

# XIAN ZHANG

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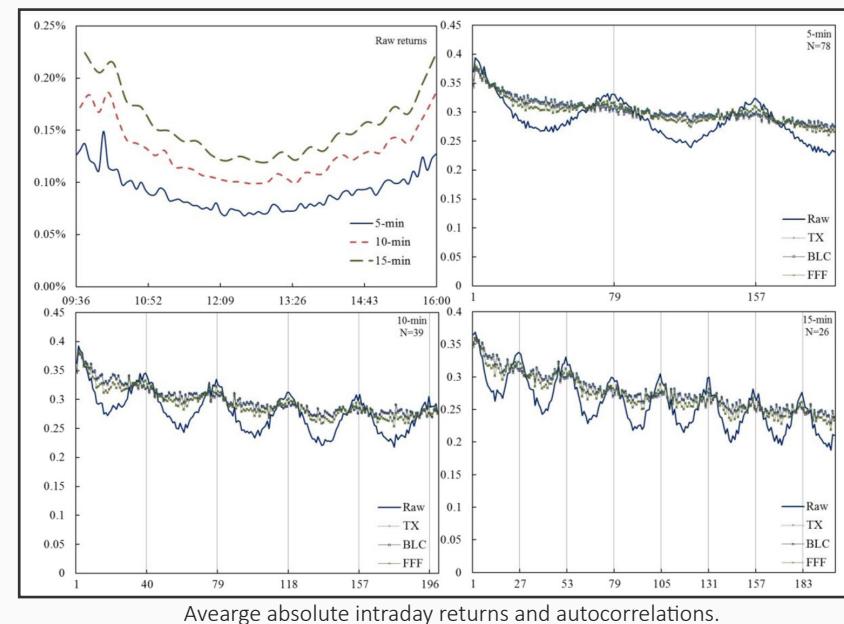
# Intraday Pattern and Jumps

Dissertation for MSc in Finance and Investments, Aston University

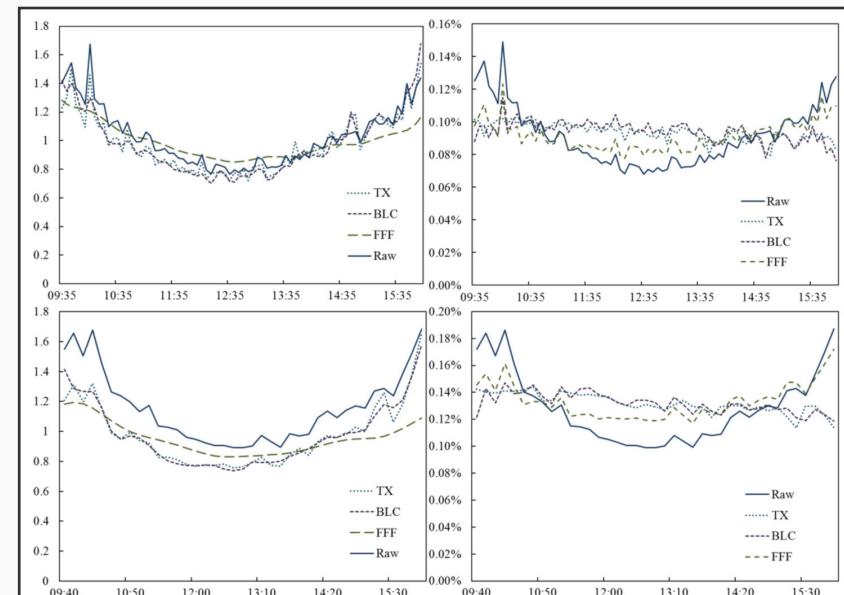
## Abstract

Jumps are extreme volatile price movements that do not fit into conventional return dynamics. In fact, the presence of jumps weakens the assumption that properly scaled returns are Gaussian. Previous research on return variations has led to the jump detection methods that can divide jump components from diffusive components in terms of contribution to total return variance. The incorporation of jumps strengthens the Gaussian assumption and has been shown to improve the accuracy of simulated forecast studies. In the meantime, intraday pattern in high frequency data renders returns to be more volatile at the open and close of the market, causing potential distortion to jump detection. Therefore, the purpose of this paper is to study the impact of intraday pattern on jumps.

