavors to help clarify the facts of the case that are being so hotly debated in public. Thus, the following section will analyze current research. The key questions are as follows: which empirical findings are currently available regarding the positive or negative consequences of financial speculation with agricultural commodities? And which economic policy conclusions do academics draw from these empirical findings in their studies?

## 2. Academic literature

This review of academic literature is split into two parts: part I analyses relevant journal articles published between 2010 and 2012. There are ten articles in total that have undergone an academic peer-review process (cf. table 1). Part II extends the size of the sample by 25 grey literature contributions that were published during the same period, but (currently) only have the status of discussion papers (table 2).

We ensured that all contributions analyzed here are independent empirical studies adhering to academic standards and deploying elaborate econometric methods of time series analysis.<sup>22</sup> Alongside the temporal focus on academic papers from 2010 to 2012, a third criterion consisted of selecting only contributions that focus expressly on the issues that are of interest here, i.e. how to assess the consequences of financial speculation and which conclusions are to be drawn as regards regulating the agricultural markets.

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<sup>19</sup> The report was published in May 2011. Some months before, on February 17, 2011, German Agro Action and other civil society organizations had jointly called for "excluding purely financial players" from trading with agricultural commodity futures. The report drawn up on behalf of German Agro Action explicitly rejects this call for exclusion, arguing that (Bass 2011; p. 91, own translation): "In our view eliminating *all* players who pursue purely financial interests would ... cause enormous liquidity shortages and not enable hedgers to take up an opposing position. ... This proposal does not do justice to ... the complexity of the issue."

<sup>20</sup> Cf. FAZ (2012), Handelsblatt (2012) and Sueddeutsche Zeitung (2012). Cf. also the corresponding video announcement at: <http://www.sueddeutsche.de/wirtschaft/steigende-lebensmittelpreise-boesespekulanten-gute-spekulanten-1.1494851>

<sup>21</sup> Cf. attac et al. (2012; p. 1).

<sup>22</sup> This literature review constructively responds to Shutes and Meijerink's suggestions in their earlier work (2012), but focuses exclusively on literature that can be classified as scientific.

### 2.1. Part I of the review: journal literature

The first part of this literature review analyzes current publications published in academic journals between 2010 and 2012. These journals use the peer-review method to assess the quality of the articles submitted, with the evaluation procedures set up by the journals' editors functioning as academic self-regulation. They are designed to ensure that the publications represent a certain methodological quality: to this end, independent, voluntary assessors from the competent specialist area verify whether both the concept behind, and the execution of, the submitted articles correspond to the current state of academic research.

This does not mean, however, that journal articles are always free of errors. On the contrary: every scientific statement is fallible *per se*. Nevertheless, journal articles can be regarded as being of a particularly high quality because they have successfully passed intra-academic controls in the form of a peer review. After all, experts only approve publication once they have ensured that the statements made hold up from both a theoretical and empirical point of view. Also, the scientific community provides significant incentives to anyone who criticizes published journal articles and uncovers errors. This is why it seems appropriate to consider journal articles that have not yet been proven wrong as the best available evidence.

Against this background we will now analyze which findings journal articles have presented on the three questions that constitute the main focus of our interest.

((1)) *On the influence of financial speculation on price levels*: eight of the ten studies pursue the issue of whether financial speculation contributed to driving up the price levels on the agricultural commodities futures market during the period in question – particularly between 2006 and 2008. In this respect the studies test the allegation made by civil society organizations. Interestingly, all eight studies conclude that there is *no* evidence for the feared effect.

The following statements are typical of the point of view advanced in the journal articles we examined. They reflect the way in which various authors sum up the empirical evidence:

- "First, there was a fairly dramatic and massive buildup in commodity index fund positions in the U.S. grain futures markets examined. ... Second, the buildup in commodity index contracts and the peak level of index holdings predates the 2007–08 increase in commodity prices for which they are blamed. This observation casts serious doubt on the hypothesis that commodity index speculation drove the 2007–08 commodity price increase. Third, formal econometric tests fail to find a statistical link between commodity index positions and returns in grain futures markets. Both Granger causality tests and long-horizon regressions generally fail to reject the null hypothesis that commodity index positions have no impact on futures prices."<sup>23</sup>
- "Commodity index rolls have little future price impact, and inflows and outflows from commodity index investment do not cause future prices to change."<sup>24</sup>
- "[T]he weight of the evidence is not consistent with the argument that index funds created a bubble in commodity futures prices. Whether the wave of index fund investment simply overwhelmed normal supply and demand functions ..., channeled investors' views about commodity price directions ..., or integrated financial and commodity markets ..., the linkage between the level of commodity futures prices and market positions of index funds should

<sup>23</sup> Sanders and Irwin (2011a; p. 530).

<sup>24</sup> Stoll and Whaley (2010; p. 44, stressed in the original.)

be clearly detectable in the data. Very limited traces of this linkage are visible, however. To date, no »smoking gun« has been found."<sup>25</sup>

Against this background, we can conclude the following: while civil society organizations warn that financial speculation causes agricultural prices to rise, academic studies unanimously give financial speculation full support. The econometric methods used have not yet furnished any proof at a statistically relevant level that the increase in financial speculation in recent years has caused agricultural prices to rise above a level that can be explained by fundamental economic factors.

((2)) *On the influence of financial speculation on price volatility*: of the ten peer-reviewed articles, four investigate whether financial speculation has contributed to an increase in volatility, i.e. the fluctuation of price levels, on the futures and spot markets for agricultural commodities. If this were the case, CITs would not serve to boost security, instead they would increase uncertainty.

- As regards such dysfunctional volatility effects, two studies provide reassurance, and are unable to confirm such concerns.<sup>26</sup>
- Although another study has detected a statistically significant correlation, the influence is actually a *negative* one: volatility was found to decrease in proportion to growing trading volumes.<sup>27</sup>
- Only one study arrived at a finding that was critical of speculation, stating that volatility increases in the short-term (on a monthly basis); but the study also notes that the identified effect does not lead to adverse results in the medium or long term, because on a six-month basis (and certainly on a twelve-month basis) fundamental economic factors are clearly decisive.<sup>28</sup>

Against this background, we can note that none of the studies have found clear, statistically relevant evidence for an increase in volatility as a result of financial speculation in both the medium and the long term. In this respect, too, the warning of civil society organizations is *invalidated* by academic literature.

