

## What do Chinese Macro Announcements Tell Us About the World Economy?

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### Abstract

We examine the effect of scheduled macroeconomic announcements made by China on world financial and commodity futures markets. All announcements related to Chinese manufacturing and industrial output move stock markets, energy and industrial commodities as well as commodity currencies. News about Chinese domestic consumption leaves most markets unaffected, suggesting that market participants view the announcements primarily as a signal of the state of the global economy rather than merely of China's domestic demand. The market response to unexpectedly strong output announcements is not consistent with investors being concerned about tightening of Chinese macroeconomic policy; instead, the world markets view strong Chinese output as a rising tide that lifts all boats.

*JEL classification:* E44; G14; G15

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## 1. Introduction

China's spectacular rise to the second largest economy in the last two decades brought about dramatic changes in the world economic landscape. Yet, in spite of China's prominent role in the world economy, we do not know much about how macroeconomic news from China affects the world financial and commodity markets.<sup>1</sup> The only systematic study is a qualitative description of China's economic indicators by Orlik (2011b).<sup>2</sup> We use intraday financial and commodity futures markets data from September 30, 2009 to December 31, 2013 to show that Chinese macroeconomic announcements wield substantial influence over the world markets compared to similar announcements from the U.S. and Japan.

Understanding how Chinese macroeconomic announcements affect asset prices is useful not only for market participants but also for central banks with staff monitoring the world markets to gauge investor views of macroeconomic conditions. For example, our results show that all three announcements related to Chinese manufacturing and industrial output – purchasing manager index (PMI), industrial production (INP) and real gross domestic product (GDP) – move the world stock indices, foreign exchange as well as energy and industrial commodities. On the contrary, news about Chinese domestic consumption measured by Chinese retail sales leaves most markets unaffected. This suggests that the world markets view China's economic news primarily as a barometer of the world economy rather than merely an indicator of China's domestic demand.

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<sup>1</sup> Previous studies have focused on announcements from developed countries. For example, Andersen, Bollerslev, Diebold and Vega (2007), Bauwens, Omrane and Giot (2005), and Hashimoto and Ito (2010) study how markets in developed countries move following U.S., European and Japanese macroeconomic announcements.

The direction of the market moves also conveys useful information because the market reaction could differ depending on the state of the economy. A positive surprise about Chinese output may drive stock markets up because strong Chinese output will translate into profits for companies in the rest of the world, reflecting global integration in industries such as electronics, where increased production in China not only benefits the Chinese manufacturers but also increases sales of multinational companies.<sup>3</sup> However, a positive surprise may also drive the markets down. The recent global financial crisis brought about a slowdown of the Chinese economy, contributing to GDP growth rate falling from 14.2 percent in 2007 to 9.6 percent in 2008.<sup>4</sup> The Chinese government responded by stimulatory fiscal, monetary and other policies, leading to expansion in investment, credit and real estate sector. While these policies successfully mitigated the shock to the external demand, they also created concerns about an overheating economy, deterioration of credit quality, and overinvestment in the real estate sector (IMF Article IV Reports 2010, 2014). It is, therefore, possible that a positive surprise about Chinese output will drive stock markets down in expectations of tighter macroeconomic policies. In our data, a positive surprise about Chinese output boosts the world stock indices, energy and industrial commodities as well as currencies of commodity exporters (Australia, New Zealand and Canada), suggesting that concerns about policy tightening do not prevail. This stands in contrast to Andersen, Bollerslev, Diebold and Vega (2007) finding that stock market reaction to the U.S. macroeconomic announcements differs across the business cycle with positive surprises causing a negative response in expansions but a positive response in contractions.<sup>5</sup>

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<sup>3</sup> The rising integration of the global economy, where intermediate goods often cross borders multiple times during the manufacturing process, is described by Feenstra (1998). Samuelson (2004) is another seminal study that discusses potential effects that globalization may have on world economies.

<sup>4</sup> World Bank database.

<sup>5</sup> Andersen, Bollerslev, Diebold and Vega (2007) argue that in expansions the discount factor component of the equity valuation prevails compared to the cash flow component due to anti-inflationary monetary policies.

Our findings also add to the literature on the transmission of information across global financial markets. An extensive branch of this literature uses macroeconomic announcements as a proxy for information, and several studies, including Wongswan (2006) and Hausman and Wongswan (2011), have shown that U.S. macroeconomic news moves emerging markets. Our study is the first one to show the transmission in the opposite direction: from macroeconomic announcements in an emerging economy to the world markets. This finding is novel because shocks from emerging economies usually come into

Chinese data including Koch-Weser (2013), who describes procedures for preparing the national output data, and Sinclair (2012), who studies revisions of economic data. Despite these data quality issues, the world markets do trade on China's most important announcements because it is the best information available to market participants.

## 2. Methodology

We use the traditional event study methodology of regressing asset returns on the unexpected component of the news announcement.<sup>7</sup> For one announcement and one market, this approach can be represented by the following specification estimated with OLS:

$$r_{i,t} = \alpha + \beta z_t + \epsilon_t \quad (1)$$

where  $r_{i,t}$  is the continuously compounded futures return, defined as the first difference of log futures prices in the intraday event window around the announcement,  $z_t$  is the unexpected component of the announcement, or surprise, and  $\epsilon_t$  is an i.i.d. error term representing price movements unrelated to the data release.

Because efficient markets react only to the unexpected component of the announcement, the announcement surprise is based on the difference between the actual announcement and the market's expectation of the announcement. To convert the announcement surprises to equal units, we standardize them by their respective standard deviations:<sup>8</sup>

$$\frac{z_t}{\sigma_z} = \frac{r_{i,t} - \alpha}{\beta \sigma_z} + \frac{\epsilon_t}{\beta \sigma_z} \quad (2)$$

<sup>7</sup> In Section 4.8, we also discuss the Rigobon and Sack (2008) identification-through-censoring methodology.

<sup>8</sup> We tested the surprise series,  $z_t$ , for autocorrelation. Seven series did not exhibit significant autocorrelation while four series (CPI, Exports, Imports and New Yuan Loans) showed negative autocorrelation and one series (PPI) showed positive autocorrelation. We, therefore, estimated the above regressions with residuals from an AR(1) model used for the surprise,  $z_t$ , and computed significance of the coefficients

For announcements that are released simultaneously, we extend the above approach and include all simultaneous announcements in the regression to disentangle their effects, as in Balduzzi, Elton and Green (2001):

$$, \tag{3}$$

where  $1 \dots$  stands for the individual announcements released simultaneously.

### **3. Data and Background**

#### *3.1 China's Macroeconomic Announcements*

Data on China's macroeconomic announcements come from the Bloomberg database. Following

removed from the sample. The resulting number of observations is indicated in the tables presenting results for each announcement.

[Insert Table 1 about here]

With the exception of the PMI announcement that is released individually, all other

with access to macroeconomic data and manage special “lock-up rooms” where journalists can preview the data ahead of time but are prohibited to communicate with the outside world during the lock-up period.<sup>12</sup> According to Orlik (2011b), the process in China differs. For example, he describes a routine procedure that involves releasing GDP data to numerous journalists 10 to 15 minutes before the data is made publicly available, with the journalists allowed to communicate with the outside world during this period.

In addition to these early releases by the official government agencies, the macroeconomic data is also subject to possible leakage by the government personnel. China Business Focus described in August 2011 that some financial institutions attempt to establish relationships with government officials by offering them positions such as honorary chairmen or other roles within their companies hoping to gain access to macroeconomic data ahead of the official releases. Wall Street Journal on June 21, 2011 argued that the Chinese news organizations also contribute to the leakage by competing to publish the news ahead of the official release. For example, Bloomberg Businessweek noted on April 21, 2011 that the CPI was reported in the media before the official release in five out of the previous six months. In mid-2011, the Chinese government took steps to reduce data leakage by decreasing the number of officials who have advance access to the data and shortening the time lag between data finalization and release. China has also attempted to crack down on data leakage by jailing two former government officials for leaking data, as reported by Bloomberg News on October 24, 2011.