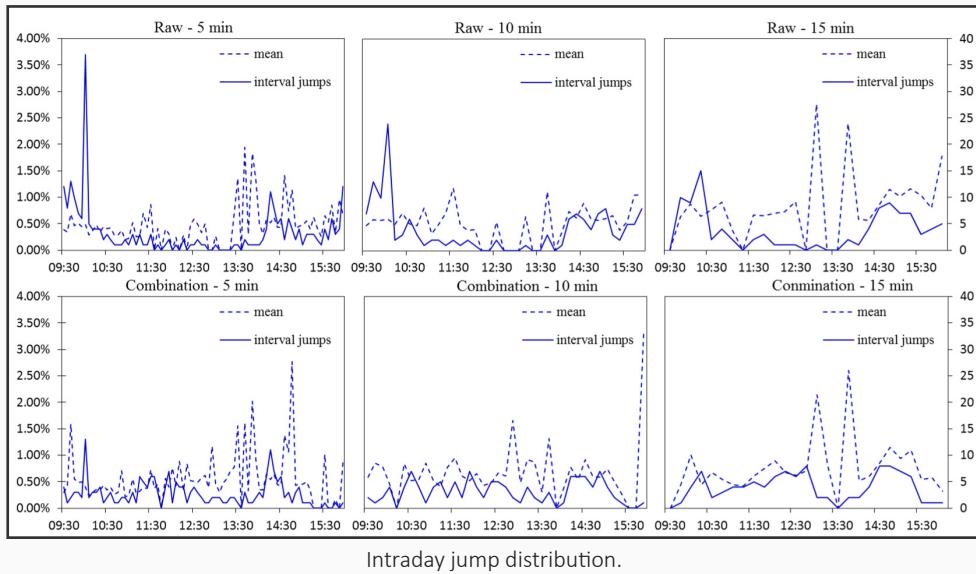
BNS, ADS, and ADB tests are carried out on raw returns and returns adjusted by three different periodicity correctors. The size and arrival of jumps are analyzed and compared at different frequencies. Results suggest that jumps contribute to about 10 percent of the total return variance of S&P 500 EFT. Raw returns and periodicity filtered returns have similar jump sizes and numbers, while the arrival of jumps varies a lot. Empirical analysis infers that intraday pattern does not have actually impacts on forecast accuracy; jumps might be associated with Treasury events, EIA resource reports, and important market moving indicators.



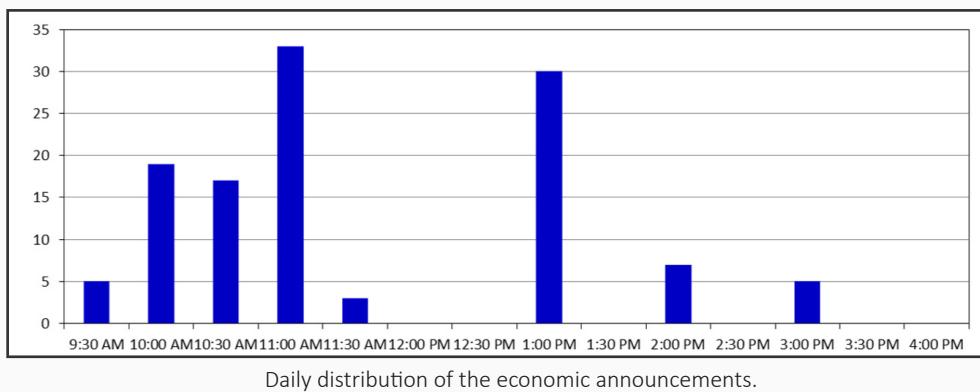
Average absolute intraday returns and autocorrelations.



Intraday pattern correctors and adjusted returns.



Intraday jump distribution.



Daily distribution of the economic announcements.

## Conclusions

First of all, the most significant difference in jumps from different tests lies in the size and arrival of jumps. Since BNS, MinRV, and MedRV are designed from similar intuition, they have minor difference in size and jump contribution. They indicate that about 7% to 12% of total variance of S&P 500 ETF are ascribed to jump components. This proportion is larger than that in Huang and Tauchen (2005), suggesting that the S&P 500 related index becomes more volatile. Jumps contribute 12% to 30% to the total daily variance on jump days. In contrast, they all indicate very different results with respect to jump arrivals. For the BNS, MinRV, and MedRV tests, the difference is 30%; for ADB tests, up to 70% jumps occur on different days compared to other tests. One major reason could be that ADB tests lose power in high volatile period suggested by the fact that a significant drop in the number of jumps in 2008 and 2009, which is consistent with the conclusion in Dumitru and Urga (2011).

Second, intraday patterns cause apparent changes in the arrival of jumps. Up to 50% jumps are identified as spurious jumps by intraday pattern. At intraday level, the distribution of arrival of jumps also changes from a U-shaped intraday pattern to a relatively flattened pattern. Other than that, the size as well as numbers of jumps is not affected severely. Nonetheless, it is still quite convincing that intraday patterns should be considered thoroughly in the analysis of jumps for the reason that the arrival of jumps is vital to the investigation of the sources of jumps.