((3)) *On regulating financial speculation with agricultural commodities*: of the ten articles published in the journals we examined, seven explicitly refer to the issue of regulation. However, none of the journal articles come out in favor of position limits, let alone a prohibition of financial speculation with agricultural commodities. On the contrary, five articles call for caution as regards regulating forward transactions and note the danger that such adverse regulation may not improve, but rather *worsen* the functioning of the agricultural markets. These articles particularly warn against taking liquidity out of the market, because this would lead to many agricultural producers not finding any exchange partners who would provide a hedge against price

<sup>25</sup> Irwin and Sanders (2011; p. 25).

<sup>26</sup> Cf. the findings and their interpretation by Bastianin et al. (2012, p. 3 and p. 4), which does not give cause for much concern. Cf. also Irwin and Sanders (2012b; p. 268 et seq.): "Cross-sectional ... regression tests ... find very little evidence that index positions influence returns or volatility in 19 commodity futures markets. The results are robust to whether lagged or contemporaneous effects are considered and the addition of the nearby-deferred futures spread as a conditioning variable. The findings are the strongest evidence against the Masters Hypothesis to date".

<sup>27</sup> Cf. Sanders and Irwin (2011b; p. 47-48).

<sup>28</sup> McPhail et al. (2012; p. 409): "We measure the relative importance of global demand, speculation, and energy in explaining corn price volatility. ... In addition to corn market shocks, speculation is the most important of the considered factors in explaining corn price variations, but only in the short run. However, in the long run, energy is the most important followed by global demand, while the effect of speculation is minimal given the effects of global demand and energy."

risks. As a consequence, agricultural producers would have to bear their risks themselves, instead of passing them on to other players who are willing and able, in return for an appropriate premium, to take on these price risks.

However, it is not only the case that most of the studies consider financial speculation to be harmless. Five journal articles explicitly state that financial speculation has a *positive* effect, and that it contributes to the better functioning of the futures markets for agricultural commodities. With respect to the system, financial speculation is regarded as exercising the following functions: it contributes to providing liquidity for the futures markets; to facilitating pricing; to increasing the efficiency of information on the agricultural markets; and to promoting economic risk diversification by giving risk-averse agricultural producers the option of passing on the risks of price changes, which they fear, to more risk-seeking speculators.

The following statements are typical of the point of view advanced in the journal articles we examined; they reflect the way in which academic authors draw economic policy conclusions from the empirical evidence.

- "Much like in the last major episode of structural change in commodity markets from 1972-1975, some blame speculators for the recent increase in commodity prices. Proposals are once again surfacing to curb »harmful« speculation in futures markets. Such policy decisions aimed at curbing speculation may well be counter-productive in terms of price levels or market volatility. In particular, these policy initiatives could severely compromise the ability of futures markets to accommodate hedgers and facilitate the transfer of risk."<sup>29</sup>
- "Important implications for public policy follow from the conclusion that index funds were not a primary driver of the 2007-08 commodity price boom. New limits on speculation are not grounded in well-established empirical findings and could impede the price discovery and risk-shifting functions of these markets. In particular, limiting the participation of index fund investors would diminish an important source of risk-bearing capacity at a time when such capacity is in high demand. Commodity futures markets would become less efficient mechanisms for transferring risk from parties who don't want to bear it to those that do, creating added costs that ultimately get passed back to producers in the form of lower prices and back to consumers as higher prices."<sup>30</sup>
- "The failure of the empirical results to support the Masters Hypothesis has important implications for the pricing performance of commodity futures markets. It implies that the markets were sufficiently liquid to absorb the large order flow of index funds in recent years, at least over daily or longer time horizons. Traders in commodity futures markets also did not confuse index fund position changes with signals about market fundamentals; rather, they reacted rationally to the market activity of index funds. The evidence strongly suggests that index funds—while a sizable participant—did *not* in fact harm price discovery in commodity futures markets. From this vantage point, recent regulatory plans to impose speculative position limits on index fund investors in all U.S. commodity futures markets appear to be ill-conceived."<sup>31</sup>

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<sup>29</sup> Sanders et al. (2010; p. 92).

<sup>30</sup> Irwin and Sanders (2011b; p. 25 et seq.).

<sup>31</sup> Irwin and Sanders (2012, p. 269, highlighted in the original).

*Table 1: Empirical journal studies*

Authors	Year of the Publication	Observation Period		Focus of the Study: Impact on		The Study Examines Prices on the		The Study Reveals an Impact on		Implications for Regulation									
		from	till	Vola-tility?	Level?	Futures Market	Spot Market	Vola-tility	Level	Normative Statements	Positive Effects of Index Funds	Caution with Regulation	Against Position Limits	Extensive Regulation is Necessary	Rules for Information & Transparency	Real or Virtual Reserves	Position Limits	Transaction Tax	Restrictive Monetary Policy
Bastianin et al.	2012	1986	2010	1		1		0											
Irwin et al.	2011	2000	2010		1	1		0	0	1			1						
Irwin, Sanders	2012b	2002	2011	1	1	1		0	0	1	1								
McPhail et al.	2012	2000	2011	1		1	1	1											
Sanders et al.	2010	2006	2008		1	1			0	1	1		1						
Sanders, Irwin	2010	2006	2008		1	1			0	1			1						
Sanders, Irwin	2011a	2006	2009	1	1	1		1	0	1	1		1	1					
Sanders, Irwin	2011b	2004	2009		1	1			0	1	1		1						
Stoll, Whaley	2010	2006	2009		1	1			0	1	1								
Stoll, Whaley	2011	2006	2009		1	1			0										
Number of Studies	10			4	8	10	1	2	0	7	5	5	1						

NB: "1" means that a corresponding investigation was carried out or that a statistically significant correlation has been found or that the authors are making certain normative statements. By contrast "0" means that a corresponding link was examined, but that no statistically significant correlation has been found. Gaps in the table can be read as meaning that the authors do not make any comments regarding the category in question.

Source: Own graphic.