These early releases and data leakage may explain why the markets tend to move prior to the time of the public release. Figure 1 provides an example of such a move for the crude oil

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futures market on April 14, 2013, when the markets were expecting the simultaneous announcement of China's GDP, INP, Fixed Assets Investment and Retail Sales scheduled to be released at 22:00 Eastern Time. The announced growth rate in Retail Sales matched the market expectations based on the Bloomberg consensus forecasts. However, the GDP, INP and Fixed Assets Investment data came below expectations. Figure 1 shows that the decline in the crude oil nearby contract futures price (top panel) as well as an increase in trading activity measured as the number of 1,000-barrel contracts (bottom panel) started about 15 minutes prior to the official release time.<sup>13</sup> We discuss in Section 4.7 how the early releases and data leakage may lead to understating our results since announcements that seemingly do not move the markets might actually be moving them before our event window.

[Insert Figure 1 about here]

### *3.3 Futures Returns*

To investigate the effect of China's macroeconomic announcements on the world markets, we use intraday futures prices and volumes at 5-minute intervals for a variety of assets including stock index, foreign exchange, and energy, metal and agricultural commodities.<sup>14</sup> Because China's macroeconomic announcements take place during China's business hours, which coincide with nighttime in the U.S. (and early morning in Europe) as shown in Figure 2, we analyze only futures markets open at that time.

[Insert Figure 2 about here]

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<sup>13</sup>The one percent decline in the crude oil futures price within the 20-minute window is a sizable price move. For comparison, the standard deviation of daily (close-to-close) returns during our sample period is about 1.7 percent. The one percent price move is especially large for the nighttime period (in Eastern Time) when volatility is relatively low compared to daytime period (in Eastern Time). The increase in volume in Figure 1 is also substantial. For example, trading volume around the Chinese GDP announcements with one-standard deviation surprises triples during our sample period, compared to almost no change in trading activity around the Japanese GDP announcements.

<sup>14</sup> The futures market data are obtained from Genesis Financial Technologies.

For each asset category, we include multiple markets, as listed in Table 2. For stock indices, we use the E-mini S&P 500, E-mini Nasdaq-100 and E-mini Dow, the three largest U.S. equity index futures products traded on the Chicago Mercantile Exchange (CME) Globex electronic platform.<sup>15</sup> We also include stock index futures for Japan, Taiwan, Hong Kong, and Australia to study the effect on the Asia-Pacific region. We exclude stock index futures for other countries such as Canada, Germany, France and the United Kingdom because they do not trade during the hours when China's macroeconomic announcements are made.<sup>16</sup>

[Insert Table 2 about here]

For commodities, we include energy, metal and agricultural commodities. Crude oil is the largest energy commodity and China ranked as the second largest consumer and net importer in 2011.<sup>17</sup> Copper and silver are the two industrial metal futures markets with the largest open interest on the CME, and China imports the highest volume of copper and large quantities of silver primarily used in industrial applications.<sup>18</sup> In agricultural commodities, China dominates the soybean market with 62 percent of world trade. China has not comprised a large percentage of world trade in the corn and wheat markets (3 percent and 2 percent in 2012, respectively) but it accounts for 24 percent and 28 percent of world consumption, respectively, according to the U.S. Department of Agriculture. In cotton, an input in the textile industry, China is the world's largest importer, accounting for 43 percent of world trade in 2012.<sup>19</sup>

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<sup>15</sup> We include multiple stock indices to ensure our results are not specific to a particular type of stock index but instead hold for stock markets in general.

<sup>16</sup> The U.K. FTSE-100 stock index futures have been trading during the time when most Chinese announcements are made only since mid-2011. The results, available upon request, are similar to the reported U.S. stock index results.

<sup>17</sup> Energy Information Administration of the U.S. Department of Energy.

<sup>18</sup> There are other metal commodities, for example, iron and steel, important for the world economy. However, these commodities are either not traded on the CME futures market or their trading activity is too low to allow analysis.

<sup>19</sup> Among the markets we analyze, cotton is the only futures market that is closed when some of China's macroeconomic announcements are released, since it does not trade from 14:30 to 21:00 ET. Announcements made before 21:00, including several PMI observations, are omitted from estimation of regressions for cotton. For

From foreign exchange futures markets, we include the Australian dollar, New Zealand dollar and Canadian dollar, considered commodity currencies as these countries rely heavily on commodity exports.<sup>20</sup> Also included are the British Pound, Euro and Japanese Yen that, along with the Australian dollar, rank as the four most actively traded currency futures contracts on Globex. All these foreign exchange contracts are denominated in U.S. dollars per unit of the foreign currency. In addition, to analyze the effect on the U.S. dollar, we include the U.S. Dollar Index futures that represent the value of U.S. dollar against a basket of world currencies.<sup>21</sup>

We compute continuously compounded returns in an intraday event window surrounding the announcement using 5-minute prices of the nearby futures contract. The nearby contract becomes relatively illiquid in its last few days of trading. Therefore, we switch to the next-to-mature contract when its daily contract volume exceeds the nearby contract volume. As Figure 3 shows, there is significant trading volume around the three output announcements (PMI, INP and GDP) even though their timing coincides with the U.S. nighttime.

[Insert Figure 3 about here]

The futures returns used in regression analysis are computed in the event window from 10 minutes before to 10 minutes after the announcement time, since the cumulative average

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announcements made at 21:00, we calculate the event window return for cotton futures using the 14:30 and 21:10 ET prices.

<sup>20</sup> For example, considering the top ten 2011 export categories at the Harmonized Commodity Description and Coding System 4-digit level from the United Nations Comtrade and World Bank databases, commodity exports comprised 13 percent, 9 percent and 14 percent of GDP in Australia, Canada and New Zealand, respectively, compared to only 1 percent in the U.S. Also, Chen and Rogoff (2003) show that the real exchange rates of Australia and New Zealand are strongly affected by world commodity prices. The short-run co-movement between the real exchange rate and commodity prices is somewhat weaker for Canada, but there is evidence of a long-run cointegrating relation between the Canadian dollar exchange rate and commodity prices.

<sup>21</sup> In the foreign exchange markets, *spot* markets are also open when the Chinese announcements occur. We have analyzed the six currencies for which we have intraday spot data (Australian dollar, New Zealand dollar, Canadian dollar, Euro, British Pound and Japanese Yen). The results are similar to the futures markets results and available upon request. We additionally included the Japanese Yen-Australian dollar spot exchange rate. A stronger than expected PMI led to a decline in the Japanese Yen value relative to the Australian dollar. We also analyzed the spot exchange rate of the Chinese yuan to the U.S. dollar because the Chinese yuan futures did not start trading on the CME until February 2013. This exchange rate did not change on many days in our sample period and did not appear to be moved by Chinese macroeconomic announcements.

return (CAR) graphs presented in Figure 4 indicate that most of the announcement impact occurs in this 20-minute window.<sup>22</sup> The CARs are presented separately for positive and negative surprises. The stock index, commodity and foreign exchange markets for commodity currencies such as the Australian dollar tend to rise when the announcement surprise is positive and fall when the announcement surprise is negative, suggesting that stronger than expected Chinese output boosts these markets. The figure shows that the price impact of the news appears to be permanent. Interestingly, the figure indicates that the markets start moving in the “right” direction even before the announcement is made, as suggested by the example in Figure 1.<sup>23,24</sup>

[Insert Figure 4 about here]

## **4. Empirical Results**

### *4.1 Manufacturing Purchasing Manager Index*

Along with the GDP announcement, the PMI exerts the strongest influence on the markets. The PMI is prepared by the China Federation of Logistics and Purchasing (CFLP) in cooperation with the National Bureau of Statistics (NBS) and reported on the first day of the month. Fashioned after purchasing manager indices in other countries, it is constructed based on data from a survey of manufacturing businesses that covers aspects such as new orders, production, and inventory. On a scale of 0 to 100, a score above 50 indicates an improving economy, whereas a score below 50 means a worsening economy compared to the previous month.

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<sup>22</sup> We describe robustness checks with wider windows in Section 4.7.