Third, the empirical analysis provides no evidence whether intraday pattern correction on jumps has any factual impacts on daily volatility forecast. Analysis on news announcements on 30 jumps days suggests that Treasury events, EIA reports on petroleum and natural gas inventories, and market moving indicators are likely to be closely associated to the occurrence of jumps.



## 3D Modeling

### Site Information

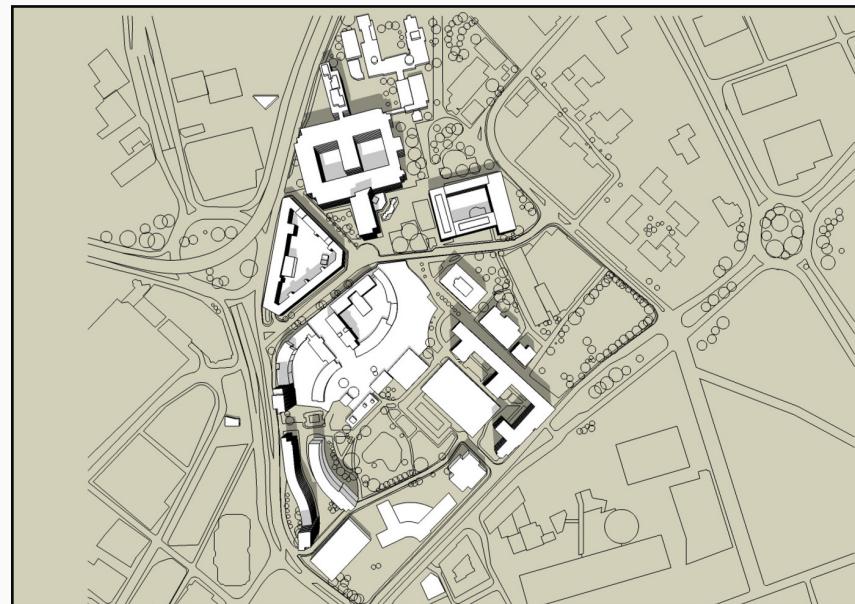
Aston Triangle is an area of Birmingham City Centre, England. The area is mostly dominated by higher education facilities. Aston University is based within the Aston Triangle area and the logo of the establishment takes from the shape of the area. Birmingham City University also uses facilities on the Aston University campus. These are in Gosta Green together with Birmingham Institute of Art and Design and Aston Science Park. The site has large numbers of teaching buildings and student halls of residence, which are used by Aston University.

### Project Information

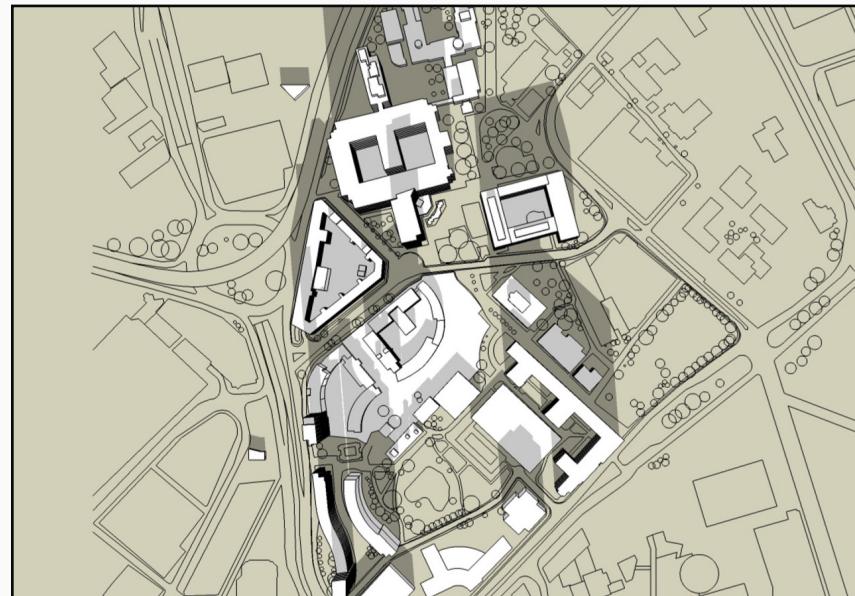
The aim of this project is to study the current development of this area and investigate what improvement can be done in the future. Multiple techniques such as 3D modeling and mapping have been used to carry out the analysis. 3D modeling is done in SketchUp while mapping is mainly done in AutoCAD and InDesign.

