Impact of Fed tapering announcements on North African equity markets

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Abstract

We propose an empirical evaluation of the transmission of the Federal reserve policy announcements to the equity price indices of three countries: Egypt, Morocco, Tunisia. The results of panel data tests allow us to highlight a significant negative impact of three of the 19 monetary policy events during the study period (01/01/2013 - 04/15/2015), generally associated with the speech coming after the FOMC's meeting and not the minutes release. Moreover, the interaction of domestic fundamentals with monetary policy dummies shows that domestic fundamentals with favorable direct effects on equity markets could indirectly increase their vulnerability to announcement effects (negative interaction).

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Introduction

The last significant stress episode in emerging markets in 2013 resulted in an unusually tense debate between Raghuram Rajan (Governor of the Reserve Bank of India), asserting that *"International monetary cooperation has broken down [...] Industrial countries have to play a part in restoring that, and they can't at this point wash their hands off and say we'll do what we need to and you do the adjustment."* and Ben Bernanke (Chairman of the Federal reserve) considering that *"A stronger U.S. economy is one of the most important things that could happen to help the economies of emerging markets."* His view has some contradictions. During the global financial crisis, the part of foreign direct investments to emerging market has reached the 50% threshold for the first time in 2009.

Since the early 1990s, North Africa started a wide process of financial reforms. The aim is to encourage the changes of financial intermediation, and thus financial development, in order to meet financing needs. The literature on this topic shows a strong heterogeneity with regards to both the reforms undertaken and first results (Alouani, 2008 [4]; Brack *et al.*, 2009 [8]; Tahari *et al.*, 2006 [19]).

The purpose of these reforms is also to integrate the domestic financial systems of North African economies to the global financial system, in order to benefit from external sources of financing. However, the unconventional monetary policies (Ahmed & Zlate, 2014 [1]) since the beginning of the Global crisis and the recent Tapering announcements (Sahay *et al.*, 2014 [18]) in advanced economies updated the issue of financial conditions and international monetary policy transmission to emerging economies (Blanchard *et al.*, 2010 [6]; Takáts, 2010 [20]; Cetorelli & Goldberg, 2011 [10]).

We study the transmission of the Fed monetary policy announcements to the equity markets of three countries of North Africa (Egypt, Morocco, Tunisia), during the period between 2013/01/01 and 2015/04/15. We choose these three countries because they have the highest level of financial development in this area. We use panel data and the tests are conducted with dummy event variables of monetary policy announcements resulting from two alternative methodologies. The first methodology (Mishra *et al.*, 2014 [14]) consists in constructing the aggregated dummy variables by selecting the dates of the meetings and minutes which are considered as tapering announcement since they have individually a significant negative impact on equity markets. The second methodology consists in constructing the dummy using the media coverage. In a second step, we test the effect of both types of dummy variables on equity markets indices. The effect of domestic fundamentals and international environment are taken into account by the addition of specific control variables.

The results show a significant effect of the Fed announcements, highlighted in particular in the case of the dummies constructed by the first methodology. The effect of statistical variables of the Fed monetary policy (Fed funds effective rate) is also significant. By contrast, the effect of control variables of the financial environment in Europe and the U.S.A. (equity market indices) is never significant. Furthermore, some control variables of domestic fundamentals have ambiguous effects. The direct effect of an improvement of these fundamentals may be positive, but increases the vulnerability to tapering announcements (effect of a negative interaction). This is especially true for the current account.

The paper is organized as follows. Section I is devoted to a survey of the international transmission of monetary policy announcements. Section II presents the stylized facts, in particular the monetary policy sequence of our study period and how it is described in

the press conferences and minutes following the FOMC meetings (Federal Open Market Committee). Finally, Section II also presents the empirical study results. We conclude with some policy recommendations.

1 Literature review

The literature on the financial integration of North African countries is not as broad as other emerging zones or advanced economies. With regards to the tapering effect, to the best of our knowledge, there is no empirical study yet. The reference literature is about emerging economies as a whole, in particular about the financial integration of the emerging countries since the global financial crisis and the transmission of shocks from advanced economies. For example, Cetorelli and Goldberg (2011) [10] show that openness to international financing or in other words to foreign banks enhances the transmission of shocks to emerging countries *via* the global network of multinational banks. Likewise, Takáts (2010) [20] highlights the existence of a "channel of international bank loans" as a transmission factor of the global financial crisis to emerging economies. He shows that the decrease of loan supply was the main cause of the decline of international bank loans to emerging countries during the global financial crisis.

Despite these drawbacks, Eichengreen (2010) [11] recommends that emerging countries should continue their international financial integration policies, in particular by making their economies more attractive to foreign investments, streamlining bureaucracy, or developing workers skills. Emerging economies should also continue maintaining their monetary, fiscal and debt policies moving as close as possible to the international credibility standards of advanced economies (in the absence of a crisis), while maintaining a flexibility for economic downturns. Finally, he considers that emerging markets have to define the optimal modalities of integration in order to get integrated into the international financing system as it is with its malfunctions, and not as it should be. Thus, when crises in advanced economies extend for a long time, capital flows to emerging countries rise significantly (Korinek, 2010 [13]), which implies to set up prudential policies limiting their effects.

In this context, our literature review has a double perspective: the literature about the setting up of unconventional monetary policies and their international effects on emerging economies; and the literature about the international effects of tapering announcements, before the exit from unconventional monetary policies.

Unconventional monetary policies and their international effects

The literature on the international effects of unconventional monetary policies is most often focused on the Fed policies, more rarely the ECB. The main issue in this study is the impact on emerging countries. Bowman *et al.* (2015) [7] who assess the effects on assets prices in emerging countries, as well as Ahmed and Zlate (2014) [1] who assess the effects on capital flows, study the full cycle of unconventional monetary policies. Bowman *et al.* (2015) identify the impulse response functions of each class of assets (government bonds, domestic currency, stock market indices) of the emerging countries of the sample to international (*i.e.*, Fed) monetary policy shocks. They obtain heterogeneous results, leading them finally to use a panel data model with individual fixed effects. Besides U.S. monetary policy decisions, the exogenous variables are the U.S. Government bonds yields (interest rate channel) and the spread of U.S. high yield bonds (risk taking

channel). Finally, the groundbreaking paper of Ait-Sahalia *et al.* (2012) [2] differs in two respects. First, the subject is not only the unconventional monetary policies of the Fed, and secondly it is not their effects on the emerging markets that are tested, but their domestic effects.

In detail, Ahmed and Zlate (2014) study capital inflows per GDP (Portfolio investments, total capital inflows). They test both net and gross flows in order to take into account the repatriation effect and the decrease of foreign investments by domestic investors. The exogenous variables are the expected determinants of yield differentials between emerging and advanced economies: growth and policy rates differentials, a dummy variable of unconventional monetary policies announcements of the Fed, global risk aversion, and finally, a variable of capital controls.

Ait-Sahalia *et al.* (2012) conduct an event study not focusing on emerging markets, but their methodology remains a reference in the literature to study this issue. They construct a detailed database of monetary and macroeconomic policies announcements by four advanced economies, between June 2007 and March 2009. The 234 announcements selected from the financial press, in particular the Financial Times, are classified into five categories: (i) fiscal policy (4%); (ii) monetary policy (25%); (iii) liquidity support (23%); (iv) financial sector policy (37%); and (v) ad hoc bank bailouts and failures (11%). As a robustness test they exclude the dates corresponding to anticipated announcements, for both monetary and fiscal policies variables. The study period is divided into two sub-periods, *pre* and *post* Lehman Brothers. The event window starts one day before and three days after each event, in order to take into account the reaction time of investors. The events that are overlapping within five days are eliminated. It is interesting to notice that the results remain unchanged even when modifying the window for robustness checks, the purpose of the tests being to assess whether these measures had an effect on financial strains measured by interbank spreads.

These studies provide key results on the effects of international transmission of unconventional monetary policies. Bowman *et al.* show that in an emerging country with a deteriorated economic environment, assets prices are more vulnerable to the transmission of the U.S. monetary policies. The effect on domestic assets prices can even be stronger than on the U.S. assets prices. Still in the case of emerging countries, Ahmed and Zlate highlight a structural change in the determinants of net capital flows: the effect of differentials of domestic interest rates compared to the U.S. policy rates is enhanced during the post crisis period. At a broader scale, Ait-Sahalia *et al.* confirm that the announcements of fiscal and monetary policies during the crisis by major advanced economies are likely to have some consequences on market conditions in other countries. These effects increase gradually, the multiplication of Central banks decisions favoring their international impact, in particular in the case of interest rates decreases and banking recapitalizations. In other words, despite the absence of an institutionalized mechanism of international monetary policies coordination, the transmission effects of monetary policy announcements of similar nature contributes to address investors concerns.