Table 2: Empirical grey literature studies

Authors	Year of the Publication	Observation Period		Focus of the Study: Impact on		The Study Examines Prices on the		The Study Reveals an Impact on		Implications for Regulation									
		from	till	Vola-tility?	Level?	Futures Market	Spot Market	Vola-tility	Level	Normative Statements	Positive Effects of Index Funds	Caution with Regulation	Against Position Limits	Extensive Regulation is Necessary	Rules for Information & Transparency	Real or Virtual Reserves	Position Limits	Transaction Tax	Restrictive Monetary Policy
Adämmer et al.	2011	1992	2011		1	1	1	1	1	1				1			1		
Algieri	2012	1995	2012	1		1	1	1											
Aulerich et al.	2012	2004	2009	1	1	1		0	0	1	1	1	1						
Baffes, Haniotis	2010	1960	2008		1	1	1		1	1						1			
Belke et al.	2012	1980	2011		1		1		1	1							1		1
Bohl et al.	2012	2006	2011	1		1		0		1	1	1	1						
Bohl, Stephan	2012	1992	2012	1		1	1	0		1	1	1							
von Braun, Tadesse	2012	1986	2009	1	1	1	1	1	1	1				1		1	1	1	
Brunetti et al.	2011	2005	2009	1	1	1		0	0	1	1		1						
Capelle-Blancard, Coulibaly	2012	2006	2010		1	1			0										
Dwyer et al.	2011	1995	2011	1		1	1	0											
Dwyer et al.	2012	1997	2011	1	1	1	1	0	0										
Frenk, Turbeville	2011	1996	2011	1	1	1		1	1	1					1			1	
Garcia et al.	2011	1986	2010		1	1			0		1								
Gilbert	2010	2001	2009		1	1	1		1										
Gilbert	2012	2006	2011	1		1		0		1		1							
Gilbert, Pfuderer	2012	2004	2011		1	1			1										
Hamilton, Wu	2012	2006	2011		1	1			0										
Irwin	2012	2004	2010		1	1			1										
Irwin, Sanders	2010	2006	2009		1	1		0		1		1	1						
Liao-Etienne et al.	2012	2004	2012		1	1		0											
Liu et al.	2012	1989	2011		1	1		0		1		1							
Manera et al.	2012	1986	2010	1	1	1		0	0										
Shanmugan et al.	2012	1995	2011	1		1	1	0											
Tang, Xiong	2012	1998	2009	1	1	1		1	1	1		1	1		1				
Number of Studies	25			13	19	24	10	4	9	13	5	7	5	2	3	2	3	2	1

NB: For an interpretation of the table, please refer to table 1. Von Braun and Tadesse (2012) also list other regulation suggestions: adapting trade policy (imports, exports); reducing export subsidies; research and development; investments on the agricultural market; reduction of bio fuel production; use of alternative bio fuels; food reserves and emergency aid for those going hungry.

Source: Own graphic.

Against this background we can note that the ten journal articles do not explicitly answer the question of whether a transaction tax should be introduced or not. However, seven of these articles comment, at least implicitly, on the calls by civil society organizations for position limits for index traders (CITs) and for prohibiting financial speculation. These seven journal articles are clearly not in favor, but *opposed* to such calls. In particular they explicitly warn against excessive and adverse regulation that would remove liquidity from the financial markets, make price finding harder and limit the insurance function.

## 2.2. Part II of the review: grey literature

It is striking that six of the ten articles were written in collaboration with either Scott H. Irwin or Dwight R. Sandler. Two articles were authored by Hans R. Stoll and Robert E. Whaley. This means that the overall number of authors is lower than the overall number of journal articles that had undergone a peer review and were published during the period in question.

This is why much can be said for examining a second sample as a control group, and is why, in addition to the ten journal articles, we also analyzed 25 grey literature papers. The criteria that were decisive in selecting these papers were as follows: (a) the papers needed to have been published between 2010 and 2012; (b) they needed to be clearly academic in nature and; (c) they needed to have carried out independent empirical analyses using econometric testing procedures, in order to; (d) examine the very same questions that are of interest to us here.

Naturally, not only does the quality of the papers vary more widely than that of the journal articles we examined, but so do the results. Alongside papers that are *unable* to demonstrate that financial speculation has an adverse effect on volatility or the price of agricultural commodities, there are also papers that claim to have found such evidence. This is why merely counting publications does not help in this case. Instead, one has to take a closer look and verify what exactly was measured, which methods were used and how sound the results really are.

The same applies to the economic policy conclusions drawn by the authors of this grey literature, which range from warnings against regulation, which can also be found in the journal literature, to statements advocating transaction taxes and position limits.

In particular, the second part of this literature review arrived at the following findings:

((1)) *On the influence of financial speculation on price volatility*: Thirteen of 25 papers examine whether financial speculation on the futures market has contributed to increasing volatility regarding agricultural prices. Four papers answer this question in the affirmative, nine in the negative. Of the four papers, two are self-critical and note that their findings must be interpreted with great care:

- In his paper, Algieri (2012; p. 28) explicitly notes that whether or not the influence of financial speculation on volatility is statistically significant depends to a considerable degree on the period being examined. As a consequence, there is a risk that the employed Granger causality tests may be insignificant with respect to the facts, even if the test

results show something different. What is empirically examined in this case is the correlation between financial speculation and market prices. This is why it is likely that the registered dependencies may be a statistical fluke: on the one hand, there might be a spurious correlation. On the other hand, it is possible that there is, in fact, no real correlation because the explanatory variable that drives both financial speculation and market prices had not been integrated into the model.

- Tang and Xiong's paper (2012; p. 27) cites the increasing interconnection of the markets as a reason for the price effects that were empirically measured. To properly evaluate this argument, however, two issues have to be considered. On the one hand, the increasing interconnection of the markets also increases inter-sector dependencies, and thus makes the agricultural sector more vulnerable towards shocks from other sectors. On the other hand, the agricultural sector also has the advantage of being able to pass on internal shocks to external sectors. From a theoretical point of view, there are strong arguments that lead one to presume that the net welfare effect ought to be positive because of risk diversification.

Methodological concerns also exist as regards the remaining two papers that claim to have found a statistically significant effect against speculation, and so their claims are in doubt.

- Although in their paper, von Braun and Tadesse (2012) claim that financial speculation has an impact on the volatility of agricultural prices, closer analysis reveals this effect not to be direct, but rather indirect in nature. The authors themselves expressly state that they are *unable* to confirm any direct effect.<sup>32</sup> The significant effect that they claim to have found is an indirect one and, strictly speaking, concerns the effect of a financial crisis on the agricultural markets.<sup>33</sup> The authors are of the opinion that the financial crisis that ensued after the Lehman collapse also affected the agricultural markets, and that financial speculation is a contributory factor that makes the agricultural markets more vulnerable to such financial crises. Ultimately this means that the authors are advancing an argument that is similar to Tang and Xiong's (2012).
- Frenk and Turbeville (2011; p. 30) are of the opinion that financial speculation increases volatility on the agricultural markets, and thus ultimately has the same effect as a tax levied on agricultural producers because they now need to hedge against greater risks – and therefore at higher costs.<sup>34</sup> If we examine it more closely, however, this

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<sup>32</sup> von Braun and Tadesse (2012; p. 33): "The result shows that the volume of futures trading has no significant effect on volatility."