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The PMI moves prices in all asset categories, as summarized in Table 3. In the stock markets, a one-standard-deviation PMI positive surprise increases the E-mini S&P 500 futures price by 0.10 percent, with the PMI surprises explaining 45 percent of the price variation in the announcement window.<sup>25</sup> The effect on the crude oil market is also strong with a coefficient of 0.11, suggesting that a higher than expected PMI will translate into a stronger economy, with higher demand for crude oil pushing oil prices up. The PMI announcement also moves the metals markets, with coefficient estimates of 0.18 and 0.06 for copper and silver, respectively. This agrees with Roache (2012) who documents a prominent role played by China in the metals markets using a structural supply-demand framework. Interestingly, our results differ from the findings of Elder, Miao and Ramchander (2012) who analyze the effect of 20 U.S. macroeconomic announcements on metals futures prices. They find that announcements reflecting an unexpected improvement of the economy have a positive effect on copper but a negative effect on silver, possibly because an unexpected improvement of the economy makes investors switch from silver to other assets such as stocks. Our results show that both copper and silver react positively to news indicating the Chinese economy is stronger than expected, suggesting that investors consider silver an input in production.<sup>26</sup> Among all markets, cotton, used as an input in the textile industry, reacts the strongest with a coefficient estimate of 0.32. Agricultural commodities used in the food industry (corn, soybeans and wheat) show no significant reaction to the PMI news.

[Insert Table 3 about here]

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<sup>25</sup> The coefficients on the Japanese and Taiwanese markets are estimated less precisely perhaps because the PMI announcement is released soon after these markets open when volatility is especially high. However, both coefficients have the same positive sign as the corresponding estimates for U.S. and Australian markets.

<sup>26</sup> According to a study of the Chinese silver market, industrial uses account for most of China's silver demand: <https://www.silverinstitute.org/site/wp-content/uploads/2012/12/ChineseSilverMarket2012.pdf>

In the foreign exchange markets, the PMI's strongest effect is on the commodity currencies of Australia, Canada and New Zealand. Positive coefficients suggest that a higher than expected Chinese PMI translates into a higher demand for commodities, leading to appreciation of commodity currencies. In contrast to the commodity currencies, the Japanese

pressure on the CFLP and NBS to report accurately. Finally, since the PMI involves surveying firms directly, it lessens the influence of local government officials misreporting statistics, an issue that has been known to occur with other announcements (Orlik, 2011a).

announcement by almost two weeks. Also, as Orlik (2011b) points out, the breakdown into products may actually cause strong industrial production to have a dampening effect on the world economy. For example, strong steel production often means that China's excess steel will flood the world markets, lowering production elsewhere.

#### *4.3 Chinese Announcements as a Barometer of Global Economic Conditions*

With all three output related announcements moving the markets, the question remains whether the output reflects rising Chinese domestic demand or demand for Chinese products from the rest of the world. Therefore, we analyze the effect of Chinese retail sales announcements, the best available measure of Chinese domestic consumption.<sup>28</sup> As Table 4 shows, this announcement does not move the U.S. stock, foreign exchange, energy or metal commodity futures markets. With consumption accounting for only 34 percent of China's GDP from 2009 to 2012 compared to 71 percent in the U.S., announcements reflecting the state of China's domestic consumption may be less important for these world markets.

A story then emerges of the markets viewing China's economic announcements primarily as leading indicators of the world economy rather than merely of China's domestic demand. China is a key link in the global value chain. Acting as the world's manufacturing center, China imports materials and intermediate inputs, and exports finished products. Much of the value added of these products comes from other countries in the supply chain.<sup>29</sup> Therefore, indicators of China's real economic activity indirectly reveal the strength of the world economy rather than merely of China's domestic demand, serving as a barometer of the world demand.

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<sup>28</sup> Orlik (2011b) discusses the differences between retail sales and consumption. For example, the retail sales include goods but exclude services while consumption includes both goods and services.

<sup>29</sup>



However, the growing importance of Chinese domestic demand shows in the Chinese Retail Sales announcements having a significant effect on Japanese, Hong Kong and Australian stock markets in the Asia-Pacific region, perhaps due to their geographic proximity and strong trade links with China.<sup>30</sup> This is also the case for two of the three agricultural food markets (corn and soybeans), perhaps because higher than expected retail sales are likely to translate into higher purchases of food products. The effect is, however, fairly small, as most food consumption is non-discretionary.

#### *4.4 Comparison with Similar U.S. and Japanese Announcements*

To put the magnitudes of the coefficients reported in Tables 3 and 4 in perspective, we compare the effect of Chinese announcements to the effect of U.S. and Japanese announcements. We select the most similar announcements for this comparison. It must be noted, however, that the announcement sets are not identical across countries. For example, the survey samples used to construct the manufacturing indices differ across countries. In the U.S., a purchasing manager index compiled monthly by the Institute of Supply Management (ISM) and known as the ISM Manufacturing Index has the closest resemblance to the Chinese PMI. Table 5 shows the results for the U.S. PMI announcement that in our sample period is the second most important macroeconomic announcement in the U.S., following the U.S. non-farm employment announcement.<sup>31</sup> A one standard deviation surprise in the U.S. PMI leads to a 0.26 percent increase of the E-mini S&P 500 futures price, with the news explaining about 41 percent of the price variation in the announcement window. This comparison shows the impact of China's PMI

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<sup>30</sup> We also analyzed the effect of the announcements on the Chinese stock market. The majority of the announcements we analyze are released either when the Chinese stock market is closed or during the opening minutes. We, therefore, analyzed daily close-to-close returns on the Shanghai Stock Exchange Composite Index. This analysis showed that the Industrial Production and Retail Sales announcements move the Chinese stock prices.

<sup>31</sup> We examined 31 U.S. announcements considered most important by previous studies and financial press. The U.S. PMI announcement ranks second in the average impact on stock index, foreign exchange and commodity futures markets. These results are available upon request.

announcement is sizeable: more than a third of the impact of the U.S. PMI. In addition, as discussed in Section 4.5, the market response to China's PMI appears to have increased over the sample period, raising the relative importance of Chinese announcements.

[Insert Table 5 about here]

The impact of Chinese announcements on commodity markets is again substantial compared to that of the U.S. announcements. In the crude oil market, the effect of China's PMI announcement is about half that of the U.S. PMI announcement while in the copper and silver markets, the effect of China's PMI exceeds that of the U.S. PMI. Underscoring the power that China wields in the commodity currency markets, in the Australian dollar and New Zealand dollar markets, the impact of China's PMI is twice as strong as that of the U.S. PMI.

A comparison of the market response to Chinese, U.S. and Japanese GDP and Industrial Production announcements produces qualitatively similar conclusions. For example, a one standard deviation Chinese GDP surprise leads to 0.25 percent increase in copper prices, exceeding the effect of the U.S. GDP announcement. Mirroring its strong effects on copper and silver prices, China's GDP announcement also beats the U.S. GDP announcement in the impact on the Australian dollar and Canadian dollar markets. It also moves the crude oil and U.S. stock markets with approximately the same force as the U.S. GDP announcement. The effect of China's GDP announcement also surpasses that of Japan's GDP announcement by a factor of two or more in all markets.<sup>32</sup> Similarly, the effect of the Chinese Industrial Production announcement on the equity, commodity and commodity currency markets is at least as strong as

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<sup>32</sup> The comparison of Chinese to Japanese announcements is used to control for market liquidity since both Chinese and Japanese announcements are released during U.S. nighttime. However, caution again needs to be exercised when comparing announcements across countries. China releases only one GDP announcement whereas Japan releases two GDP announcements (Preliminary and Final) and the U.S. releases three GDP announcements (Advance, Preliminary and Final).

the effect of comparable U.S. announcement and generally stronger than the impact of the corresponding Japanese announcement.

#### *4.5 Time Trend*

Since China's relative importance in the world economy has been increasing, we investigate whether the impact of Chinese macroeconomic announcements on the world markets has also increased. Figure 5 shows time-varying responses of the E-mini S&P 500, Nikkei 225, Australian dollar and crude oil futures to the PMI announcement. These coefficients are estimated using a rolling OLS regression with a window of 17 observations. Since the total number of observations for PMI in our sample is 35, we can interpret the beginning (ending) value of the response coefficients shown in Figure 5 as the average responses to the PMI announcement in the first (second) half of the sample period. The figure shows that all four markets have become more responsive to PMI news since mid-2011.