The tapering and its effects

As shown by the reference literature, the announcements of Central banks of advanced economies may have significant effects even before the measures are implemented. Thus, in 2013, when the Fed announced the beginning of the tapering, it triggered a reversal of capital flows back to the United States, and consequently a period of strong tensions

in emerging countries. In this context, Eichengreen and Gupta (2015) [12] are interested in the announcement effect in itself. The study focuses on the first tapering announcement, in May 2013, by Ben Bernanke [5]. This speech has a strong negative but highly differentiated impact on emerging countries. Some of them are affected both by immediate effects and by a persistence for several months. The endogenous variables are the exchange rate, currency reserves and an equity prices indicator, between April and August 2013. The exogenous variables are the usual macroeconomic fundamentals, the size and openness of financial markets (in particular, cumulative inflows of private capital, stocks of portfolio investments, market capitalization) and the structural environment (exchange rate regime, government debt, openness of the capital account, quality of the economic or institutional environment). The authors also test a variable of public intervention on the real exchange rate and the current account balance during the period of quantitative easing, which represents an original contribution of the study.

Although they do not name it explicitly, Rai and Suchanek (2014) [17] also study the impact of the tapering announcements by the Fed, from January 1st 2013 to January 1st 2014. They conduct a "*quasi* event study", *i.e.* the use of event dummies in the context of panel data tests, with panel and individual data on capital flows, exchange rates, equity prices and government debts yields of a sample of emerging countries. The event study methodology is aimed to limit identification problems. Indeed, markets fastly integrate the informations of announcements while regardless of the event window fundamentals remain unchanged. Furthermore, the event study prevents the endogeneity problems resulting from the use of monthly or quarterly data. It should be noted that the authors consider that it is unnecessary to identify the surprise effect of tapering announcements because it would generally be agreed that these announcements were widely unexpected. Thus, their dummy contains all the announcements of the study period. The selection of dates is made with a qualitative approach, by choosing the dates when Ben Bernanke or the FOMC release an information related to the upcoming tapering. This method gives May 22th, June 19th, September 18th and December 18th, 2013. Besides the reactions to these announcements, the study aims to determinate which macroeconomic characteristics (GDP, inflation, current account balances) of the countries of the sample affect their reactions.

With the same methodological approach ("*quasi* event study"), Aizenman *et al.* (2014) [3] assess the international effects of monetary policy announcements during a period beginning before the start of the tapering (from November 27th 2012 to October 3rd 2013). Their purpose is to characterize the specificity of tapering announcements compared to announcements of unconventional monetary policies, on three types of assets prices (equity markets, exchange rates and sovereign CDS spreads). The estimations are made on the full sample, and then on two sub-groups of emerging countries: one group whose key characteristics are related to a weakness (16 countries), and the second one to a soundness (11 countries). Different sources of announcements are tested (Ben Bernanke, the Federal Reserve Board of Governors, the Federal Reserve Bank Presidents, and the FOMC statements and minutes). The authors use different event variables depending on wether the announcement is related to the tapering or quantitative easing, as well as depending on who released it.

With a somewhat different methodological approach but still conducting a *quasi* event study, Mishra *et al.*, which is our methodological reference, study the impact of tapering announcements of the Fed and the role of domestic macroeconomic characteristics in the differences of reactions between emerging countries. The panel is composed of

21 emerging economies. Domestic characteristics include macroeconomic fundamentals, financial depth and integration, commercial links with China and measures of capital flow and macro-prudential policies. The authors differentiate between positive and negative events in order to select only the negative. Three dependent variables are used (exchange rates, government bond yields in domestic currency, and a stock prices index). They use the following equation, which is tested individually for each event *i,* to identify negative events:

$$\Delta y_{c,i-m,i+m} = \alpha + \beta * D_i \tag{1}$$

A negative effect is associated with a positive coefficient β when the endogenous variable (Δy) is the exchange rate and the government bond yield and a negative coefficient when it is the stock price. (D_i) is the dummy variable corresponding to event i of monetary policy.

The second step of the study consists in evaluating the role of domestic characteristics. The aggregated dummy variable is obtained by the sum of the vectors corresponding to the dates with significant negative effects only.

$$\Delta y_{c,i-m,i+m} = \alpha + \beta * D_i^N + \gamma x_{c,i-q} + \delta D_i^N * x_{c,i-q} + s_c \tag{2}$$

In addition to this new specification of the dummy variable, the authors add to the exogenous variables of equation 1 ($x_{c,i-q}$) representing the characteristics of country (c) one quarter before the event, the interaction of these characteristics with the dummy variable, and (s_c) accounting for country fixed effect.

These four studies highlight an important effect of tapering announcements on emerging countries. Tapering announcements depreciate assets prices (Rai & Suchanek, 2014), especially as the countries have let their exchange rate appreciating and their current account deficits widening during the unconventional monetary policies period. It is the same for the level of reserves and size of equity markets. The effect of market size is systematically negative and significant, which can be explained by the possibility to sell and withdraw capital more easily (Eichengreen & Gupta, 2015). Aizenman *et al.* (2014) obtain partly similar results but the decrease of exchange rates is stronger for robust countries. It could be explained by the forecast of balance sheet adjustments, where the size and liquidity of the market play an important role. To the contrary, unfavorable effects appear with a delay for countries with fragile international positions. Mishra *et al.* (2014) get usual results since the lowest depreciation of exchange rates and most important resilience characterize the countries whose macroeconomic fundamentals and growth prospects are the most robust. Capital controls (as in Eichengreen & Gupta, 2015) or the tightening of macro-prudential measures also have positive effects. Nonetheless, the effect of financial depth is positive, which is a singularity. Generally speaking, these results highlight the peculiar effect of financial development (which is generally negative) in comparison with other characteristics of the macroeconomic environment (whose improvement usually reduces vulnerability). The systematically favorable effect of restrictive measures on financial sectors (exchange or macro-prudential controls) points in the same direction. Our purpose is to test the existence of similar contradictory effects in the case of the countries of our sample.

Methodologically, regardless of countries specificities, other findings are obtained. Notably, Rai and Suchanek (2014) show that it is the FOMC's meeting of June 19th which has the strongest effect, even more than the speech of May or the Meeting of July. This difference of reaction could be explained by the fact that the May speech was the first

time where the tapering was mentioned. So there would be a true surprise effect, and a longer reaction time of markets. Furthermore, Aizenman *et al.* (2014) show that it is the speeches of Ben Bernanke (their study period covers only the mandate of Ben Bernanke, and not Janet Yellen) that mainly have an effect, compared to the speeches of governors of other Central banks. These results legitimate the choice, in the remainder of this study, of only the FOMC meetings dates, selected with two alternatives methodologies: on the one hand, as in Mishra *et al.* (2014), with individual tests of different dates; and on the other hand, as in Ait-Sahalia *et al.* (2012), with the media coverage.

2 Empirical analysis of the Fed tapering announcements to the equity markets of North Africa

Stylized facts

After the global financial turmoil of 2007-2008, Central banks of advanced economies set up unconventional monetary policies. In particular, the Quantitative Easing of the Fed ($QE1$, 2008-2010; $QE2$, 2010-2011; $QE3$, 2012-2015) caused an unprecedented increase of global liquidity. Thus, emerging countries were impacted not only by the global financial turmoil, but also by these unconventional monetary policies. They experienced a strong increase of capital flows during the QE period, with favorable but also weakening effects. Figures 2a and 2b show foreign direct investment inflows covering a period from 1970 to 2014. Figures 2a shows inflows by economic area and Figure 2b shows inflows by country (countries in the sample).