<sup>33</sup> von Braun and Tadesse (2012; p. 33): "The positive relationship between financial crisis and food price volatility implies the significance of food commodities as financial instruments (financialization). Whenever banks, sovereign debt, exchange rates, and inflation enter crisis, the food market enters crisis too. Financial crisis is more relevant than speculation in creating price volatility. However, speculative activity in commodity markets is one of the reasons for the linkage between financial crisis and food markets."

<sup>34</sup> Frenk and Turbeville (2011; p. 30 et seq.): "CIT-created price volatility makes the affected markets more attractive for speculative volatility traders whose strategy focuses on price swings rather than fundamentals. It is also particularly well suited for algorithmic and high frequency speculative trading strategies. Thus the increased participation by more speculators employing



view is *not* based on empirical tests. Rather, it is based upon making a conjecture as to how best to interpret certain empirical findings. The authors are interested in three findings in particular: firstly, their data indicate that rising prices on the futures market go hand in hand with different trading volumes than falling prices. Secondly, they argue that within one rolling cycle, volatility takes on different values. Thirdly, they identify a structural break between 2003 and 2004 that coincides with the appearance of index traders. These findings lead the authors to draw conclusions that are critical of speculation. An objection that can be raised against this analysis is that the empirical methods used do not explicitly measure the influence of financial speculation. Particularly missing are test procedures that would show whether the conclusions drawn are statistically significant. In addition, no control variables are used that consider the effects of changes in fundamental economic factors. This is why it is doubtful whether the conclusions drawn by the authors are valid.

It is therefore debatable whether the findings – and particularly the conclusions – of the papers criticizing speculation are indeed sound.

In contrast to these four papers, nine papers were *unable* to prove that financial speculation adversely affects the volatility of agricultural prices. The following statements are typical of the arguments advanced in this sub-sample, and reflect the way in which various authors sum up the empirical evidence of their studies, some of which are methodologically rather elaborate:

- "Motivated by repeated price spikes and crashes over the last decade, we investigate whether the rapidly growing market shares of futures speculators have destabilized spot prices of corn, crude oil, natural gas, soybeans, sugar, and wheat. We approximate conditional volatility using a GARCH model, and analyze how it has been affected by expected and unexpected speculative open interest and net positions, respectively, controlling for volatility persistence and the impact of aggregate trading activity. We split our sample into two subperiods where the market shares of speculators are larger in the second half than in the first, and document whether the speculative impact on conditional volatility has increased. However, with respect to the six heavily traded agricultural and energy commodities examined, we do not find robust evidence that this is the case. We thus conclude that the increasing financialization of raw material markets over the last decade has not made them more volatile."<sup>35</sup>
- "[W]e investigate whether the intensive investment activities of CITs has led to a destabilization of agricultural futures markets. Using a stochastic volatility model, we treat conditional volatility as an unobserved component, and analyze whether it has been affected by the expected and unexpected open interest of CITs. As robustness checks, we replace open interest of CITs by net positions of CITs and open interest of swap dealers, respectively, in order to account for index-based trading activities. However, with respect to twelve increasingly financialized grain, livestock, and soft commodities, we do not find robust evidence that CITs can be held responsible for making their futures prices more volatile. Instead, we detect volatility persistence and a positive effect of unexpected overall trading volume, confirming prior results in the literature."<sup>36</sup>

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such strategies increases the amplitude of price moves, creating a kind of volatility feedback relationship. ... Moreover, this associated price volatility in effect constitutes a market tax that is borne by hedgers. It is a cost of business, whether expressed in the need for larger sources of liquidity to fund margin or simply the risk of doing business in an environment rendered more uncertain by the opaque impact of non-fundamental forces. As a result, prices required to induce supply must increase more in a market endemic with CITs, versus a market without them."

<sup>35</sup> Bohl and Stephan (2012; p. 15).

<sup>36</sup> Bohl et al. (2012; p. 14 seq.).

- "Commodity prices are currently both high and volatile relative to the past few decades, consistent with the physical supply and demand fundamentals that underpin these markets. However, the increase in prices and volatility is not unprecedented, having occurred during other large global supply and demand shocks throughout the past century. There is a lack of convincing evidence (at least to date) that financial markets have had a materially adverse effect on commodity markets over time periods of relevance to the economy. It is possible that speculators have had some effect on commodity price volatility, but their contribution would appear to be relatively small – particularly when compared with the contribution from fundamental factors – and short term in nature."<sup>37</sup>
- "We employ a unique dataset that allows us to precisely identify positions of market participants in five actively-traded and recently volatile futures markets to investigate whether speculation moves prices and/or increases market volatility. Through correlations, Granger-causality tests, and contemporaneous tests with instrumental variables, we find that speculative groups like hedge fund and commodity swap dealer position changes do not lead price changes, but rather lead to reduced market volatility. As a whole, these speculative traders provide liquidity and do not destabilize futures markets.

Importantly, these results hold uniformly across a variety of financial and commodity futures products over recent periods when turmoil in financial markets has generated historically high levels of volatility. Indeed our results hold both for periods when prices trend upward and also for periods where prices drop significantly and market volatility spikes. Our results are also robust to measuring speculation by the total net positions taken by hedge funds and swap dealers and by herding among hedge funds and to various alternative volatility metrics."<sup>38</sup>

- "The conditional volatility modeling approach espoused in this paper has failed to uncover substantial and statistically clear impacts of financialization on the volatilities of cash and futures returns in the Chicago grains and vegetable oils markets. In particular, we have failed to find any evidence for the Masters ... hypothesis that the major increase in commodity index investments over the past decade has contributed to increased volatility. Although negative, this conclusion is important since a number of commentators, including Masters himself, have called for the suppression or discouragement of index based investment.

In qualification of the previous conclusion, there does appear to be evidence that large changes in index investment positions do have an impact in raising the volatility of soybean prices. However, since position changes are largely uncorrelated over time, these volatility effects dies out relatively quickly."<sup>39</sup>

Against this background we note that the vast majority of the grey literature papers examined here support the same view that dominates in journal articles: most empirical studies are *unable* to confirm that financial speculation has led to increasing the price volatility of agricultural commodities. Many studies are unable to identify a significant effect and some studies even argue that financial speculation has reduced volatility.