[Insert Figure 5 about here]

This rolling regression by itself does not tell us whether the changes are statistically significant, so we test for statistical significance of a change in the slope by estimating our model with an interactive term that interacts the surprise term with a dummy equal to one before a given date. We have used different breakpoints. For example, we used April 15, 2011 because this was the date when the Chinese government announced its decision to crack down on data leakage as reported by Bloomberg News and other media. The results, available upon request, showed evidence of a stronger market response to the PMI, GDP and INP announcements in six, eleven and eight markets, respectively. We find no evidence of a rising market response to comparable U.S. and Japanese announcements, which would suggest that the importance of Chinese announcements relative to announcements from the largest and third largest economies

has increased over our sample period. However, it is important to note that these sub-sample tests are based on short sample periods, and time-variation does not appear in all markets and all announcements, perhaps for the reasons discussed in Sections 4.6 and 4.7.

#### *4.6 Exports and Imports Announcement*

As reported in Table 6, the effect of the export announcement is significant only for U.S. stock markets, the Hang Seng (Hong Kong) stock market and cotton market, and the magnitude and significance of these coefficients are low when the entire sample period is considered. However, the split-sample testing shows that the magnitude and significance have become stronger in the recent period, and other markets such as foreign exchange and cotton also move following the exports announcements.<sup>33</sup>

Higher than expected exports can have two opposing effects. On the one hand, higher than expected Chinese exports – imports into the U.S. and other developed countries – increase the current account deficit in these countries, which could dampen the world markets. On the other hand, higher than expected exports signal rising demand in the developed world. This latter effect prevails in our data: similarly to the output announcements, the export announcements appear to act as a barometer of global economic conditions and boost the markets.

[Insert Table 6 about here]

#### *4.7 Other Announcements*

The results for the other Chinese macroeconomic announcements that we examine are reported in Tables 7 and 8. With some exceptions, these announcements appear to have little effect on financial and commodity futures returns. We question why this is the case. It needs to be pointed

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<sup>33</sup> The reason that this trend began only recently is possibly due to the exports data previously being questionable as Chinese exporters were suspected of misreporting shipments to avoid financial capital controls and gain tax rebates, a practice that the Chinese government recently cracked down on (BBC, 2013, and Sevastopulo and Hornby, 2013).

out that even studies of the U.S., European and Japanese macroeconomic news find many insignificant announcements.<sup>34</sup> For example, Elder, Miao and Ramchander (2012) analyze the effect of 20 U.S. macroeconomic announcements on metals futures markets and find that only six or seven announcements move the prices. The 20 announcements they examine are already a selected subset of U.S. macroeconomic news announcements considered the most important. It is, therefore, not surprising to find that some Chinese announcements also do not move markets.

[Insert Table 7 about here]

[Insert Table 8 about here]

Several possible explanations exist. First, although the data release process is said to be improving, issues with early releases and data leakage persist as discussed in Section 3.2. We

market reaction was muted but Orlik (2011a) points out that the markets already fell on January 20, 2010 and suggests that the data had leaked earlier.<sup>36</sup>

Second, using the median values from surveys of professional forecasters as proxies for the market expectations can introduce noise into the measurement of surprise as discussed in Section 5. Third, a given announcement may contain both good and bad news. For example, a higher than expected inflation announcement may bundle good news of the economy expanding faster than expected with expectations of a more contractionary monetary policy, pulling the markets in the opposite direction. Fourth, the effect that announcements exert on world markets may differ with circumstances, as noted by Wongswan (2006). This state-dependence can mute the impact on returns measured by our regressions. Therefore, we analyze the effect of announcement surprises on market volatility and trading volume, as Wongswan (2006) suggests. Table 9 shows that some announcements that do not appear significant in the returns regressions, such as inflation announcements, cause volatility and trading volume to be higher on announcement days compared to non-announcement days, indicating that perhaps even these announcements move the markets.

[Insert Table 9 about here]

#### *4.8 Identification-through-Censoring Technique*

In addition to the OLS results presented above, we apply the Rigobon and Sack (2008) identification-through-censoring (ITC) technique for analyzing the effect of news announcements on prices. Rigobon and Sack (2008) point out that the OLS estimate of the response coefficient is biased downward because the announcement surprise contains a

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<sup>36</sup> Griffin, Kelly and Hirschey (2011) show that the reaction of stock returns to major firm-specific news is much weaker in emerging markets than in developed markets. They provide evidence that this difference is primarily due to prevalence of insider trading in emerging markets.

measurement error due to the forecasts coming from an unrepresentative sample of analysts, forecasts being out of date by the time the announcement is made, or imprecise data released by the government. Using the fact that both the true surprise and the measurement error are “censored” on non-announcement days, Rigobon and Sack (2008) propose the ITC technique for adjusting coefficient estimates for such measurement error bias and identifying the market response to the true surprise.

Our limited sample size does not allow estimating the ITC model when more than two announcements occur simultaneously. However, we are able to apply the ITC technique for the PMI (announced individually), CPI announced with PPI, and Exports announced with Imports. The results, available upon request, show that, for example, in the U.S. stock index futures markets, the ITC estimates of the PMI effect are almost 50 percent higher than the OLS estimates, and the CPI and Exports announcements appear to be much more important than the OLS estimates suggest. Given this finding, it is possible that the market response to the GDP and INP announcements is also stronger than indicated by our OLS estimates.

## **5. Summary and Conclusions**

Rare and severe negative shocks originating in emerging economies have been shown to rock the world markets. We argue that events in emerging economies do not have to escalate into crises to

macroeconomic indicators boost the stock index, commodity, and foreign exchange markets for commodity currencies while dampening the currencies of commodity importers. These findings agree with anecdotal evidence from the business press that brings headlines such as “Copper Weakens for Second Day as China’s Manufacturing Slows” by Bloomberg Businessweek on April 30, 2013 and “Bernanke and China Send World Stocks Lower” by CNN on June 20, 2013. At the same time, announcements such as Retail Sales that provide the best available information about China’s domestic consumption do not move most of the world markets. Thus, our results are consistent with the markets looking to China’s macroeconomic announcements primarily as a leading indicator of global economic conditions rather than merely of China’s domestic demand. The story of China as a barometer of global demand is reinforced by higher than expected Exports announcements boosting the world markets,



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**Table 1**  
**Summary Information for Chinese Macroeconomic Announcements**

Announcement	Abbreviation	Category	Frequency	Day of the Month when Announcement is Usually Released <sup>a</sup>	Units	Source <sup>b</sup>
Real GDP (YoY)	GDP	Output	Quarterly	15 <sup>th</sup>	%	NBS
Industrial production (YoY)	INP	Output	Monthly	11 <sup>th</sup>	%	NBS
Manufacturing purchasing manager index	PMI	Output	Monthly	1 <sup>st</sup>	Index (0 to 100)	CFLP & NBS
Consumer price index (YoY)	CPI	Inflation	Monthly	11 <sup>th</sup>	%	NBS
Producer price index (YoY)	PPI	Inflation	Monthly	11 <sup>th</sup>	%	NBS
Retail sales (YoY)	RES	Consumption	Monthly	11 <sup>th</sup>	%	NBS
Exports (YoY)	EXP	Trade	Monthly	10 <sup>th</sup>	%	GAC
Imports (YoY)	IMP	Trade	Monthly	10 <sup>th</sup>	%	GAC
Trade balance <sup>c</sup>	TRB	Trade	Monthly	10 <sup>th</sup>	USD billion	GAC
Fixed assets investment (YoY)	FAI	Investment	Monthly	11		