The governments and Central banks of emerging markets tried to limit the consequences of these unconventional monetary policies (with capital controls, interventions in exchange markets...), to varying extents. Indeed, the purpose of these unconventional monetary policies is to limit the effect of the global financial crisis and to revitalize the economies of advanced countries. They do not aim to be permanent, as shown by the beginning of the Fed tapering. For the first time, Ben Bernanke is referring to this beginning during his congressional testimony on May 22nd, 2013 [5]. Since the early stages of the financial crisis, he is the first central banker to mention tapering. This causes massive capital flows back to the U.S.A. and consequently massive capital outflow from emerging markets, simultaneously with a decrease of their equity markets indices, in particular. Table 2 shows the chronology of the tapering and the amounts of the successive reductions of asset purchases announced after the FOMC's meetings during our study period.

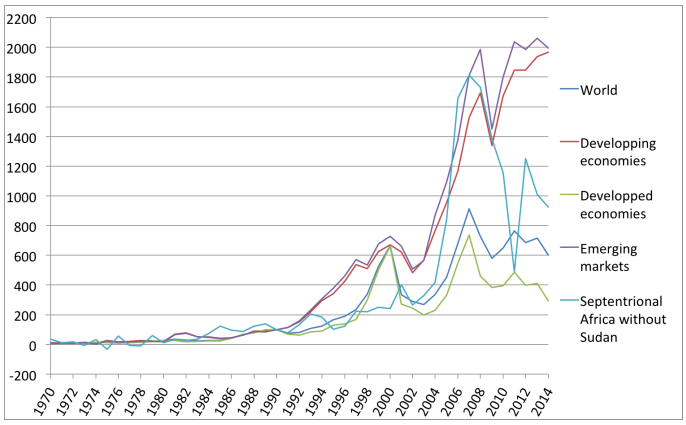
At first glance North African equity markets seem to be impacted by these announcements, like emerging economies in general. Figure 2 shows the equity market indices of the three countries of our sample and the Eurostoxx50 and S&P500. Vertical bars plot meetings included in the dummies of our empirical tests. Let us recall that these six dates have been selected with two different methodologies, allowing us to consider that each of these meetings had a negative impact on our sample equity markets indices. As we can see on the chart, Meetings 4 and 17 show an important change in the trend. Meeting 9 is less clear but seems to have the same effect.

Furthermore, on the whole period, the Moroccan index has two trends, a strong increase until meeting 15 and then a decreasing trend with a strong volatility. To the

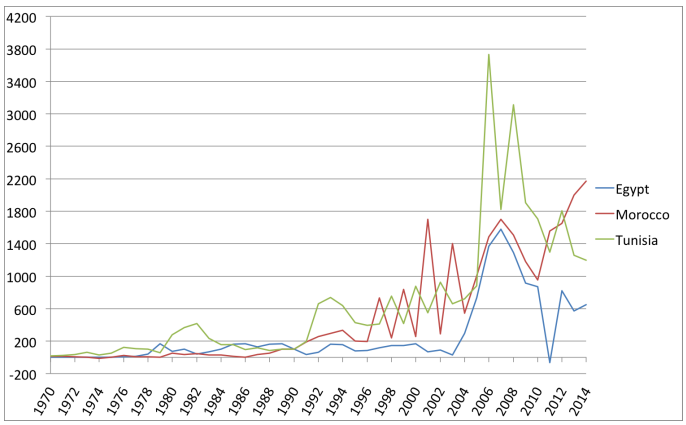
Table 1: Event studies and monetary policy announcement effects in equity markets: selective bibliography

	Aït-Sahalia *et al.* 2012	Rai and Suchanek 2014	Aizenman *et al.* 2014	Mishra *et al.* 2014	Bowman *et al.* 2015
Title	Market response to policy initiatives during the global financial crisis	Effect of the Federal reserve's tapering announcements on emerging markets	Transmission of Federal reserve tapering news to emerging financial markets	Impact of Fed tapering announcements on emerging markets	U.S. unconventional monetary policies and transmission to emerging market economies
Methodology	Event study (strict sense). Parametric and nonparametric tests (*Average Cumulative Abnormal Differences*)	Event study (event variable). Individual and panel data tests	Event study (event variable). Panel data tests	Event study (event variable). Panel data tests	Event study (only in robustness checks). Panel data tests
Dummy variable	Policies announcements of several developed countries. Choice of the dates: media coverage	Dates chosen when Bernanke or the FOMC make an announcement relating to the tapering. All dates (announcements always considered as a surprise)	Statements of the Fed chairman, the Board, and the president of the Central bank, and FOMC meetings	Econometrical tests: classification of events into positive/negative and selection of only negative ones	Unconventional policy announcements by the Fed (FOMC and Bernanke)
Event window	D-1 to D+3	D0 D0 to D+5	H0 to H+24 D0 to D+21/D+19	D-1 to D+1	D-1 to D+1
Period	06/01/2007 to 03/31/2009	01/01/2013 to 01/21/2014	11/27/2012 to 10/03/2013	01/01/2013 to 01/22/2014	January 2006 to December 2013
Sample	Advanced economies	Emerging economies	Emerging economies	Emerging economies	Emerging economies

Figure 1: FDI inflows by area and by countries of the sample



(a) FDI inflows by area



(b) FDI inflows by countries sample

data: Unctad, base 100 in 1990, 1970-2014

Table 2: Key dates of the tapering during the study period

Dates	Action of the Fed	Remaining amount of assets purchases
June 18-19, 2013	Tapering announcement	85 billions dollars
December 17-18, 2013	beginning of tapering (-10 billions)	75 billions dollars
January 28-29, 2014	-10 billions	65 billions dollars
March 18-19, 2014	-10 billions	55 billions dollars
April 29-30, 2014	-10 billions	45 billions dollars
June 17-18, 2014	-10 billions	35 billions dollars
July 29-30, 2014	-10 billions	25 billions dollars
September 16-17, 2014	-10 billions	15 billions dollars
October 29-29, 2014	End of tapering (-15 billions)	0 billions dollars

(source: Fed)

Table 3: Descriptive statistics of the countries sample during the study period

	Mean	Median	Minimum	Maximum	Standard deviations
Casablanca__MAD	95.333	95.108	88.994	100.7	3.1581
Tunis__Tunindex	98.964	99.034	93.849	103.37	2.1817
Caire__EGX30_	99.376	97.399	80.278	121.93	9.2993
Eurostox50	103.13	101.53	92.645	114.76	5.7066
S_P500	112.76	113.14	99.674	126.49	6.9329

(base 100 01/02/2013, sources: investing.com and finance.net)

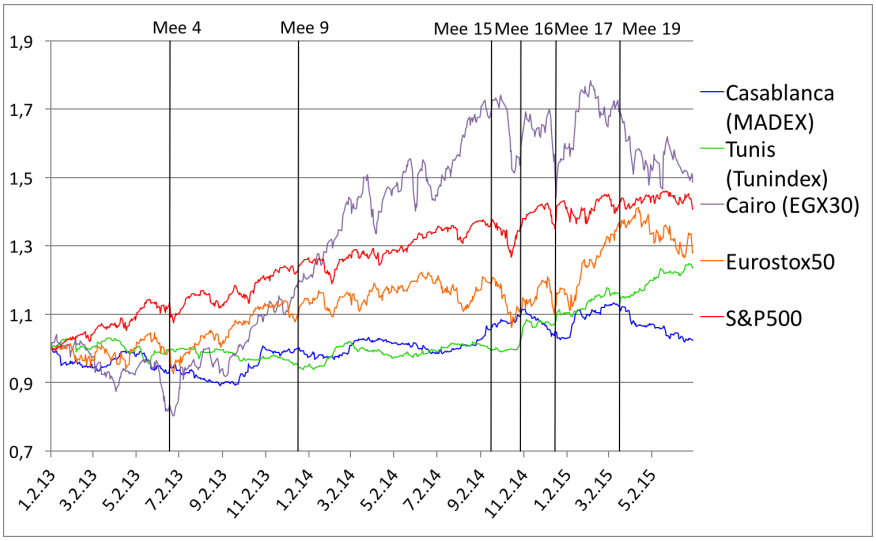
contrary, the Tunisian index is relatively stable until meeting 16 and then experiences a steady increase. With the exception of this index, we can see a decrease after meeting 19 for all indices. Finally, a quick glance at this graph already suggests that there are some meetings which have a significant effect on equity markets indices. The purpose of this paper is to specify this observation with an empirical study aiming to evaluate the short-term impact of these announcements.