((2)) *On the influence of financial speculation on price levels*: nineteen of the 25 papers examine whether financial speculation on the futures market has contributed to driving agricultural commodities prices upwards. Nine papers answer this question in the affirmative, ten in the negative. As for the nine papers, it is important to note that five of these studies are self-critical and state that their findings need to be interpreted with great care:

- The paper published by Belke et al (2012) ultimately sees the increase in prices as a consequence not of financial speculation, but of the ex-

<sup>37</sup> Dwyer et al. (2011; p. 57).

<sup>38</sup> Brunetti et al. (2011; p. 19).

<sup>39</sup> Gilbert (2012, p. 11).

pansive monetary policy pursued by central banks.

- Gilbert (2010) argues that financial speculation may lead to a price increase on the commodity markets that is akin to a bubble and has, in effect, done so.<sup>40</sup> However, the author himself cautions that the methods he employs are new and that there is therefore little experience as regards their use. This paper is innovative, particularly because for the first time Gilbert makes a distinction between rising and explosively rising time series. He holds the view that it is appropriate to use different measuring techniques in each case.
- Gilbert and Pfuderer's paper (2012; pp. 13-14) finds that financial speculation only affects prices on markets where there is little liquidity. These include the markets for soy oil, feeder cattle, live cattle or lean hogs. On the corn, wheat and soybean markets, however, such an effect has not yet been found. The authors nevertheless suspect that such an effect exists. The fact that it has not yet been possible to prove this effect may, in their view, result from the problem that the testing procedures used so far have not been strong enough.<sup>41</sup> In addition, these procedures are not well-suited to providing clear empirical evidence about the direction of causality.
- Irwin (2012) has carried out a total of three different methodical testing procedures with different specifications. The tests using time series regression are unable to identify any statistically significant correlations. Cross-section regression tests arrive at similar results. Only a few of the empirical tests investigating the relationship between index trading, price differences and contract terms were able to find a significant correlation depending on the specification. Irwin himself concludes that the

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<sup>40</sup> Gilbert (2010; p. 28): "I find strong evidence of speculative bubbles in the copper market. I also find some evidence for bubble behavior in soybeans. The results for crude oil and nickel are more problematic and depend on the interpretation of the outcomes of the test procedure. I do not find evidence for bubbles in the aluminium, corn or wheat markets. ... The estimated price impact of index-based investment on energy and metals prices is of the order of 3–10 per cent in 2006–2007 but rises to 20–25 per cent in the first half of 2008. When oil peaked in July at over \$140 billion, the price in the absence of indexbased investment might have been slightly around \$115 billion. When three months copper was at \$8,200/ton in April 2008, it would have been at \$6,800 absent index-based investment. The impact on grains prices was approximately half that on oil and metals. According to these estimates, it would be incorrect to argue that high oil, metals and grains prices were driven by index-based investment but index investors do appear to have amplified fundamentally-driven price movements."

<sup>41</sup> Gilbert and Pfuderer (2012; p. 13 et seq.) raise the issue that the Granger causality tests that are most commonly used in the literature are not sufficiently granular to identify actual price effects in a statistically significant manner. They write: "This lack of [statistical] power is particularly acute in the analysis of asset returns since, if markets are efficient, predictability should be limited. We have attempted to counter this problem by adding less liquid markets (soybean oil, feeder cattle, live cattle and lean hogs) to the universe of contracts under consideration. Doing this, we find clear evidence that index investment does affect returns in these less liquid markets. ... The contemporaneous correlations between CIT position changes and futures price changes, which are positive and generally statistically significant, are similar for the liquid and less liquid markets. Although an unambiguous causal interpretation is unavailable for these contemporaneous correlations, they are consistent with the view that changes in CIT positions affect the entire range of grains and live- stock futures prices. However, this remains a conjecture." And to make sure that their findings cannot be misinterpreted Gilbert and Pfuderer (2012; S. 14) explicitly add: "None of this implies that index investors were responsible for the high levels of grains prices observed in 2007-08 and 2010-11. The econometric methods needed for quantification of any price impact differ from those required to demonstrate causal impact."

sum of the findings *contradicts* the Masters hypothesis. In general, there is *no* confirmation that speculation influences price levels.<sup>42</sup>

- Tang and Xiong's paper (2012; p. 27) argues that an increase in index trading not only influences volatility, but also price levels. The authors consider the correlations they have found to reflect the increasing interconnectedness of the markets for agricultural and energy commodities. In the authors' view, the widely diversified portfolios of institutional investors in particular have contributed to the markets moving closer together.

There are also concerns about the remaining four papers that claim to have found a statistically significant price level effect, and so their claims are in doubt.

- In the paper by Adämmer et al. (2011; p. 16) we read: "[W]e investigate whether the rapidly growing investment activities have triggered speculative bubbles on the corn and wheat market. From a technical point of view, we draw on the convenience yield model and use commodity dividends to derive corn's and wheat's fundamental value. Based on the deviations of the actual commodity price from its fundamental value, we apply the MTAR approach to detect periods of substantial overvaluation followed by a crash. The empirical evidence is favorable for speculative bubbles in the corn and wheat price over the last decade." The authors thus reach the conclusion, in accordance with the Masters hypothesis, that financial speculation has caused bubbles on the agricultural markets. To arrive at this result, the authors use a momentum-threshold-autoregressive model (MTAR).<sup>43</sup> Using this MTAR approach the paper identifies, at a statistically significant level, that within the last decade temporary bubbles repeatedly formed on the markets.<sup>44</sup> However, this is only based on the pattern of time series. As a consequence, the results therefore only allow the conclusion that bubbles were formed or that price development was bubble-like. *Why*, however, this development occurred, cannot be identified using the MTAR approach because it does not consider control variables.
- In Baffes and Haniotis's paper (2010; p. 18) we read: "We conjecture that index fund activity (one type of »speculative« activity among the many that the literature refers to) played a key role during the 2008 price spike." In other words, the authors consider the speculative behavior of index funds (CITs) as playing a central part in price increases on agricultural markets. However, this paper only empirically tests whether a price transmission mechanism exists between the energy markets, the bio fuel markets and the food markets. Thus the influence of financial speculation is not tested empirically in its own right, but deduced from literature.<sup>45</sup>
- In their paper, von Braun and Tadesse (2012; p. 31 and p. 33) state the following: "We used seemingly unrelated regression to test the statistical and economic importance of supply shock, oil price shock, and

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<sup>42</sup> Irwin (2012; p. 18): "In sum, a growing body of literature fails to find compelling evidence that buying pressure from commodity index investment in recent years caused a massive bubble in agricultural futures prices. The Masters Hypothesis is simply not a valid characterization of reality."