**Table 2**  
**Summary Information for Futures Markets**

	Contract		
	Symbol	Exchange <sup>a</sup>	Trading Hours (Eastern Time)
<b>Stock Index Futures</b>			
E-mini S&P 500	ES	CME	Su 18:00 – Fr 17:15 with 45-minute breaks starting at 17:15
E-mini Nasdaq-100	NQ	CME	Su 18:00 – Fr 17:15 with 45-minute breaks starting at 17:15
E-mini Dow	YM	CBOT	Su 18:00 – Fr 17:15 with 45-minute breaks starting at 17:15
Nikkei 225 (Japan)	NK	SGX	Vary depending on U.S. daylight saving time
MSCI Taiwan	TW	SGX	Vary depending on U.S. daylight saving time
Hang Seng (Hong Kong)	HS	HKFE	Vary depending on U.S. daylight saving time
SPI 200 (Australia)	AP	SFE	Vary depending on U.S. and local daylight saving time
<b>Foreign Exchange Futures</b>			
Australian dollar	6A	CME	Su 18:00 – Fr 17:00 with 1-hour breaks starting at 17:00
New Zealand dollar	6N	CME	Su 18:00 – Fr 17:00 with 1-hour breaks starting at 17:00
Canadian dollar	6C	CME	Su 18:00 – Fr 17:00 with 1-hour breaks starting at 17:00
Euro	6E	CME	Su 18:00 – Fr 17:00 with 1-hour breaks starting at 17:00
British Pound	6B	CME	Su 18:00 – Fr 17:00 with 1-hour breaks starting at 17:00
Japanese Yen	6J	CME	Su 18:00 – Fr 17:00 with 1-hour breaks starting at 17:00
U.S. Dollar Index	DX	ICE	Su 18:00 – Fr 17:00 with 3-hour breaks starting at 17:00
<b>Commodity Futures</b>			
Crude Oil	CL	NYMEX	Su 18:00 – Fr 17:15 with 45-minute breaks starting at 17:15
Copper	HG	COMEX	Su 18:00 – Fr 17:15 with 45-minute breaks starting at 17:15
Silver	SI	COMEX	Su 18:00 – Fr 17:15 with 45-minute breaks starting at 17:15
Cotton	CT	ICE	Su 21:00 – Fr 14:30 with breaks from 14:30 to 21:00
Corn	ZC	CBOT	Mo–Fr 9:30–14:15 & Su–Fr 20:00–8:45
Wheat	ZW	CBOT	Mo–Fr 9:30–14:15 & Su–Fr 20:00–8:45
Soybeans	ZS	CBOT	Mo–Fr 9:30–14:15 & Su–Fr 20:00–8:45

<sup>a</sup>Chicago Board of Trade (CBOT), Chicago Mercantile Exchange (CME), Commodity Exchange (COMEX), IntercontinentalExchange (ICE), New York Mercantile Exchange (NYMEX), Singapore Exchange (SGX), Hong Kong Futures Exchange (HKFE), Sydney Futures Exchange (SFE). All CBOT, CME, COMEX and NYMEX contracts are traded on the CME's Globex electronic platform. U.S. Dollar Index and cotton futures contracts are traded on the ICE electronic platform.

**Table 3**  
**Response of Futures Prices to the Manufacturing**  
**Purchasing Manager Index (PMI) Announcement**

**Table 4**  
**Response of Futures Prices to the Real Gross Domestic Product, Industrial Production**  
**(Value Added of Industry), Retail Sales, and Fixed Asset Investment Announcements**

	N	GDP	Industrial Production	Retail Sales	Fixed Asset Investment	R <sup>2</sup>
<b>Stock Index Futures</b>						
E-mini S&P 500	42	0.09 (0.04)**	0.06 (0.02)**	0.03 (0.02)	0.03 (0.02)	0.131
E-mini Nasdaq-100	42	0.08 (0.04)**	0.05 (0.02)**	0.02 (0.02)	0.02 (0.02)	0.093
E-mini Dow	42	0.07 (0.03)**	0.06 (0.02)**	0.02 (0.02)	0.02 (0.02)	0.097
Nikkei 225 (Japan)	41	0.06 (0.04)	0.10 (0.03)***	0.05 (0.02)*	-0.01 (0.03)	0.234
MSCI Taiwan	41	0.11 (0.04)**	0.04 (0.02)	-0.03 (0.03)	-0.01 (0.03)	0.205
Hang Seng (Hong Kong)	40	0.13 (0.08)	0.17 (0.05)***	0.11 (0.05)**	0.01 (0.05)	0.201
SPI 200 (Australia)	39	0.07 (0.05)	0.12 (0.04)***	0.13 (0.04)**	0.05 (0.04)	0.180
<b>Foreign Exchange Futures</b>						
Australian dollar	42	0.11 (0.05)**	0.07 (0.02)***	0.03 (0.02)	0.05 (0.03)**	0.288
New Zealand dollar	42	0.07 (0.06)	0.07 (0.02)***	0.04 (0.03)	0.05 (0.03)	0.201
Canadian dollar	42	0.06 (0.03)**	0.02 (0.01)*	0.004 (0.01)	0.01 (0.01)	0.227
Euro	42	0.05 (0.02)**	0.02 (0.01)*	-0.002 (0.01)	0.01 (0.01)	0.279
British Pound	42	0.03 (0.01)*	0.02 (0.01)***	0.01 (0.01)	0.004 (0.01)	0.244
Japanese Yen	42	-0.05 (0.03)*	-0.04 (0.01)**	-0.02 (0.01)	-0.01 (0.01)	0.256
U.S. Dollar Index	42	-0.04 (0.02)**	-0.02 (0.01)*	0.002 (0.01)	-0.01 (0.01)	0.210
<b>Commodity Futures</b>						
Crude Oil	42	0.13 (0.08)*	0.08 (0.03)**	0.04 (0.03)	0.05 (0.03)	0.271
Copper	42	0.25 (0.10)**	0.05 (0.04)	0.01 (0.04)	0.03 (0.04)	0.244
Silver	42	0.23 (0.13)*	0.11 (0.04)***	0.02 (0.03)	0.08 (0.06)	0.338
Cotton	39	0.19 (0.08)**	-0.08 (0.05)	0.02 (0.05)	-0.05 (0.04)	0.123
Corn	42	0.01 (0.03)	0.04 (0.02)**	0.03 (0.02)*	0.01 (0.01)	0.079
Wheat	42	0.01 (0.03)	0.01 (0.02)	0.03 (0.02)	0.03 (0.01)**	0.046
Soybeans	42	0.04 (0.03)	0.05 (0.02)**	0.04 (0.02)**	0.003 (0.02)	0.197
Standard deviation of surprise		0.21%	1.23%	1.36%	0.48%	

**Table 5**



**Table 6**  
**Response of Futures Prices to the Ex**

**Table 7**  
**Response of Futures Prices to Inflation Announcements**

	N	CPI	PPI	R <sup>2</sup>
Stock Index Futures				
E-mini S&P 500	42	-0.02 (0.01)	-0.01 (0.01)	0.020
E-mini Nasdaq-100	42	-0.02 (0.01)	-0.01 (0.01)	0.036
E-mini Dow	42	-0.01 (0.01)	-0.01 (0.01)	0.023
Nikkei 225 (Japan)	41	-0.01 (0.02)	-0.02 (0.02)	0.014

**Table 8**  
**Response of Futures Prices to Monetary and Financial Announcements**

	N	Money Supply M2	New Yuan Loans	Foreign Exchange Reserves	R <sup>2</sup>
<b>Stock Index Futures</b>					
E-mini S&P 500	51	0.02 (0.02)	-0.01 (0.01)	0.02 (0.03)	0.026
E-mini Nasdaq-100	51	0.02 (0.02)	-0.01 (0.01)	0.04 (0.03)	0.049
E-mini Dow	51	0.02 (0.02)	-0.01 (0.01)	0.02 (0.02)	0.037
Nikkei 225 (Japan)	37	-0.02 (0.04)	0.14 (0.11)	0.01 (0.04)	0.126
MSCI Taiwan	36	-0.08 (0.03)**	0.15 (0.06)**	0.02 (0.05)	0.195
Hang Seng (Hong Kong)	45	0.06 (0.06)	0.01 (0.06)	0.01 (0.07)	0.041
SPI 200 (Australia)	38	0.01 (0.02)	0.01 (0.04)	-0.01 (0.03)	0.010
<b>Foreign Exchange Futures</b>					
Australian dollar	51	0.02 (0.02)	0.01 (0.02)	-0.002 (0.03)	0.039
New Zealand dollar	51	0.01 (0.02)	-0.002 (0.02)	0.003 (0.03)	0.011
Canadian dollar	51	0.01 (0.01)	-0.004 (0.01)	-0.02 (0.01)	0.027
Euro	51	0.02 (0.02)	-0.01 (0.01)	0.0003 (0.02)	0.041
British Pound	51	0.02 (0.01)	-0.003 (0.01)	-0.01 (0.02)	0.032
Japanese Yen	51	-0.02 (0.01)*	0.02 (0.01)**	-0.003 (0.02)	0.096
U.S. Dollar Index	51	-0.02 (0.01)	0.01 (0.01)	0.002 (0.02)	0.036
<b>Commodity Futures</b>					
Crude Oil	51	0.04 (0.03)	0.001 (0.02)	-0.002 (0.03)	0.081
Copper	51	0.03 (0.04)	0.02 (0.04)	0.01 (0.05)	0.025
Silver	51	0.05 (0.05)	-0.02 (0.04)	-0.05 (0.07)	0.032
Cotton	50	0.02 (0.04)	-0.10 (0.08)	0.17 (0.09)*	0.070
Corn	51	0.05 (0.02)**	-0.04 (0.03)*	0.01 (0.04)	0.099
Wheat	51	0.03 (0.02)	-0.02 (0.02)	0.01 (0.04)	0.024
Soybeans	51	0.04 (0.02)**	-0.03 (0.02)	0.04 (0.03)	0.097
Standard deviation of surprise		0.76%	101.7 bln yuan	83.2 bln yuan	