Data and methodology

Key steps of the empirical analysis

In this section, we assess the existence of transmission effects of the Fed monetary policy announcements to a subsample of countries (Egypt, Morocco, Tunisia), with panel data tests. As in Mishra *et al.* (2014), the tests are conducted in two steps. In the first step,

Figure 2: Equity markets indices of the countries of the sample during the study period



[1,2]Meeting in both dummies

[1]Meeting in only the first dummy

[2]Meeting in only the second dummy

(base 100 01/02/2013, sources: investing.com and finance.net)

we construct a dummy variable of announcement effects of the Fed monetary policy by testing the individual dates of meetings. We also construct an alternative dummy with a qualitative approach using the media coverage.

The second step consists in evaluating the effects of these dummies and their interaction with domestic fundamentals (controlling the direct effects of these fundamentals, without interaction). The dependent variable is composed of the price indices of equity markets of the countries of the sample. Contrary to Mishra *et al.*, we do not use the exchange rate data as an alternative dependent variable because the currencies of the countries of the sample are managed. We control for the international financial environment variables (equity markets indices, short term monetary markets rates), and we also include a statistical variable of the Fed monetary policy (policy interest rate).

Construction of the announcement effect dummy

In a first step, we construct the announcement effects dummies. We study in particular the effect of tapering announcements, that should have a negative effect on securities prices for the countries of the sample. We choose to assess only the effects of the FOMC meetings dates, and the corresponding minutes releases.

The first time that Ben Bernanke talked about the tapering was during his statement to the U.S. congress, on May 22nd, 2013 [5]. However, he specified at that time that it was only one of the possibilities that the Fed had. He also specified that the Fed could reduce or increase its unconventional monetary policy within the following months. Besides the fact that this date is not tested since we assess the effect of the sole meetings

as in Mishra *et al.*, 2014 [14], the study window of event studies is generally shorter than one week, which is too short to observe the response of the market in this case. It was the first time that the tapering was discussed, so market participants presumably needed more time to analyze this information and reallocate their portfolios. So, the impact is difficult to measure using an event study.

Bowman *et al.* (2015) [7] and Rai and Suchanek (2014) [17] confirm this point. They both show that the June meeting, following the May statement, has the biggest impact. Nonetheless, this does not mean that the speech of May does not have any impact, but the following meetings have a more important short term impact.

As regards the identification of the meetings that have a potentially significative effect on the equity markets of the countries of the sample, there are two possibilities in the literature. The first possibility is to test the individual effect of each FOMC's meeting and minutes release (as in Mishra *et al.*, 2014 [14]). The second possibility is to use the Central bank communication and the media coverage of monetary policy decisions to construct a dummy variable of events that would seem *a priori* to have negative effects (e.g., Ait-Sahalia *et al.*, 2009 [2]). In both methods, the aggregated dummy variable of tightening announcement effects is constructed by the sum of individual variables corresponding to unfavorable events.

Construction of the dummy variable with individual tests

In this first methodology, we test the individual effect of each meetings and minutes release of the FOMC. We use daily values of equity markets price indices (see Figure 2 and Table 3), from January 1st 2013 to April 15th 2015 for this first set of tests[4].

During the study period (see Table 4), there are 19 meetings and 18 minutes releases. At this stage, each date corresponds to a specific dummy. The first differences of equity markets indices are tested successively on the whole set of dummy variables corresponding to meetings, and then minutes releases. The results are shown in Tables 7 to 9. We tested the event dummies in three different forms of the event window: with a non-null value the first day of the meeting (or the first day of the release of minutes, denoted by $d1$), with a non-null value the two days of the meeting (or the day and the following day of the release of minutes, denoted by dd), and with a non-null value the second day of the meeting (or the following day of the release of minutes, denoted by $d2$).

Considering the existence of individual effects in the panel data (Moulton & Randolph, 1989 [15]), we conduct the tests with random effects[5]. We test the following equation:

$$\begin{gathered} \Delta y_c = \alpha + \beta\, D_i + \varepsilon_{c,t} \\ c = 1,\, ...,\, N,\; t = 1,\, ...,\, T \end{gathered} \tag{3}$$

Δy is the first difference of equity market indices series. D_i is a dummy variable corresponding to event i in one of the two categories (meetings or minute releases). In this model, $\varepsilon_{c,t} = \alpha_c + e_{c,t}$, $\alpha_c \sim i.i.d.\left(0, \sigma_\alpha^2\right)$ corresponds to the individual effects and $e_{c,t} \sim i.i.d.\left(0, \sigma_e^2\right)$ to a random disturbance.

The results allow us to classify meetings and minutes into two categories: favorable events, and unfavorable events. The rule, which is inspired of the rule of thumb of the

[4]Note that contrary to most of the literature on this topic (Aizenman *et al.* [3]; eichengreen & gupta[12]), we do not need to use a time lag in order to construct our dummy variables, because the countries of our sample do not have a lag which is sufficiently large to take it in account. Indeed, papers that use a time difference with the United States do it only for Asian countries.

[5]The results with fixed effects, which are roughly similar, are available upon request

Table 4: Calendar of meetings and minutes releases of the FOMC

Meeting n°		Minute n°	
1	29/30 January 2013	1	20 February 2013
2	19/20 March 2013	2	10 April 2013
3	30/1st April/May 2013	3	22 May 2013
4	18/19 June 2013	4	10 July 2013
5	30/31 July 2013	5	21 August 2013
6	17/18 September 2013	6	9 October 2013
7	16 October 2013		
8	29/30 October 2013	7	20 November 2013
9	17/18 December 2013	8	8 January 2014
10	28/29 January 2014	9	19 February 2014
11	18/19 March 2014	10	9 April 2014
12	29/30 April 2014	11	21 May 2014
13	17/18 June 2014	12	9 July 2014
14	29/30 July 2014	13	20 August 2014
15	16/17 September 2014	14	8 October 2014
16	28/29 October 2014	15	19 November 2014
17	16/17 December 2014	16	7 January 2015
18	27/28 January 2015	17	18 February 2015
19	17/18 March 2015	18	8 April 2015

reference paper[6], is the following: more than three positive and significant coefficients (respectively, negative and significant) correspond to a positive event (respectively, a negative event). Finally, four meetings (one with a positive effect and three with negative effects) and one minute release (positive effect) are relevant. Our aim is to characterize the effects of monetary policy tightening announcements, so only the dates with a negative effect are selected to construct the dummy variable of the second stage of the test. These dates are all meetings events: meetings number 9, 17 and 19 are selected for the first dummy.

Construction of the dummy variable with the media coverage

This subsection is devoted to the presentation of the second methodology allowing to construct the dummy of announcement effects. As in Ait-Sahalia *et al.* (2009) [2], we rely on the media coverage of FOMC meetings and the corresponding monetary policy decisions. We use the Financial Times as a proxy of the media coverage, since this newspaper is one of the most read and used by markets participants. In addition, it proposes a thorough analysis of the market allowing us to identify the expectations as regards the Fed upcoming decisions.

We study articles releases both in the newspaper edition and the website. Indeed, in the paper edition, the bulk of articles on the topic is published the day after the press conference of the FOMC while analysts and investors following the FOMC conference with interest want to be informed about the facts and newspaper analysis in real time.

In this second stage of the tests, the event window is the two days of the meeting and the day following it (D to D+3). Generally speaking, during the first day of the meeting, the articles present the expectations and anticipations of market participants, collected by the journalists. The articles of the second and third days sum up the conference and the monetary policy decisions and present the first reactions of some market participants as well as an analysis of the markets themselves. The deep analysis of the coverage by these articles allows us to differ from the existing literature which focuses on the front page of newspapers only. This approach is intended to allow us to have a more qualitative picture of the situation and thus be able to identify the meetings during which the surprise effect would be significant.

The identification of the surprise effect is important because it should induce markets to respond quickly (that is to say, respond in the windows of our dummies). It should also bring out significant effects of the Fed announcements on the equities markets of our sample. To the contrary, when the FOMC announcement is already anticipated by the markets, there is a weak response. We have used three keywords in the search engine of Europresse, with search filters where the Financial Times is the only possible source. These three key words are *"taper"*, *"Fed"* and *"FOMC"*. This approach is inspired of Aizenman *et al.* (2014) who use the news of Bloomberg as their reference media coverage with the following keywords: *"QE Federal", "Federal Reserve Bank of", "QE"* and *"Fed Taper",* using the Factiva database.