The purpose of the 3D modeling is to analyze the sunshine pattern in this area. Parameters such as heights and size of the buildings in this area is collected from public documents from relevant institutions and estimated from the various sources such as Google Street View. On the right are two plan views of the site. They provide simulation of the sunshine pattern in June and January respectively. In addition, this model is rendered in detail to provide a closer look at the place, promoting a better understanding of the development of this site.

The next step is to use mapping techniques to analyze this site from both deeper and wider viewpoints. The analysis is focused on land use, circulation, and the site's context.



Solar System Analysis: June 22nd 12:00pm, Aston Triangle, Birmingham, UK



Solar System Analysis: January 22nd 12:00pm, Aston Triangle, Birmingham, UK

## Rendering drawings

Analysis from the plan view and the rendering 3D model suggests that the solar altitude keeps constantly low. Consequently, the duration of direct sunlight is relatively long during the day, affecting some of the buildings with windows faced south. Thus it is very important to account for direct sunlight throughout the whole year.

In addition, the rendering views show that the buildings have an appealing design. Also, there is a lot of green open space in this site, adding to its diversity.



Eye-level view



Aerial view

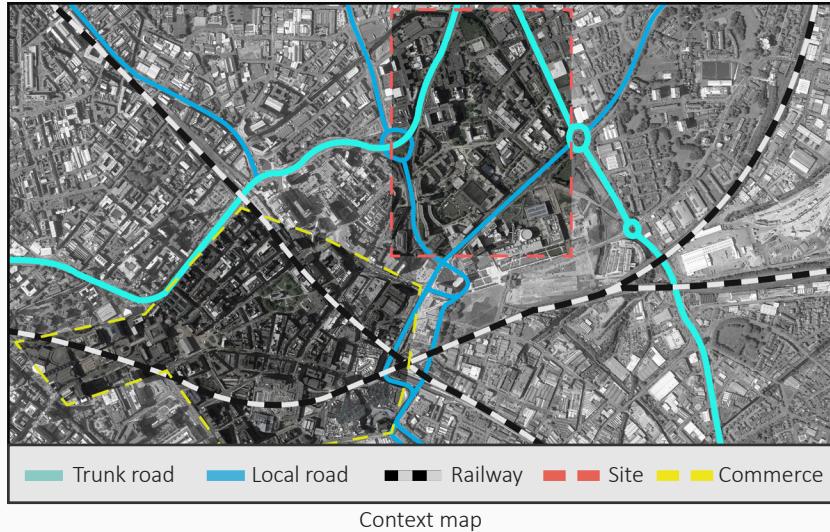


## Technical Drafting

AutoCAD drawing



# Mapping



There are example's land use mix. For instance, the football field is built on the top of a parking lot, and on the first floor of one of the residence building is a large supermarket. Transportation is convenient. In addition to walking spaces and bike lanes and storage, there is a taxi stand and a bus stop within this site. There is also a small lake and some green land.

This site is surrounded by a well established transportation road system including trunk road, local roads, and minor roads.

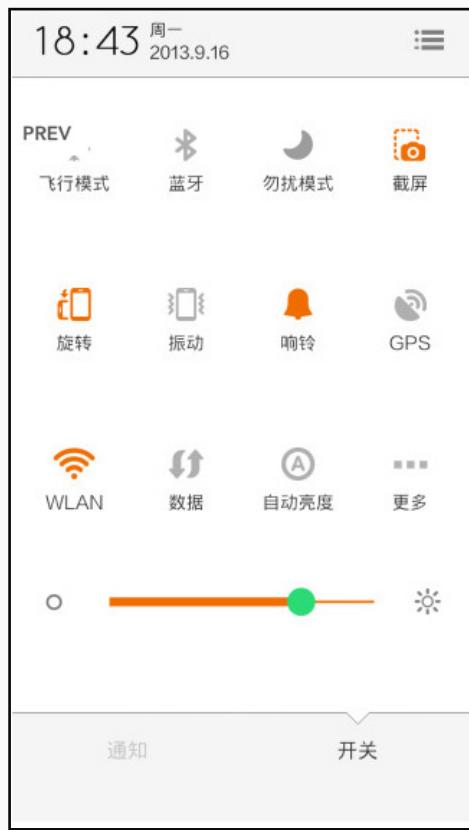
Since this site is at the center of the city, it's less than ten minutes' walk from the shopping center, where there are several department stores, large open market, restaurants, banks, a train station, and many other stores.