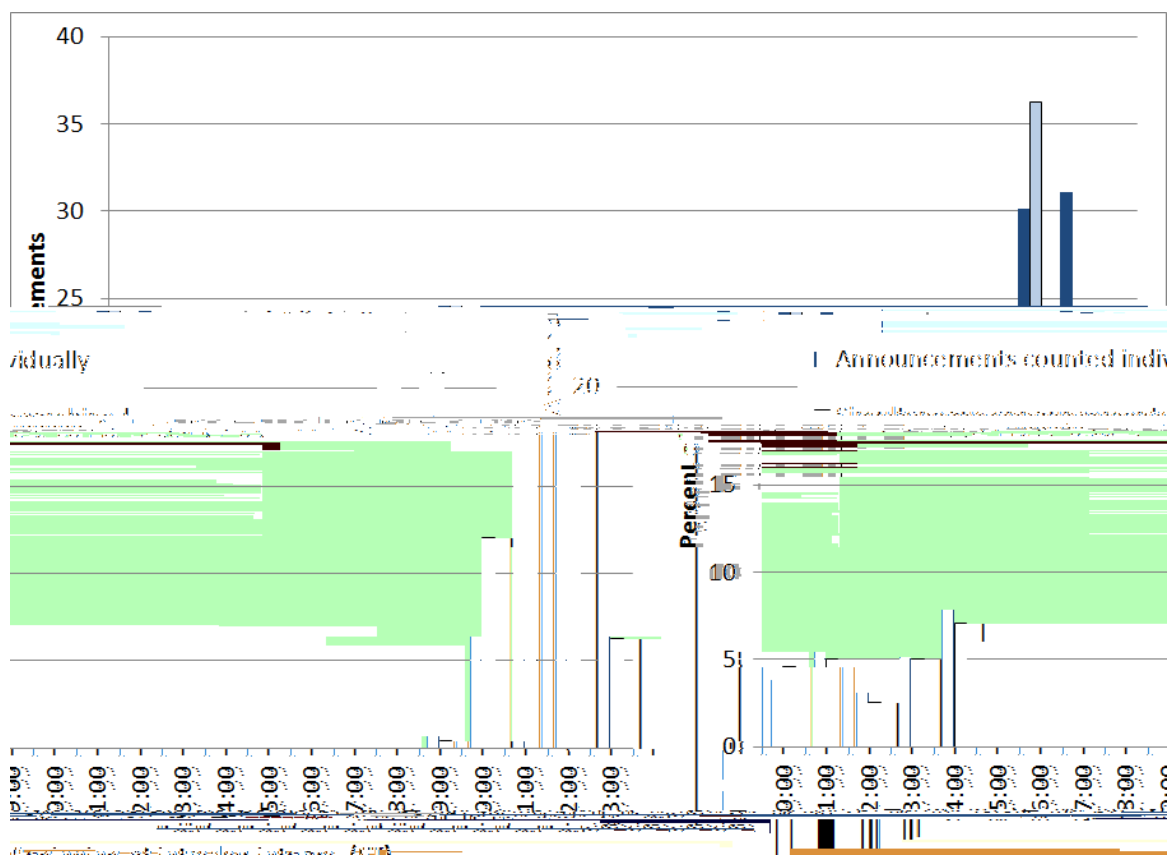
The table shows the estimated responses of futures returns to unexpected changes in the Money Supply M2, New Yuan Loans, and Foreign Exchange Reserves. These announcements are made simultaneously. Money Supply M1 is also released simultaneously

**Table 9**  
**Effect of Macroeconomic Announcements on Volatility and Trading Volume**

	Realized Volatility					Trading Volume				
	PMI	GDP, INP RES, FAI	EXP, IMP	CPI, PPI	M2, NYL, FER	PMI	GDP, INP RES, FAI	EXP, IMP	CPI, PPI	M2, NYL, FER
Stock Index Futures										
E-mini S&P 500	0.11*** (0.06)	0.13*** (0.07)	0.07 (0.06)	0.09* (0.07)	0.10 (0.09)	4.81*** (2.02)	5.61*** (2.85)	2.24* (1.85)	3.46*** (2.06)	5.75 (5.11)
E-mini Nasdaq-100	0.11*** (0.06)	0.12*** (0.06)	0.07** (0.06)	0.08* (0.06)	0.09 (0.08)	0.42*** (0.19)	0.41*** (0.21)	0.23 (0.17)	0.31*** (0.21)	0.55 (0.48)
E-mini Dow	0.09*** (0.05)	0.11*** (0.06)	0.06 (0.05)	0.08* (0.06)	0.09 (0.07)	0.34*** (0.15)	0.43*** (0.23)	0.23 (0.19)	0.31** (0.20)	0.39 (0.45)
Nikkei 225 (Japan)	0.21 (0.18)	0.20*** (0.17)	0.18*** (0.12)	0.18 (0.17)	0.17 (0.13)	4.36 (4.10)	4.63*** (3.49)	3.14 (2.04)	3.66 (3.69)	3.80 (2.87)
MSCI Taiwan	0.28 (0.22)	0.22 (0.18)	0.18* (0.16)	0.26* (0.22)	0.23 (0.18)	5.78* (4.96)	3.40 (3.06)	2.73** (2.51)	3.70 (3.61)	3.88 (3.42)
Hang Seng (Hong Kong)	---	0.29*** (0.17)	0.25 (0.20)	0.31 (0.26)	0.21 (0.18)	---	7.10*** (4.94)	5.71 (4.94)	8.18*** (6.74)	5.09 (4.51)
SPI 200 (Australia)	0.20*** (0.13)	0.21*** (0.12)	0.13 (0.14)	0.17** (0.13)	0.12 (0.09)	1.75*** (1.08)	1.79*** (1.02)	1.04 (0.91)	1.57*** (1.02)	0.77 (0.55)