Table 6 summarizes the informations collected for each meeting of the FOMC (the details of the decisions are shown in Table 5). On this basis, we select four relevant dates which are *a priori* associated with negative effects. These dates are: *mee4, mee9, mee15, mee16*. They form the dummy constructed by the second methodology. In order to check

[6]In the reference paper the rule is that at least two significative coefficients of the same sign are required to classify an event as favorable or unfavorable. Since our study period is both longer and for that precise reason less homogeneous, we retain three significant coefficients of the same sign.

Table 5: Key dates of FOMC meetings, identified with the Financial Times

Mee 4	June 18-19 2013	Announcement of the tapering by the Fed which was not expected by the markets
Mee 9	December 17-18 2013	Within a climate of uncertainty, the Fed confirms the beginning of the tapering
Mee 15	September 16-17 2014	As expected by the markets, the Fed continues the tapering. The issue of futures rates increase is discussed, which is a surprise
Mee 16	October 28-29 2014	Despite the expectations of a progressive implementation, the Fed announces the finalization of the tapering

the choice of the dates and have a wider view of the press during these meetings, we conducted a targeted search with Google news by using two keywords simultaneously, *"FOMC taper"*. This approach allows us to count for each meeting the number of pages given by the search engine, with a customized period corresponding to the dummy windows. Using the two key words simultaneously is necessary to avoid too many propositions with no link with the tapering or the FOMC. The purpose of this search is only to be a robustness check of the choice of the dates, with the most used search engine of the Internet at the time of writing. Indeed, in our judgement, this methodology cannot be sufficient to select qualitatively the dates composing the dummy. In particular, the operation of Google causes additional identification problems over time. Indeed, we do not know how the algorithm selects the pages shown by the search engine. In addition, it can change over time, which does not allow to find the same result irrespective of the date of the search.

Nevertheless, the Google search confirms the larger number of articles and opinions appearing in the result page on several dates corresponding to the dates in the dummies, for both methodologies. For both the Google search and the Financial Times search, with the exception of the first two and the last two dates of Table 2, the remaining dates have a small impact. We can assume that it is due to the fact that the decisions taken at these remaining dates were anticipated by the markets.

Pros and cons of the qualitative methodology

Using the media coverage as a dummy construction methodology has some advantages and disadvantages that must be considered. This methodology offers a genuine qualitative approach because it allows to study the markets expectations and compare them with the decisions of the Fed. It is not only a quantitative study of how many articles appear with the keywords and their relevance, but a thorough study of what is happening. It allows to select the dates which are *a priori* the most relevant and likely to be the most significant, because markets have to adjust promptly to unexpected FOMC announcements. Indeed, this methodology allows to take into account the surprise effect of announcements. However, it is a representation of the interpretations by journalists and market participants of these announcements, with their shortcomings and subjectivity.

This methodology has some additional defaults. Some of them are inherent in it. First, a careful study of the articles requires significantly more time than a simple ranking by popularity. In addition, a subjectivity bias may persist, both in the study of the articles or in the selection of the key words or the source by itself. Last but not least, the surprise effect identified by the media coverage could result in a lack of significance of the control variables associated with transmission channels of the Fed monetary policy, because this transmission is already included in the construction of the dummy.

Interaction with domestic characteristics

This subsection is devoted to the second step of our methodology. We test the interaction between dummy event variables and the domestic characteristics of countries in the transmission of the Fed monetary policy decisions. The first dummy is built by conducting individual tests and aggregating the individual dummy variables of meetings 9, 17 and 19. The second dummy is built by using the media coverage (table 5). It is the sum of the individual dummy variables of meetings 4, 9, 15 and 16.

This second set of tests includes three types of exogenous variables, besides the direct effect of event dummies: domestic fundamentals of the countries of the sample, their interaction with announcement effects dummies, and a set of international control variables (international financial environment, statistical variables of the Fed monetary policy).

We control for three types of domestic characteristics: domestic financing systems, commercial opening, and financial opening. In detail the variables are the following: inflation, national investment and national savings as regards domestic financing systems; trade openness (exports + imports / GDP), public balance and current account, as regards commercial opening; portfolio investments (debt instruments and equities) inflows, FDI inflows and reserves / GDP as regards financial opening.

Finally, in order to control the effects of monetary markets short term rates and world equity markets, we tested in each case two alternative variables in preliminary tests: in the first case, the effective Fed funds rate and the EONIA; in the second case, the EUROSTOXX50 and the S&P500. In each case we chose the alternative which was the most significant and / or less correlated with the other exogenous variables: the effective Fed funds rate in the case of monetary markets, and the EUROSTOXX50 for world equity markets[7] (see the summary and descriptive statistics in Tables 10a and 11a).

The correlation coefficients of Pearson, Spearman and Kendall show a strong correlation between macroeconomic fundamentals. In some cases, we also note that there is a strong correlation between the announcement dummy and its interaction with the domestic fundamentals of the countries of the sample. The exogenous variables in the different models are chosen on the basis of those correlations. Finally, the Hausman specification test shows that we cannot reject the null hypothesis of independence between errors and explanatory variables. Thus, the random-effect model is not biased.

We tested the following equation:

$$\Delta y_{c,t} = \alpha + \beta D + \delta D x_t + \gamma x_t + \theta z_t + \varepsilon_{c,t} \tag{4}$$

With $c = 1, ..., N$; $t = 1, ...T$ and $\varepsilon_{c,t} = \alpha_c + e_{c,t}$, α taking into account the individual factors that are not present in the model and $\varepsilon_{c,t}$ being a random perturbation.

$\Delta y_{c,t}$ is the first difference of equity market indices. The exogenous variables are the aggregated event dummy D, its interaction with domestic fundamentals x_t and the

[7] The results with EONIA and the S&P500 are available upon request.

domestic fundamentals tested directly. Note that the domestic fundamentals are tested in three groups (see above), with in each case specifications taking into account bilateral correlations: commercial opening, domestic financing systems, and financial opening. Finally, z_t is the control variable of the international financial environment. Post-estimation tests of intra-individual homoscedasticity (Breusch-Pagan, 1980 [9] and White), inter-individual heteroscedasticity (modified Wald), individual contemporaneous correlation (Breusch-Pagan) and intra-individual autocorrelation (Wald) were conducted, as well as the test for selectivity bias (Nijman & Verbeek, 1992 [16]).

Results

Let us recall that the first event dummy includes meetings 9, 17 and 19; whereas the second dummy includes meetings 4, 9, 15 and 16. In addition, it should be noted that meeting 14 (from the 29th to the 30th of July 2014) cannot be significant since during the event window of this date, none of the equity markets of our country sample was open.

The results are shown in Table 12 (macroeconomic fundamentals: domestic funding systems), Table 13 (macroeconomic fundamentals: trade integration), and Table 14 (financial openness). The two dummies were tested within the nine different models. The first result is that there is a large difference of significance between the two dummies. The first dummy, build with individual tests, is significant at a 1% threshold in all models except the fourth and sixth model, where it is significant at a 5% threshold. The coefficient is always negative as expected. Its value ranges approximatively from -3.4 and -0.7.

To the contrary, the second dummy is not significant, whatever the model used. A very straightforward possible explanation of this lack of significance is related to the magnitude of the effects corresponding to the dates of which it is composed. The fourth meeting corresponds to the first tapering announcement by the FOMC. It should have a much more important effect than the others. The coefficients related with the effects of the different dates would therefore not be stable, which would alter the significance of the aggregated dummy.

One can also see that there are less significant control variables in the tests with the second dummy. Furthermore, eight of the significant control variables are significant at a 10% threshold only. However, all the coefficients of direct effects of these domestic environment variables have the same sign with both dummies. Three interaction variables (public debt, incoming FDI, inflation) have a different sign with the two versions of the dummy, but the coefficients associated to the first version of the dummy are always largely more significant.

The direct effects of macroeconomic control variables presented in Tables 12 and 13 (domestic financing systems and trade integration) are also in line with expectations most of time. Thus, a higher current account balance and a higher investment level have a positive direct effect. Furthermore, a higher level of openness has a negative direct effect whose interpretation is more ambiguous, since commercial openness results from both imports and exports. The positive direct effects of inflation and public debt are also easily interpretable: by the association of a relatively high level of inflation with a relatively high level of domestic growth in the first case; and by a multiplier effect of public debt in the second case.