# Design

## MIUI theme

MIUI is a Chinese variant of Android OS .This design includes over one hundred icons and layouts using Photoshop and a lockscreen using XML.



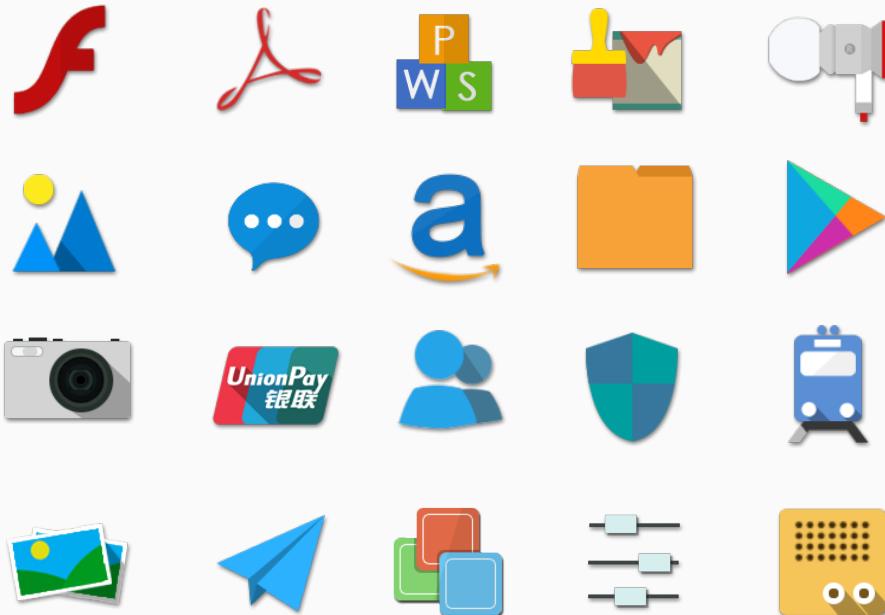
Notification bar



Message app



Lockscre



## Icons

These icons on the left are designed according to flat design. Simple shapes and bright colors are used to provide a clean and clear representation certain apps or functionalities. Shadows are added to provide some dynamics to the icons.

# Resume

Xian Zhang  
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## Education

Aston University, Aston Business School, Birmingham, UK Master of Science in Finance and Investments, average score: 78/100	September 2014
Northern Consortium of UK Universities, Chengdu, Kaplan China Graduate Diploma Program, "A" for English for Academic Purpose and Distinction for Research Methods	July 2013
Southwestern University of Finance and Economics, Chengdu, China Bachelor of Science in Economics with concentration in Finance, average score: 84/100	June 2013

## Honors and Awards

The Best Student Scholarship (Kaplan China, Chengdu)  
NCUK Prize (UK)

## Relevant Courses

Advanced Mathematics · Statistics · Probability Theory · Advanced Algebra · Statistics · XBRL Foundation and Application · VFP Programming · Microeconomic · Game Theory Application · Social Psychology · Modern Psychology · Decision Psychology · Finance Theory and Practice

## RELATED EXPERIENCE

<b>Analytical Research</b> <i>Jump testing and intraday pattern</i> - Master's Thesis for Aston University, Birmingham, UK. • Carried out jump tests on S&P 500 returns from 2007 to 2011, extracted intraday pattern, and evaluated its effects, using methods of statistical testing and regression. • Compared jumps to 26 news announcements and identified the relation between them using correlation tests.	April – September 2014
<b>Designing Experience</b> <i>MIUI theme</i> – Registered as a MIUI theme designer, Chengdu, China. • Designed over one hundred icons and layouts using Photoshop and a lockscreen using XML • Maintained and updated the theme based on users' requests.	July 2012 – September 2013

**Social Science Research**

November 2012 – June 2013

*Motivation for English learning-* Dissertation for Pre-Master Program (NCUK),  
Chengdu, China, received distinction from NCUK.

- Designed and distributed questionnaires to 108 students and interviewed three teachers.
- Analyzed the data using SPSS and investigated seven factors based on attribution theory and achievement goal theory.
- Identified the sense of control over outcomes as the most important motivation for students.

**Research on Decision Behavior**

September – November 2011

*Emotions and finance management* – Research project for the course Decision Psychology, Chengdu, China.

- Tracked and analyzed personal expenses in detail; surveyed 34 students to investigate their satisfaction and emotional status for certain consumptions.
- Identified the emotions' interference with finance management and proposed a solution that incorporates technology to correct distorted utility expectation.

**SKILLS**

Microsoft Excel; Photoshop; SPSS; Eviews; Pascal; XML; VFP; XBRL

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