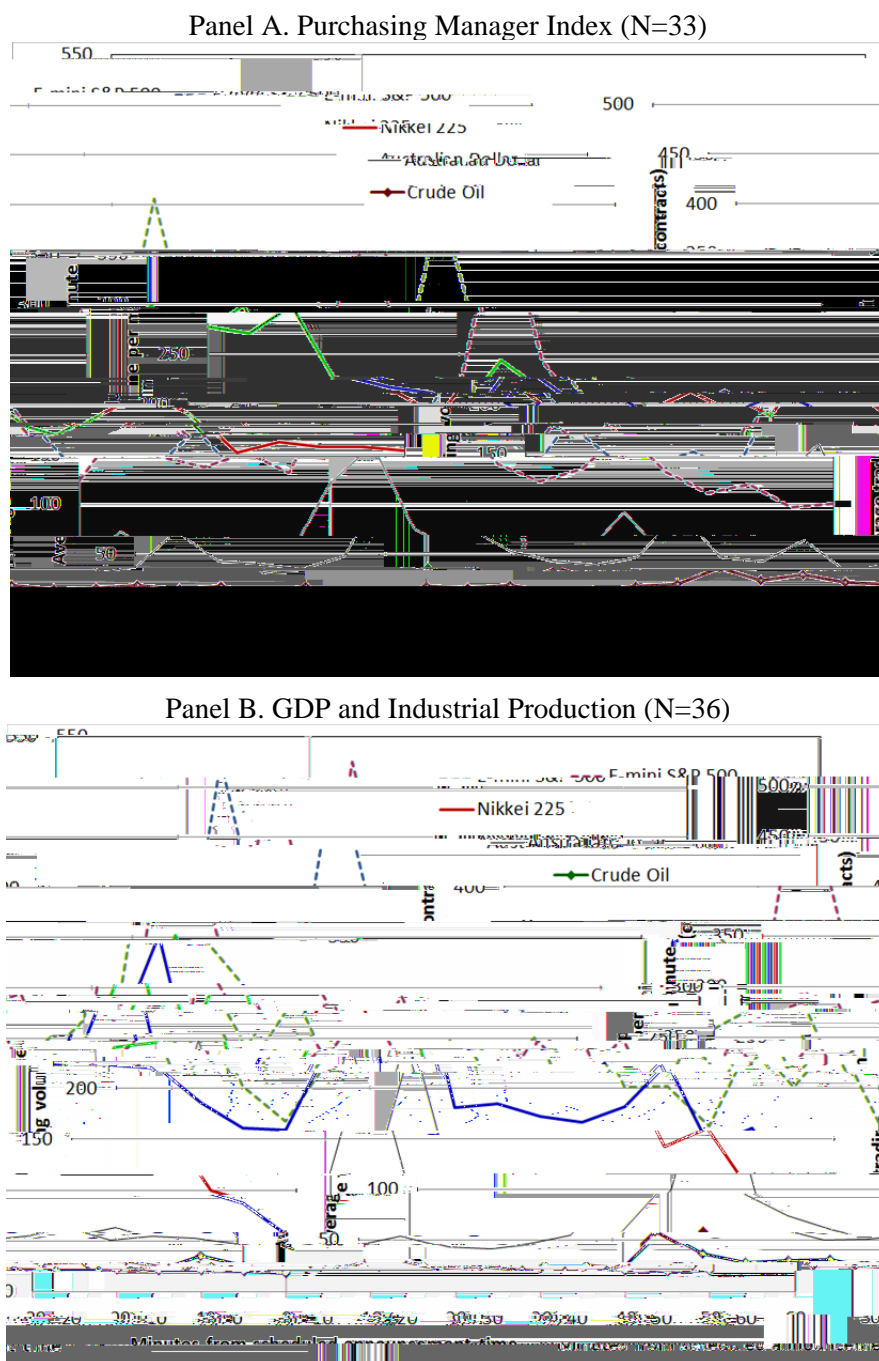


**Figure 2**  
**Distribution of Announcement Times**



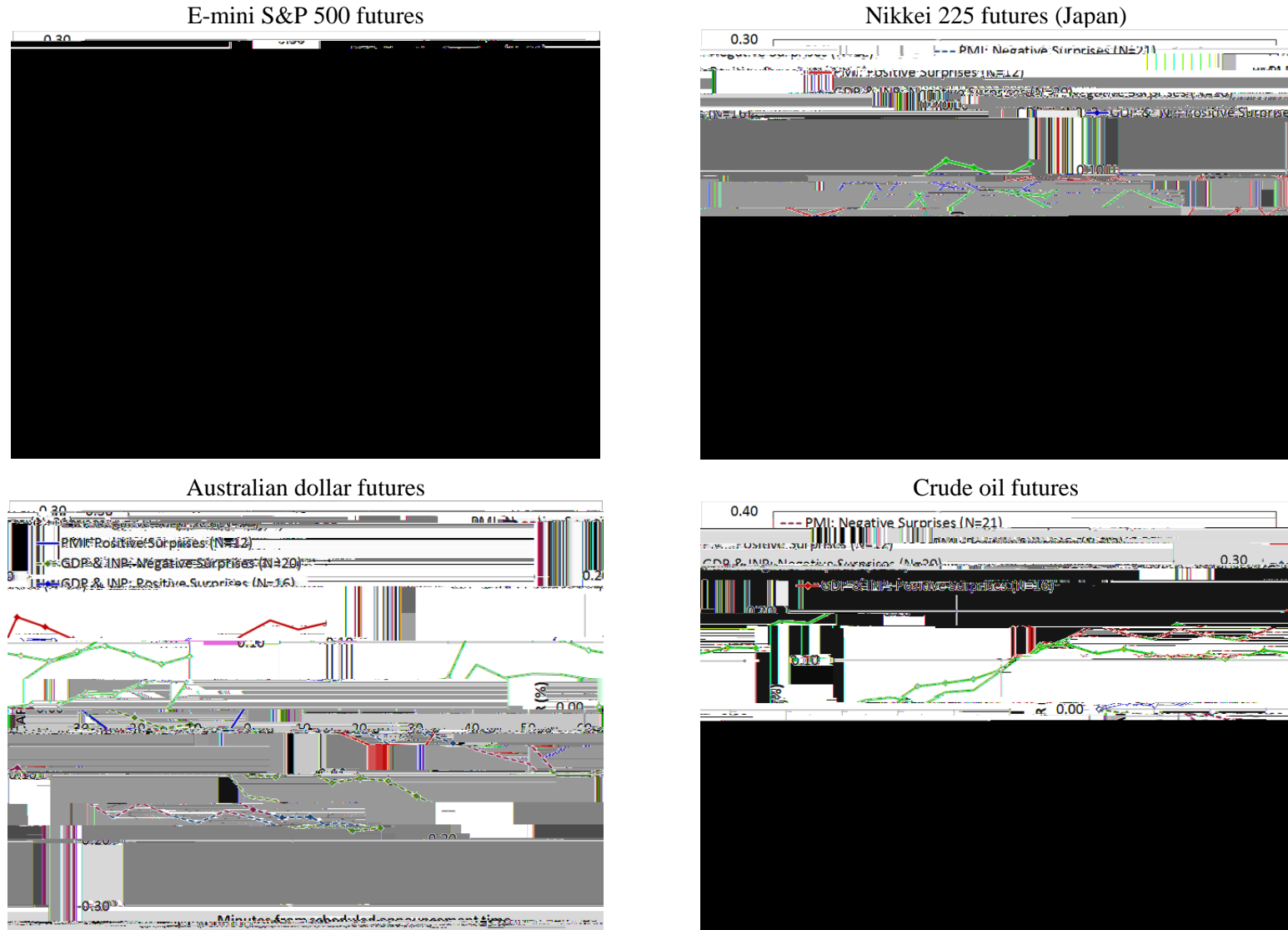
The figure shows the distribution of announcement times stated in U.S. Eastern Time as a percentage of all announcements. The dark bars treat all 14 announcements individually. The light bars combine announcements that are made simultaneously into a single event.

**Figure 3**  
**Average Futures Trading Volume around Manufacturing Purchasing Manager Index, Real Gross Domestic Product and Industrial Production Announcements**



The figure shows the average trading volume per minute around the three output announcements (Manufacturing Purchasing Manager Index, Real Gross Domestic Product and Industrial Production) for the most important market in each subgroup (U.S. stock index, Asia-Pacific stock index, commodity currency, and energy/industrial commodity). Only the events with non-zero surprises are included to maintain consistency with Figure 4.