Nevertheless, the interaction effects with the control variables that can be associated with the extroversion of economies (current account, public debt, openness) are all three in the opposite direction to their direct effects. Thus, an improvement of the current account balance has a positive direct effect on equity market indices of the sample countries. But

it has a negative and significant interaction effect with international monetary policies announcements. It is the same for public debt (with a much higher negative indirect effect than its positive direct effect) and commercial openness (with a positive indirect effect going in the opposite direction of its negative direct effect, the latter being much less intense).

The indirect effects of some control variables that are not associated with the extroversion of economies (inflation, investment) are interesting since they are also ambivalent. Inflation has a positive direct and negative indirect effect. Whereas domestic investment has a negative direct and positive indirect effect. In both cases, the intensity of the indirect effect is stronger than the direct effect.

Concerning the effects of capital flow variables (Table 14), none of the three variables has simultaneously a significant direct and indirect effect. Thus, it is only the indirect effect which is (negatively) significant for portfolio investments and incoming FDI. On the contrary, the reserves / GDP ratio has only a direct significant effect (at a 10% threshold). This effect is negative, which might be associated with monetary policy choices resulting in negative short-term effects on equity markets.

Finally, concerning the control variables of international financial environment (Tables 12 to 14), we can see that the Eurostoxx variable is never significant. On the contrary, the Fed funds rate is significant at a 1% threshold in the models associated with domestic financing systems and trade integration. Whatever the model considered, the variable has a negative effect, which means that an increase of the Fed funds rate has a negative effect in the countries of our sample as expected.

Finally, the equity markets of the countries of the sample are effectively exposed to Fed announcement effects, even if they are characterized by a low level of financial development in comparison with the emerging economies which are usually included in the sample of the reference literature. It is therefore important for North Africa as well to take this issue into account and try to limit these effects. By conducting financial reforms resulting in an increase of their degree of global financial integration, the Maghreb countries will certainly take advantage of an enhanced financial development, but they will also be more exposed to international monetary policy announcement effects. This is all the more true that commercial integration also has a weakening interaction effect. Another important result is that while the countries of the sample are comparable to emerging economies as regards the significance of the direct and interaction announcement effects, our results highlight the difficulty to identify the unfavorable events using the media coverage. This unpredictability, which might result from the use of parametric estimations as exposed before, might also be the consequence of the peculiar domestic characteristics of the countries of the sample and the lower level of substitutability of domestic assets (in comparison with emerging economies). It is in any event a specific factor of vulnerability.

Conclusion

Our study covers a study period where the Fed is already committed to stop its unconventional monetary policies, with some primary effects which are unanimously considered as disruptive for emerging markets. It is all the more important to specify this observation that this normalization of monetary policy is only in its early stages, and that its effects will be strengthened by the normalization of the ECB monetary policy when it begins.

To the best of our knowledge, the literature does not address these issues in the case of North African economies.

We propose an empirical assessment, with a sample composed of the three countries whose equity markets are the most developed. We use event dummy variables constructed with two different methodologies: on the one hand, the individual test of each possible event dates and the aggregation of the significantly negative dates only; on the other hand, the analysis of the media coverage. We conclude that there is a significant effect of the measures taken during the study period. More specifically, meetings are more significant than minutes, which means that a thorough review of the detailed content of meetings after the release of the minutes does not offer more information, or at least does not result in significant changes in equity prices.

However, the significance of the dummy variable constructed with the second methodology is low, which may be explained by the presence in this variable of a date whose effects are supposed to be much more important than the others; or alternatively by the fact that the disconnection between the determinants of equity prices in the countries of the sample and the main concerns of markets participants reflected in the reference media would be too large. Conducting nonparametric tests, which is a possible extension of this paper, should allow to confirm the first hypothesis.

With regard to the public policies recommendations, our findings highlight the need for caution in financial opening issues, which is in line with the main result of the reference literature about emerging economies. First, because the effects of international monetary policies decisions on the countries of the sample are already effective whereas long term financing costs in global capital markets are still sparsely affected. Second, because the domestic variables measuring financial and commercial opening, whose direct effects is generally positive in accordance with the intuition, can have negative interaction effects.

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Appendices

Meeting	Forecast before announcement	Meetings announcement	Effect	Key moments of the tapering	FT Articles ("FOMC", *"taper"*, "Fed")
mee1	Keeping the QE to the same level	No change Deferral of the QE during several months	Low significance	_	Low (3,0,23)
mee2	Keeping the QE to the same level	Postponement of the QE Possible future decrease	Markets are reassured. Worried about a future decrease	_	Low (3,1,27)
mee3	Keeping the QE to the same level	Postponement of the QE Neutral position (possible increase or decrease)	Markets are reassured. No tapering expected	_	Low (9,1,40)*
mee4	Unexpected (tapering unplanned)	Announcement of the tapering later in the year	Fall in stock prices	Tapering announcement (85bn $)	Plentiful (5, 17, 42)
mee5	No tapering, unfavorable statistical releases. Possible in September	Postponement of the QE. No tapering (unfavorable statistical releases)	Tapering not until September	_	Low (8,8,56)*
mee6	Beginning of tapering (likely but not certain): guidelines	Postponement of the tapering	Negative	_	Very plentiful (15, 39, 95)
mee7	Postponement of the tapering. Unlikely in 2013	Postponement of the tapering	Low impact	_	Medium (0,24,37)
mee8	Continuation of the QE at the same level, at least until 2014	Continuation of the QE. Possibility of tapering in December	Equities decrease, dollar increase. Tapering for December	_	Low (2,14,37)
mee9	Beginning of the tapering (even if large uncertainty)	Beginning of the tapering	Increase of U.S. equity markets and dollar	Beginning of the tapering (-10bn $) 75bn$	Plentiful (6, 49, 72)
mee10	Tapering continuation. Fed considered in autopilot	Tapering continuation	Few reactions because of few expectations	(- 10bn$) 65bn$	Medium (4,26,43)*
mee11	Tapering continuation. Fed taking into account unemployment + other statistical releases	Tapering continuation depending on statistical releases. Possible rates increase in 6 months	Small decrease of U.S. equity markets. Policy rates increase in a long time	(-10bn$) 55bn$	Low (9,8,37)*
mee12	Tapering continuation. Questions about the date of 1st policy rate increase	Tapering continuation. Corresponding to expectations	Markets are worried about a policy rates increase	(-10bn$) 45bn$	Low (5, 8, 34)

Meeting	Forecast before announcement	Meetings announcement	Effect	Key moment of the tapering	FT Articles ("FOMC", *"taper"*, "Fed")
mee13	Tapering continuation. Possible rate increase in 2015	Tapering continuation. Pessimistic forecasts, low rates for a long time	Markets have difficulties to understand. U.S.: Rise in equity markets, stability of bonds markets	(-10bn$) 35bn$	Low (6,6,43)
mee14	Tapering continuation ($10bn)	Tapering continuation with $10bn. Low rates for a long time October: end of tapering	Questions about the beginning of the policy rates increase	(-10bn$) 25bn$	Medium (4,11,42)
mee15	Tapering continuation ($10bn)	Tapering continuation. End of QE next month. Future increase in policy rates	Rates increase, Markets are surprised. Increase in U.S. equity/bonds markets	(-10bn$) 15bn$	Medium (7,12,51)
mee16	Further decrease of the QE, $10bn remaining	End of QE. Rates increase possibly in 2015	Expected lower. Strong reaction	*End* of the tapering (QE) (-15bn$)	Low (6, 8, 43)
mee17	Questions about the consideration of the negative international context	"Prudent approach" + "patience". Target: rates increase	Positive in equity markets	_	Low (5, 1, 32)
mee18	Similar message than the previous one. Few expectations of new decisions	Continuation of the indication of patience, but improvement of the situation	No rates increase before June	_	Low (14,0,31)
mee19	Future policy rates increase announcement. End of the "patience indication"	Rates increase will be thoughtful and not immediate. Indication of a situation worse than expected	Mixed (contradictory indications)	_	Medium (13, 7, 59)