<sup>43</sup> Cf. Adämmer et al. (2011; pp. 7-8).

<sup>44</sup> Cf. Adämmer et al. (2011; pp. 14-15).

<sup>45</sup> Cf. Baffes and Haniotis (2010; pp. 5-9).

speculative actions in the commodity futures market. As hypothesized, a market factor—excessive speculation—has significantly driven the extreme spikes seen in global food price dynamics." The authors find that financial speculation influences the prices of agricultural commodities on a statistically significant level. They base their findings on the "seemingly unrelated regression" procedure. However, the authors do not explain why they have used this particular method. In view of the issue explored in the paper, it might have seemed appropriate to use a panel regression to adequately consider the individual heterogeneity that was not observed. By way of explanation, if the model does not specify for unobserved heterogeneity, the estimation is often inconsistent once the residuals have been correlated with the regressors.<sup>46</sup> A panel analysis, which allows for unbiased parameters in spite of the unobserved individual heterogeneity, might have solved this problem.<sup>47</sup> Instead of a panel regression, however, this paper uses a relatively weak method and thus the results need to be treated with caution.

- Frenk and Turbeville (2011; p. 29 et seq.) arrive at findings that are critical of speculation. The authors hold the view that financial speculation distorts the signal effect of prices, meaning that distorted information causes market players to stockpile (agricultural) commodities. The authors used the following method: their empirical investigation is based on the density functions of price differentials.<sup>48</sup> These density functions are then compared, depending on the respective rolling cycle. The authors reach the conclusion that the density functions diverge from one another to an extent that is statistically significant. These divergences are then ascribed to the behavior of speculators<sup>49</sup> without testing empirically, however, whether the differences in the rolling cycle can be explained by the behavior of speculators to a statistically significant degree. Therefore, the criticism leveled against speculation in this paper is not based on robust empirical analyses, but on conjecture.

If we consider the papers that are critical of speculation as a whole, we inevitably conclude that the empirical findings – and particularly the conclusions that are, on occasion, only very loosely connected to these findings – are debatable. Five papers raise methodical reservations themselves, and grave objections can be raised against the remaining four papers.

In contrast to these eight papers, ten papers were *unable* to prove that financial speculation adversely affects agricultural price levels. The following statements are typical of the arguments advanced in this sub-sample. They reflect the way in which various authors sum up the empirical evidence of their studies, some of which are methodologically rather elaborate:

- "In sum, the results of this study add to the growing body of literature showing that buying pressure from financial index investment in recent years did not cause massive bubbles in agricultural futures prices. The Masters Hypothesis is simply not a valid characterization of reality."<sup>50</sup>

<sup>46</sup> Cf. Cameron and Trivedi (2005, pp. 763-764).

<sup>47</sup> Cf. Cameron and Trivedi (2005, p. 700).

<sup>48</sup> Cf. Frenk and Turbeville (2011; pp. 16-22).

<sup>49</sup> Cf. Frenk and Turbeville (2011; p. 21).

<sup>50</sup> Aulerich et al. (2012; p. 34).

- "In recent years, prices of agricultural and livestock commodities rose substantially. The increasing importance of financial investment in commodity trading has been viewed as a source of this surge in prices. This paper examines the causality between index investors positions and commodity prices on twelve grain, livestock, soft commodity markets. We use the panel Granger causality testing approach that uses SUR systems and Wald tests with market specific bootstrap critical values. This approach allows to test for Granger causality on each individual market separately by taking into account the possible contemporaneous correlation across markets.

Our results show that, in agricultural and livestock futures markets, there is no evidence of a causality relationship from index funds to future prices. This result holds for the period 2006-2010, but also for the sub-periods 2006-2008 and 2008-2010. These findings imply that speculation has not been an important driver in the substantial increase in commodities prices. In other words, movements in commodities prices seem to be explained by fundamental supply and demand relationships (such as increased demand in emerging countries) rather than speculation."<sup>51</sup>

- "Overall, while financial speculation at times may have exerted some influence on some commodity prices beyond fundamentals, the available evidence does not support the hypothesis that financialization has been the main driver of commodity price developments in the 2000s. More generally, the theoretical relationship between commodity futures and spot prices does not imply that changes in futures prices need necessarily lead to changes in spot prices. In practice, this is supported by the results of Granger causality tests, which point to substantial variation across individual commodities."<sup>52</sup>
- "Our overall conclusion is ... consistent with most of the previous literature – we find little evidence that commodity index-fund investing is exerting a measurable effect on commodity futures prices."<sup>53</sup>
- "In this paper, we define the explosive periods in commodity futures market as periods when price fails to follow a random walk. We use the multiple-regime switching testing procedure ... to identify explosive periods in the prices of corn, soybeans, and wheat futures traded on the CBOT, as well as wheat futures traded on the KCBT between January 2004 and February 2012. The findings indicate that most these grain futures markets experienced explosive periods between the end of 2007 and first half of 2008, as well as in the second half of 2010. In corn and soybean futures, prices were explosive about 12% of the time. For the two wheat futures, the number is slightly lower – the prices were explosive about 8% of the time. ... We find that no Granger causality can be established from changes in CITs net long positions to returns in corn, soybeans, and KC wheat futures in either explosive or non-explosive periods, consistent with the results from the traditional Granger causality test. For wheat futures traded on CBOT, estimation results show that CITs Granger cause returns in explosive and no explosive periods. Examination of the impulse response function, however, suggests that the effect is relatively small to moderate and dissipates quickly. ... The results from the modified Granger causality test differentiating explosive from non-explosive periods provide additional evidence that CITs are mostly likely not responsible for the large price movement observed in grain futures between January 2004 and February 2012."<sup>54</sup>

Against this background we note that the vast majority of the grey literature papers examined here support the very same view that also dominates in journal articles: most empirical studies are *unable* to confirm that financial speculation has led to an increase in the price levels of agricultural commodities.

((3)) *On regulating financial speculation with agricultural commodities*: Of all the 25 grey literature papers, thirteen explicitly address the issue of regulation. Not a single paper supports the public call made by civil society organizations for an exclu-

<sup>51</sup> Capelle-Blancard and Coulibaly (2012; p. 18).

<sup>52</sup> Dwyer et al. (2012; p. 75).

<sup>53</sup> Hamilton and Wu (2012; p. 24).