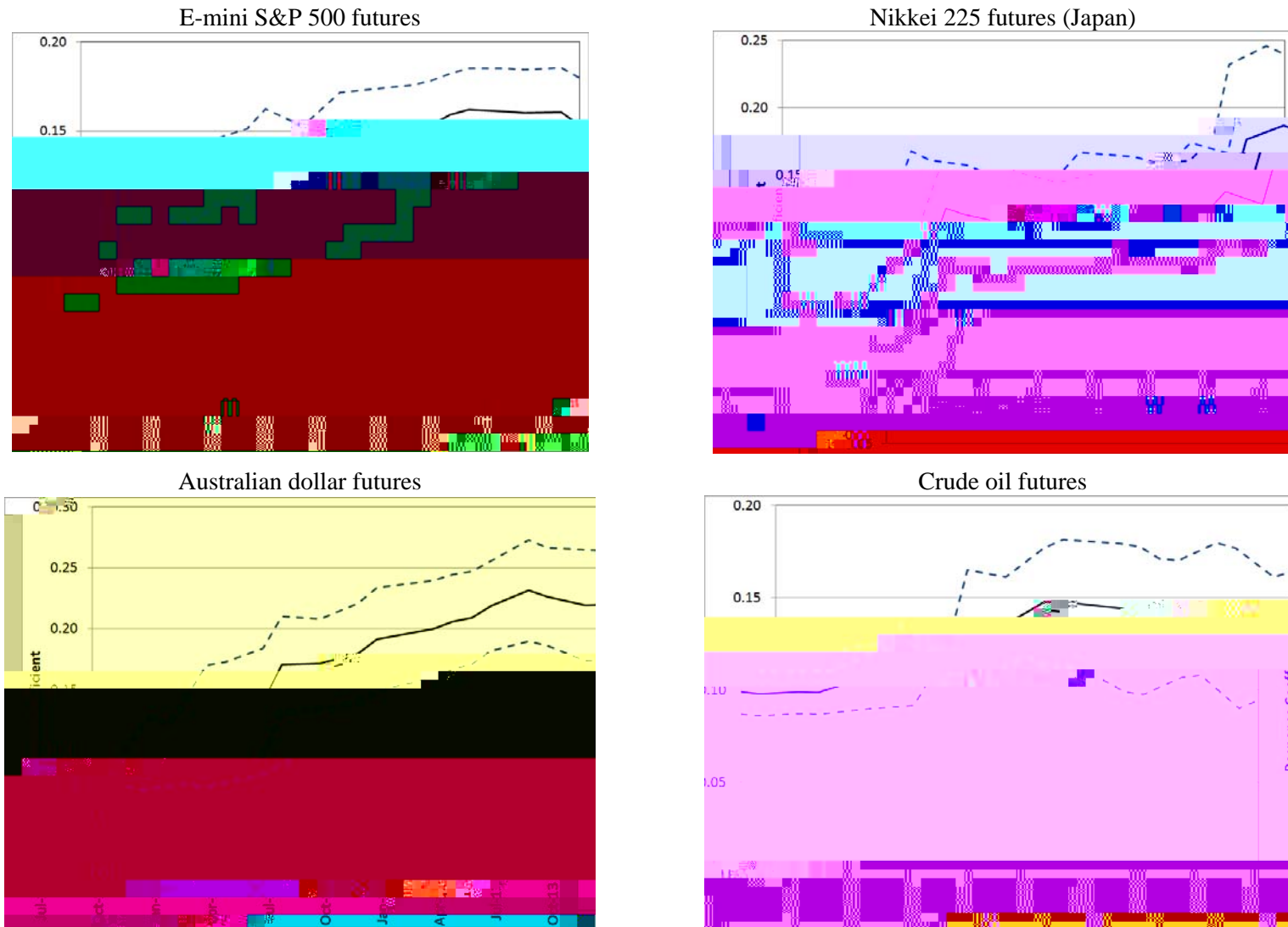
**Figure 4**  
**Cumulative Average Returns (CAR) around Manufacturing Purchasing Manager Index (PMI),  
 Real Gross Domestic Product (GDP) and Industrial Production (INP) Announcements**



The figure shows the cumulative average returns around the three output announcements (Manufacturing Purchasing Manager Index, Real Gross Domestic Product and Industrial Production) for the most important market in each subgroup (U.S. stock index, Asia-Pacific stock index, commodity currency, and energy/industrial commodity). For the GDP and Industrial Production announcement, when the GDP and Industrial Production announcement surprises have opposite signs, the sign of the GDP surprise is used.



**Figure 5**  
**Time-Varying Response of Futures Markets to Manufacturing Purchasing Manager Index Announcements**



The figure shows the time-varying response to the Manufacturing PMI announcements for the most important market in each subgroup (U.S. stock index, Asia-Pacific stock index, commodity currency, and energy/industrial commodity). The time-varying response coefficient is estimated with a rolling OLS regression with a window of 17 observations. The 17<sup>th</sup> observation corresponds to July 31, 2011 which is August 1, 2011 in China Standard Time. The futures returns are computed from 10 minutes before to 10 minutes after the announcement. Dashed lines are one-standard-error bands.

**Not-for-Publication Appendix**  
**(Includes Tables A1, A2 and A3 including ITC Results)**

**Table A1**  
**Test of Unbiasedness of Bloomberg Forecasts**

The reported coefficients are for the following regression:  $A_t = \zeta_0 + \zeta_1 F_t + \kappa_t$ , where  $A_t$  is the actual announced value of the given macroeconomic statistic and  $F_t$  is the consensus Bloomberg forecast. This test of unbiasedness is similar to the one used in Pearce and Roley (1985).

Announcement	N	$\zeta_0$	$\zeta_1$	R <sup>2</sup>	p-value
Consumer price index (YoY)	51	-0.0002 (0.0007)	1.01 (0.02)	0.98	0.78
Exports (YoY)	51	0.017 (0.012)	0.98 (0.08)	0.74	0.23
Fixed assets investment (YoY)	47	0.007 (0.004)	0.97 (0.02)	0.98	0.20
Foreign exchange reserves	16	33.4 (165.3)	1.00 (0.05)	0.95	0.60
Imports (YoY)	51	-0.004 (0.015)	1.08 (0.06)	0.86	0.25
Industrial production (YoY)	45	0.014 (0.010)	0.87 (0.09)	0.83	0.38
Manufacturing purchasing manager index	52	6.24 (3.23)	0.88 (0.06)	0.82	0.13
Money supply M1 (YoY)	44	-0.005 (0.005)	1.00 (0.04)	0.93	0.15
Money supply M2 (YoY)	51	-0.001 (0.003)	1.01 (0.02)	0.97	0.82
New yuan loans	51	83.2 (46.1)	0.88 (0.08)	0.76	0.16
Producer price index (YoY)	51	-0.001 (0.001)	1.01 (0.01)	0.99	0.45
Real GDP (YoY)	17	-0.005 (0.003)	1.06 (0.03)	0.98	0.14
Retail sales (YoY)	45	0.012 (0.02)	0.92 (0.12)	0.68	0.24
Trade balance	51	3.09 (3.81)	0.85 (0.19)	0.47	0.72

The sample period is from September 30, 2009 through December 31, 2013. The regression is estimated using OLS with the White (1980) heteroskedasticity consistent covariance matrix. Standard errors are shown in parentheses. The p-values are for the joint Wa

**Table A2**  
**Cumulative Average Returns (CAR) around Manufacturing Purchasing Manager Index,  
Real Gross Domestic Product and Industrial Production Announcements**

**Table A3**  
**Identification through Censoring Estimates for Chinese Macroeconomic Announcements**

	Manufacturing	Inflation		Trade	
	PMI	CPI	PPI	Exports	Imports
E-mini S&P 500	0.14*** (0.02)	-0.16*** (0.05)	-0.01 (0.04)	0.22** (0.09)	-0.17 (0.10)
E-mini Nasdaq-100	0.14*** (0.02)	-0.17*** (0.05)	-0.03 (0.04)	0.22** (0.09)	-0.17* (0.10)
Australian dollar	0.17*** (0.03)	-0.30*** (0.06)	0.08 (0.05)	0.33*** (0.12)	-0.19 (0.14)
New Zealand dollar	0.13*** (0.02)	-0.26*** (0.07)	-0.05 (0.05)	0.14** (0.06)	-0.07 (0.07)
Crude Oil	0.13*** (0.02)	-0.39*** (0.09)	0.04 (0.07)	0.13* (0.07)	-0.06 (0.07)
Copper	0.20*** (0.03)	-0.37*** (0.09)	0.28*** (0.08)	0.13 (0.09)	-0.05 (0.09)
Proportion of Measured Surprise Due to Noise $\left(\frac{\omega_{\xi}^2}{\omega_z^2}\right)$	13%	85%	76%	26%	24%

The table shows the estimated responses of futures returns to the Manufacturing PMI, Inflation, and Trade announcements using the identification-through-censoring (ITC) approach. The sample period is from September 30, 2009 through December 31, 2013. The sample contains 35 observations for PMI, 42 observations for Inflation, and 35 observations for Trade. The futures returns are computed from 10 minutes before to 10 minutes after the announcement. The estimation is performed separately for the announcements made individually (PMI) and jointly for the announcements made simultaneously (CPI announced simultaneously with PPI and Exports announced simultaneously with Imports). The model parameters are estimated jointly for the six most important markets since the sample size does not allow us to estimate the model for all markets together. All variables are demeaned prior to estimation. The null hypothesis of the Hansen (1982) test that the over-identifying restrictions of the ITC model are valid is not rejected at the 5% level. Standard errors are shown in parentheses. \*, \*\*, \*\*\* indicate statistical significance at 10%, 5%, and 1% levels, respectively.





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