*Dates when an event has increased the occurrence of a keyword

Table 6: FOMC's meetings, anticipations and announcements

	RE		RE		RE		RE
Meet1	-0.485	Min1	-0.068	Meet11	0.09	Min11	-0.238
	(0.856)		(0.24)		(0.214)		(0.218)
Meet2	0.241	Min2	-0.074	Meet12	-0.466***	Min12	-0.238
	(0.22)		(0.077)		(0.039)		(0.218)
Meet3	-0.7	Min3	-0.009	Meet13	-0.8	Min13	0.47***
	(0.521)		(0.4)		(0.784)		(0.177)
Meet4	0.52	Min4	0.172	Meet15	0.404	Min14	-0.152***
	(1.2)		(0.194)		(0.532)		(0.034)
Meet5	-0.283	Min5	0.196	Meet16	1.065***	Min15	0.298
	(0.796)		(0.192)		(0.526)		(0.334)
Meet6	-0.283*	Min6	-0.046	Meet17	-1.462	Min16	0.434
	(0.151)		(0.428)		(2.18)		(0.581)
Meet8	0.102	Min7	0.481	Meet18	0.483	Min17	0.339
	(0.15)		(0.511)		(0.7)		(0.7)
Meet9	0.156	Min9	0.713	Meet19	0.195	Min18	0.076
	(0.57)		(0.661)		(0.126)		(0.555)
Meet10	0.609	Min10	0.687***				
	(0.635)		(0.309)	R2	0.56		0.99

Models: Random Effect (RE) Panel, heteroscedasticity correction (Huber-White), observations from 2013/01/01 to 2015/04/15. Dependent variables: delta_casa (T = 474), delta_tunis (T = 470), delta_caire (T = 466). Standard deviations in brackets. *, ** and *** correspond to a significance of the variable to a threshold of 10, 5 and 1% respectively.
Notes: The omitted events correspond to the dates which values of the first difference series of the equity market indices are missing. The results without heteroscedasticity correction and with heteroscedasticity correction and fixed effects are available upon request.

Table 7: Equity market indices and FOMC's announcements: dummy *d1*

	RE		RE		RE		RE
dd_meet1	-0.16	dd_min1	0.027	dd_meet11	0.291	dd_min11	0.064
	(0.133)		(0.111)		(0.352)		(0.23)
dd_meet2	-0.189	dd_min2	0.209	dd_meet12	0.063	dd_min12	-0.032
	(0.158)		(0.277)		(0.309)		(0.097)
dd_meet3	-0.074	dd_min3	-0.4	dd_meet13	-0.323	dd_min13	0.098
	(0.519)		(0.498)		(0.273)		(0.314)
dd_meet4	0.312	dd_min4	-0.042	dd_meet14		dd_min14	-0.214
	(0.281)		(0.113)				(0.169)
dd_meet5	0.003	dd_min5	0.332***	dd_meet15	0.423	dd_min15	0.36***
	(0.18)		(0.057)		(0.34)		(0.161)
dd_meet6	-0.306***	dd_min6	0.287	dd_meet16	1.228**	dd_min16	0.22
	(0.065)		(0.603)		(0.67)		(0.35)
dd_meet7		dd_min7	0.044	dd_meet17	-1.753	dd_min17	0.243
			(0.165)		(2.345)		(0.317)
dd_meet8	0.118	dd_min8	0.171	dd_meet18	0.061	dd_min18	0.485
	(0.337)		(0.381)		(0.075)		(0.598)
dd_meet9	-0.058	dd_min9	0.577	dd_meet19	-0.809***	dd_min19	
	(0.355)		(0.43)		(0.309)		
dd_meet10	0.269	dd_min10	0.832				
	(0.321)		(0.715)	R2	0.09	R2	0.39

Models: Random Effect (RE) Panel, heteroscedasticity correction (Huber-White), observations from 2013/01/01 to 2015/04/15. Dependent variables: delta_casa (T = 474), delta_tunis (T = 470), delta_caire (T = 466). Standard deviations in brackets. *, ** and *** correspond to a significance of the variable to a threshold of 10, 5 and 1% respectively.
Notes: The omitted events correspond to the dates which values of the first difference series of the equity market indices are missing. The results without heteroscedasticity correction and heteroscedasticity correction with fixed effects are available upon request.

Table 8: Equity market indices and FOMC's announcements: dummy *dd*

	RE		RE		RE		RE
d2_meet1	0.17	d2_min1	0.111***	d2_meet11	0.497	d2_min11	0.354
	(0.594)		(0.044)		(0.51)		(0.661)
d2_meet2	-0.821	d2_min2	0.387	d2_meet12	0.596	d2_min12	-0.269
	(0.631)		(0.561)		(0.586)		(0.266)
d2_meet3		d2_min3	-0.804	d2_meet13	0.16	d2_min13	-0.286
			(0.641)		(0.248)		(0.813)
d2_meet4	0.108	d2_min4	-0.268	d2_meet14		d2_min14	-0.266
	(0.361)		(0.361)				(0.247)
d2_meet5	0.352	d2_min5	0.456***	d2_meet15	0.447***	d2_min15	0.392***
	(0.413)		(0.081)		(0.22)		(0.147)
d2_meet6	-0.324	d2_min6	0.608	d2_meet16	1.396	d2_min16	-0.006
	(0.206)		(0.793)		(1.136)		(0.581)
d2_meet7		d2_min7	-0.406	d2_meet17	-2.04	d2_min17	0.135
			(0.287)		(2.552)		(0.852)
d2_meet8	0.137	d2_min8	0.517	d2_meet18	-0.356	d2_min18	1.084*
	(0.598)		(0.478)		(0.678)		(0.577)
d2_meet9	-0.267*	d2_min9	0.429*	d2_meet19	-1.81***	d2_min19	
	(0.162)		(0.248)		(0.58)		
d2_meet10	-0.067	d2_min10	0.965				
	(0.073)		(1.111)	R2	0.02		0.09

Models: Random Effect (RE) Panel, heteroscedasticity correction (Huber-White), observations from 2013/01/01 to 2015/04/15. Dependent variables: delta_casa (T = 474), delta_tunis (T = 470), delta_caire (T = 466). Standard deviations in brackets. *, ** and *** correspond to a significance of the variable to a threshold of 10, 5 and 1% respectively.
Notes: The omitted events correspond to the dates which values of the first difference series of the equity market indices are missing. The results without heteroscedasticity correction and with heteroscedasticity correction and fixed effects are available upon request.

Table 9: Equity market indices and FOMC's announcements: dummy *d2*

Variable	Obs	Mean	Std. Dev.	Min	Max
act	1845	112.2305	23.10859	80.27828	178.2916
balance	2730	-5.386385	2.849854	-8.922	-.823
inflation	2730	5.1236	3.27927	.443	10.261
investment	2730	23.02436	8.315036	14.047	34.265
savings	2730	17.5853	7.364411	11.289	30.072
debt	1820	72.04926	8.68112	62.882	83.002
openness	2730	2.195297	2.481643	-3.565418	4.373631
eurostox	1911	113.6026	11.3141	92.64472	141.2183
fundsfed	2730	.1023077	.0224911	.07	.15

(a) Descriptive statistics

	act	balance	inf	inv	savings	debt	open	eurostox	fundsfed
act	1.0000								
balance	0.6062 ***	1.0000							
inflation	0.4460 ***	0.6563 ***	1.0000						
investment	-0.4281 ***	-0.8238 ***	-0.6541 ***	1.0000					
savings	-0.1943 ***	-0.5339 ***	-0.8776 ***	0.7100 ***	1.0000				
debt	0.7323 ***	0.9124 ***	0.7439 ***	-0.7362 ***	-0.6215 ***	1.0000			
openness	-0.1957 ***	0.0336	-0.1097 ***	-0.0358	-0.2629 ***	0.1464 ***	1.0000		
eurostox	0.6914 ***	0.2440 ***	-0.0085	0.0454	0.2403 ***	0.4267 ***	-0.0479	1.0000	
fundsfed	0.0574 *	-0.0481	0.1084 ***	0.2387 ***	-0.0444	0.0723 **	0.1361 ***	0.0680 **	1.0000

(b) Matrix of correlation

Standard deviations in brackets. *, ** and *** correspond to a significance of the variable to a threshold of 10, 5 and 1% respectively.