<sup>54</sup> Liao-Etienne et al. (2012; p. 12).

sion of CITs from the futures market, or for issuing a regulatory ban on financial speculation. Two papers are in favor of a transaction tax and three are in favor of position limits to restrain financial speculation in quantitative terms. By contrast, seven papers warn of the risks of misregulation and five papers are of the view that one should not attempt to curb financial speculation in the first place, because it exerts a beneficial effect overall. Five papers are explicitly against position limits. Three papers are in favor of market-friendly regulation that would introduce transparency rules as regards OTC transactions, which are currently not recorded in the statistics, and that would help support information efficiency on the futures markets.

Therefore the majority of the grey literature papers examined here support the view, which clearly dominates in journal articles, that the extreme price events of recent years give little cause to use regulation to curb financial speculation. Rather, the opposite is the case: similar to journal articles, in grey literature we also find a number of warnings against the risks of misregulation. The following quotations are typical of such warnings:

- "Important implications for public policy follow from the conclusion that the Masters Hypothesis is not valid. First, new limits on speculation in agricultural futures markets are not grounded in well-established empirical findings and could impede the price discovery and risk-shifting functions of these markets. Second, the focus on speculation has wasted precious time, attention, and effort that could be more productively directed towards the multiple challenges that global agriculture will face in the coming decades."<sup>55</sup>
- "Our econometric findings have important policy implications. As generally accepted, futures trading is a valuable activity since it improves price discovery, enhances market efficiency, increases market depth and informativeness, and contributes to market completion. However, in order to justify their demand for curbing commodity speculation, for instance by implementing position limits, politicians, regulators, and part of the media regularly take increased price volatility as a major concern. Based on our empirical results, we argue that taking such measures in response to the allegedly destabilizing impact of CITs on agricultural futures prices is unwarranted."<sup>56</sup>
- "In order to justify their demand for curbing commodity speculation, for instance by implementing (tighter) position limits and higher margin requirements, politicians, regulators, and part of the media regularly take increased spot price volatility as a major concern. In the United States, the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 includes substantial innovations of US financial market law, and is currently implemented, among others, by the CFTC with respect to commodity markets. Similarly, the European Commission prepares a broad-based reform of its "Markets in Financial Instruments Directive" (MiFID) which is also aimed at limiting speculation on commodity futures markets. However, based on our empirical results, we argue that taking these measures in response to the allegedly destabilizing impact of futures speculation on commodity spot prices is unwarranted. In addition, the Commodity Futures Modernization Act which became effective in late 2000 and implemented relaxed position limit regulations, often seen as the trigger of the increasing financialization of raw material markets over the last decade, apparently has not allowed speculators to make important agricultural and energy prices more volatile."<sup>57</sup>
- "The empirical evidence presented in this preliminary study does not appear at present to warrant extensive changes in the regulation of index funds participation in agricultural commodity markets; any such changes require careful consideration so as to avoid unintended negative impacts. For example, limiting the participation

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<sup>55</sup> Aulerich et al. (2012; p. 35).

<sup>56</sup> Bohl et al. (2012, p. 15).

<sup>57</sup> Bohl and Stephan (2012; p. 15 et seq.).

of index fund investors could unintentionally deprive commodity futures markets of an important source of liquidity and risk-absorption capacity at times when both are in high demand."<sup>58</sup>

- "Our main message is that testing for speculative bubbles in agricultural commodity prices is a very sophisticated task and its treatment implies many degrees of freedom for the researcher. We conclude that our results do not provide the ultimate answer to the question whether bubbles are present or not and definite answers to this question should be treated with caution. Against this background we recommend that far reaching suggestions on the regulation of speculative activities in agricultural commodity markets that have been made in the aftermath of the price boom should be carefully reconsidered."<sup>59</sup>

Against this background we note that the vast majority of the grey literature papers examined here support the same view that dominates in journal articles: based on their empirical findings, most studies that make economic policy statements arrive at the recommendation that extreme care and caution be exercised when setting the political framework for financial markets, so as not to accidentally weaken their functionality. The call for transaction taxes made by civil society organizations is given little support in this literature. Equally, the call for tight position limits to curb financial speculation with agricultural commodities is given little support. Rather, the dominant position in these papers is one that considers such position limits to be inappropriate. The call for a ban on financial speculation made by civil society organizations receives no support at all. Instead it is rejected across the board. Not a single one of these papers – including particular papers that advance findings or conclusions that are critical of speculation – adopt this call for a ban. Instead, many papers highlight that financial speculation supports the common good, and is therefore in principle desirable.

This finding justifies the following conclusion: in their calls for position limits and particularly in their calls for a regulatory ban on financial speculation with agricultural commodities, civil society organizations are not supported, but are rather contradicted by mainstream academic literature.

### 2.3 Conclusion and need for further research

All articles that successfully passed academic peer review, as well as the vast majority of the empirical contributions to grey literature unanimously arrive at the conclusion that financial speculation does *not* have an adverse effect on the functioning of the agricultural commodities markets. Rather, they express the view that the increase in trading volumes that has accompanied the increasing involvement of index traders (CITs) is strengthening the information function of the markets. In addition, it is noted that financial speculation contributes to expanding the hedging options available to producers of agricultural commodities, and thereby has a positive effect on the supply volume. Although some contributions to grey literature include findings that are critical of speculation, it cannot be deduced from this that fundamental regulation, in the form of position limits or bans, is necessary. If one considers the empirical evidence in its entirety and without prejudice, the alarm raised by civil society organizations must, inevitably, be regarded as a *false* alarm.

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<sup>58</sup> Irwin and Sanders (2010, p. 1).

<sup>59</sup> Liu et al. (2012, p. 15).



In spite of these currently unequivocal research findings, one can, of course, never be absolutely certain that financial speculation with agricultural communities only ever had desirable consequences from a social welfare point of view in the past or will only ever have such consequences in the future. The reason for this is that the studies examined here focused on certain transmission mechanisms that are investigated in order to find out whether, and to what extent, financial speculation has a positive or a negative influence on agricultural commodities markets. As a consequence, empirical studies can only ever offer a *conditional* pronouncement on the concrete subject of investigation. After all, it is impossible to rule out that there might exist other transmission mechanisms that have not been considered.

Against this background we would like to highlight several aspects that require further research.

((1)) Thus far, mainstream economic research has been of the view that excessive speculation on the futures market will only ever affect the spot market and cause price increases there – increases which are not covered by fundamental economic factors – if the prices on the futures markets that were fueled by speculation result in increased stockpiling. It is thus a welcome development that academic literature is beginning to explore the question of whether a transmission of speculation effects from the futures market to the spot market might not also occur without increased inventory levels.