Table 10: Summary of domestic and international variables (commercial opening, domestic financing systems)

Variable	Obs	Mean	Std. Dev.	Min	Max
act	1845	112.2305	23.10859	80.27828	178.2916
fdi	1456	3.35e+09	1.42e+09	1.06e+09	4.78e+09
portfolio	1456	4.42e+07	3.25e+08	-4.31e+08	4.85e+08
reserve	1820	.1299217	.0609212	.0520943	.1907341
eurostox	1911	113.6026	11.3141	92.64472	141.2183
fundsfed	2730	.1023077	.0224911	.07	.15

(a) Descriptive statistics

	act	fdi	portfolio	reserve	eurostox	fundsfed
act	1.0000					
fdi	0.4430***	1.0000				
portfolio	0.6388***	0.1186***	1.0000			
reserve	-0.6601***	-0.7244***	-0.3942***	1.0000		
eurostox	0.5515***	0.5076***	0.5118***	-0.5114***	1.0000	
fundsfed	-0.0376	-0.1416***	-0.1428***	0.1477***	-0.5338***	1.0000

(b) Matrix of correlations

Standard deviations in brackets. *, ** and *** correspond to a significance of the variable to a threshold of 10, 5 and 1% respectively.

Table 11: Summary of domestic and international variables (financial opening)

	Dummy I				Dummy II					
	Model 1	Model 2		Model 3	Model 1		Model 2		Model 3	
Dummy	-3.298***	-1.208***		-2.873***	0.5		0.499		0.705	
	(0.79)	(0.527)		(0.518)	(0.316)		(0.316)		(0.458)	
Interaction Balance	-0.495***					-0.034				
	(0.134)					(0.049)				
Interaction Debt			-0.018***					0.011*		
			(0.007)					(0.006)		
Interaction Openness				0.898***						-0.002
				(0.154)						(0.097)
Balance	0.024***				0.021*	0.021**				
	(0.01)				(0.01)	(0 .011)				
Debt		0.009*	0.009*				0.009*	0.009*		
		(0.005)	(0.005)				(0.005)	(0.005)		
openness				-0.031***					-0.025***	-0.025***
				(0.112)					(0.012)	(0.012)
Eurostox	-0.000	-0.001	-0.001	-0.001	-0.000	-0.000	-0.001	-0.001	-0.001	-0.001
	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
FED funds	-3.364***	-5.405***	-5.4***	-2.493*	-3.311***	-3.38***	-2.644**	-2.755***	-5.259***	-5.248***
	(1.287)	(1.868)	(1.867)	(1.309)	(1.295)	(1.296)	(1.326)	(1.327)	(1.873)	(1.873)
Constant	0.549	0.11	0.098	0.317	0.528	(0.56)	0.279	0.311	0.087	0.089
	(0.344)	(0.554)	(0.553)	(0.32)	(0.345)	(0.345)	(0.324)	(0.324)	(0.555)	(0.555)
Obs.	1391	928	928	1391	1391	1391	1391	1391	928	928
R2	0.67	0.99	0.99	0.89	0.67	0.66	0.87	0.87	0.99	0.99

Models: Random Effect (RE) Panel, heteroscedasticity correction (Huber-White), observations from 2013/01/01 to 2015/04/15. Dependent variables: delta_casa (T = 474), delta_tunis (T = 470), delta_caire (T = 466). Standard deviations in brackets. *, ** and *** correspond to a significance of the variable to a threshold of 10, 5 and 1% respectively.
Notes: The omitted events correspond to the dates which values of the first difference series of the equity market indices are missing. The results without heteroscedasticity correction and heteroscedasticity correction with fixed effects are available upon request.

Table 12: Equity market indices, FOMC's announcements and commercial opening

	Dummy I					Dummy II					
	Model 4		Model 5	Model 6		Model 4		Model 5		Model 6	
Dummy	-0.718**		-2.576***	-0.718**		0.5		0.5		0.5	
	(0.364)		(1.063)	(0.364)		(0.316)		(0.316)		(0.316)	
Interaction Inflation		-0.189***					0.104*				
		(0.059)					(0.053)				
Interaction Investment			0.081*						0.014		
			(0.044)						(0.013)		
Interaction Savings					-0.029						0.02
					(0.019)						(0.017)
Inflation	0.019***	0.02***				0.019***	0.018***				
	(0.009)	(0.009)				(0.316)	(0.009)				
Investment			-0.007*					-0.006*	-0.006*		
			(0.004)					(0.004)	(0.004)		
Savings				-0.005	-0.005					-0.005	-0.005
				(0.004)	(0.004)					(0.004)	(0.004)
Eurostox	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	(0.001)	0.001	(0.001)
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
FED funds	-3.377***	-2.367***	-3.331***	-3.333***	-3.334***	-3.275***	-3.269***	-3.236***	-3.272***	-3.23***	-3.261***
	(1.292)	(1.289)	(1.292)	(1.294)	(1.294)	(1.295)	(1.294)	(1.295)	(1.296)	(1.296)	(1.296)
Constant	0.254	0.241	0.482	0.384	0.384	0.236	0.238	0.453	0.467	0.366	8.378
	(0.325)	(0.324)	(0.336)	(0.33)	(0.33)	(0.325)	(0.325)	(0.337)	(0.337)	(0.33)	(0.33)
Obs.	1391	1391	1391	1391	1391	1391	1391	1391	1391	1391	1391
R2	0.92	0.92	0.81	0.52	0.52	0.92	0.92	0.81	0.81	0.52	0.52

Models: Random Effect (RE) Panel, heteroscedasticity correction (Huber-White), observations from 2013/01/01 to 2015/04/15. Dependent variables: delta_casa (T = 474), delta_tunis (T = 470), delta_caire (T = 466). Standard deviations in brackets. *, ** and *** correspond to a significance of the variable to a threshold of 10, 5 and 1% respectively.
Notes: The omitted events correspond to the dates which values of the first difference series of the equity market indices are missing. The results without heteroscedasticity correction and heteroscedasticity correction with fixed effects are available upon request.

Table 13: Equity market indices, FOMC's announcements and domestic financing systems

	Dummy I					Dummy II				
	Model 7	Model 8		Model 9		Model 7	Model 8		Model 9	
Dummy	-1.705***	-1.632***		-2.045***		0.591	0.484		0.598	
	(0.6)	(0.491)		(0.601)		(0.434)	(0.35)		(0.429)	
Interaction Portfolio	-7.53***					1.69				
	(1.83)					(1.32)				
Interaction Reserve			-5.322					1.446		
			(3.435)					(2.441)		
Interaction FDI					-6.96***					2.28*
					(1.64)					(1.18)
Portfolio	1.53					1.09				
	(1.68)					(1.72)				
Reserve		-1.166*	-1.137*				-1.166*	-1.182**		
		(0.596)	(0.599)				(0.599)	(0.6)		
FDI				2.32	2.72				2.39	2.13
				(3.51)	(3.49)				(3.53)	(3.53)
Eurostox	0.01	0.005	0.005	0.01	0.01	0.01	0.005	0.005	0.011	0.011
	(0.008)	(0.005)	(0.005)	(0.008)	(0.008)	(0.009)	(0.005)	(0.005)	(0.008)	(0.008)
FED funds	-2.112	-2.847*	-2.821*	-2.494	-2.402	-2.155	-2.663	-2.734	-2.113	-2.092
	(2.04)	(1.742)	(1.751)	(2.055)	(2.045)	(2.081)	(1.753)	(1.754)	(2.071)	(2.067)
Constant	-0.729	-0.048	-0.058	-0.834	-0.861	-0.742	-0.096	-0.073	-0.915	-0.914
	(1.019)	(0.702)	(0.705)	(0.919)	(0.915)	(1.038)	(0.706)	(0.706)	(0.924)	(0.924)
Obs.	729	914	914	729	729	729	914	914	729	729
R2	0.99	0.99	0.99	0.87	0.87	0.99	0.99	0.99	0.87	0.87

Models: Random Effect (RE) Panel, heteroscedasticity correction (Huber-White), observations from 2013/01/01 to 2015/04/15. Dependent variables: delta_casa (T = 474), delta_tunis (T = 470), delta_caire (T = 466). Standard deviations in brackets. *, ** and *** correspond to a significance of the variable to a threshold of 10, 5 and 1% respectively.
Notes: The omitted events correspond to the dates which values of the first difference series of the equity market indices are missing. The results without heteroscedasticity correction and heteroscedasticity correction with fixed effects are available upon request.

Table 14: Equity market indices, FOMC's announcements and financial opening