New ideas about dealing with open questions such as these are always welcome, but not all ideas are equally promising.

Thus Tilton, Humphreys and Radetzki's proposal was convincingly criticized by Östensson.<sup>60</sup> However, Sockin and Xiong's approach demonstrates that the interplay between prices on the futures markets and prices on the spot markets has not yet been conclusively resolved on a purely theoretical level.<sup>61</sup> Both authors investigate how prices on futures markets can have a sustained effect on cash market prices without a change in fundamental data. To this end they have developed a theoretical model that focuses on information problems and complementarities in the production process.

Additional conceptual research would be desirable in this area. As a next step, empirical tests should then statistically examine the effect of these mechanisms, which are currently only a theoretical possibility at best. This is also why such investigations are currently not (yet) suited to allowing any political conclusions to be drawn on the regulation of financial speculation with agricultural commodities.

((2)) Another question, which has not yet been answered conclusively from either a theoretical or an empirical point of view, concerns the influence of trading volumes on volatility. In this respect, a monocausal relationship appears not to exist. For instance, Bessembinder and Seguin (1993) have demonstrated for capital markets that increasing trading volumes also accompany an increase in volatility.<sup>62</sup> By contrast, the studies examined here, which assess the influence of financial speculation on the volatility of agricultural markets, arrive at rather the opposite view. This begs the ques-

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<sup>60</sup> Cf. also the exchange between Tilton, Humphreys and Radetzki (2011), as well as (2012a) and (2012b) on the one hand, and Östensson (2011) and (2012) on the other.

<sup>61</sup> Cf. Sockin and Xiong (2012).

<sup>62</sup> For an overview of the contradictory findings in the literature on capital markets as regards the correlation between trading volumes and volatility, cf. Hanke et al. (2010; p. 59) and Hau (2006; pp. 866-867).

tion, which is currently still largely open, of exactly which conditions result in a positive correlation being measured on capital markets, whereas no correlation can be found on agricultural markets.

((3)) The question regarding the relationship between trading volumes and price levels is quite similar. Hang and Yogo (2012), for instance, find that not only the current price on the futures market, but also trading volumes have a valid informational value, and thus exercise a potentially important signaling function. Ultimately, it seems necessary to change focus compared to previous research: thus far empirical studies have been concentrating on the hedging function of the futures markets. In future, this focus must be extended to include the price identification function of the future markets in particular. In this regard, closer investigation must be undertaken regarding the way in which investors form expectations<sup>63</sup> and how information is processed in interdependent market events.<sup>64</sup>

((4)) For future research, the question of whether the pricing process follows the same laws if there are indications that an explosive development is looming is also significant.<sup>65</sup> This requires both a better theoretical understanding of the agricultural commodities markets and further refinement of empirical methods to be able to investigate individual parameters in a more targeted manner.

((5)) Still, as the considerations below make clear, there is a need for research beyond these four issues:

- Parallel to the debate among agricultural economists about the effect of financial speculation on agricultural commodities, resource economists have been debating the effects of financial speculation on energy commodities. Both bodies of literature arrive at similar conclusions.<sup>66</sup> As a consequence, there is the option, which has doubtlessly not yet been used in the best possible way, of interdisciplinary cooperation and mutual learning.

Also, both agricultural and resource economists are increasingly forced to rely on financial econometrics in their investigations of their respective future markets, even though financial econometrics had originally been developed for quite different markets (e.g. stock markets). This is why empirical testing procedures will need to be even better adapted to the special features of the energy and agricultural commodities markets than they have been thus far. These special features include the role played by stockpiling<sup>67</sup> and, in the case of agricultural commodities, also the fact that pricing is linked to the marginal willingness to pay of consumers and is thus rooted in the fundamentals of the real economy. This means that any potential bubbles that form on stock markets must be modeled differently than potential bubbles on agricultural commodities markets.

- There is also great demand for research to arrive at a better under-

<sup>63</sup> Cf. for instance Hoffman et al. (2012), who investigate the way in which expectations are formed in times of crisis.

<sup>64</sup> For an innovative modeling suggestion, see Banerjee (2011).

<sup>65</sup> For a literature review of the current state of this research direction, cf. Gilbert and Pfuderer (2012; p. 3).

<sup>66</sup> Cf. the overview in Fattouh et al. (2012).

<sup>67</sup> Cf. Wright (2011).

standing, and at a better design, of the political regulatory process and its own special features. Some initial work has already been done in this respect. For instance, historical studies highlight that the current displeasure at extreme price developments has often led to political overreaction, thus resulting in misregulation of the agricultural commodities markets.<sup>68</sup> It is also known that political regulatory initiatives may risk ignoring economic expertise.<sup>69</sup> Interesting initial work has also been done on findings that the news bias in the media (which prefer bad news to good) influences civil society organizations by impeding both their fundraising efforts and their political lobbying.<sup>70</sup>

### 3. Summary

((1)) This comprehensive literature review has arrived at three conclusions that can make an important contribution to improving the points of reference for the democratic public in the long term:

- Even if the literature still leaves many questions open, the current level of knowledge strongly suggests that the alarm raised by civil society should be classified as a *false* alarm.
- Political regulatory demands for the introduction of a transaction tax, stipulation of stringent position limits and an all-out ban on financial speculation are *contradicted* by the dominant mainstream of academic literature.
- In contrast, demands for the regulatory improvement of transparency in futures markets for agricultural commodities are well-founded and supported by research. This particularly applies to regulations towards enhancing *information efficiency*. Here, Europe is lagging behind the US.

((2)) Based on the literature review and its results, we can draw the following conclusions:

- The attempt to name-and-shame CITs and their forward transactions for financial speculation with agricultural commodities has distracted public attention from the political options that are, in fact, appropriate for combating acute hunger crises.
- The biased public perception of the issue is not least due to the fact that civil society criticism fell on particularly fertile soil in view of the world financial crisis.
- This bias can be countered with the economic ethics insight that, due to their hedging function, commodity futures markets operate in a mode of institutionalized solidarity. This alternative view is supported by the findings arrived at in the vast majority of empirical studies, that financial speculation has contributed to making the agricultural markets function not worse, but better.

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<sup>68</sup> Cf. Jacks (2007).

<sup>69</sup> Cf. Peck (1980).

<sup>70</sup> Cf. Swinnen (2011) and Swinnen et al. (2011).

- Those who want to effectively combat hunger in the world have to take real-economy precautions to ensure that food supplies will match the envisaged increasing demands.

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