

Sharma, Abhijit

**Article**

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\*Corresponding author: Abhijit Sharma,  
Accounting, Finance and Economics  
Group, University of Bradford School of  
Management, Emm Lane, Bradford BD  
9 4JL, UK  
E-mail: [A.Sharma12@bradford.ac.uk](mailto:A.Sharma12@bradford.ac.uk)

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Huddersfield, UK

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## GENERAL & APPLIED ECONOMICS | REVIEW ARTICLE

# Use of Bloomberg Professional in support of finance and economics teaching

Abhijit Sharma<sup>1\*</sup>

**Abstract:** This paper evaluates the use of specialist software within university trading rooms in order to enable students to experience a simulated environment which allows them to gain an appreciation of “real life” decision-making within the finance and banking industry and become familiar with real-time data. An important additional aim of trading room-based instruction is to encourage responsible financial decision-making. Our analysis focuses on business schools within the United Kingdom and provides a detailed illustration of use of such resources, in particular, as deployed at the Bradford University School of Management. We provide a critical overview of the main challenges involved in making effective use of a trading room. We also offer recommendations to other academics to enable productive and appropriate use of resources such as Bloomberg Professional in order to enhance the student learning experience and to facilitate the development of valuable skills.

**Subjects:** Finance; Teaching & Learning; Economics; Education

**Keywords:** trading room; finance; economics; teaching; Bloomberg; economic tools for teaching

**JEL classifications:** A2; A20; G17



Abhijit Sharma

### ABOUT THE AUTHOR

Abhijit Sharma is currently a senior lecturer in Economics at the Bradford University School of Management. His research interests include international economics, innovation and technology adoption decisions, environmental economics and applied econometrics. Abhijit is academic lead for the Bradford University School of Management's trading room lab and he is also programme leader for the MSc in Finance and Investment. Abhijit previously worked as a lecturer in economics at the Department of Economics at the University of Sheffield. He has also worked as a postdoctoral research economist at the Centre for Environmental Policy, Imperial College London on an ESRC and RCUK funded project involving econometric modelling of technology adoption decisions. Abhijit is currently working as a co-investigator on an EU FP7 research project titled “Crossing Boundaries” (EUR 194,500), with particular focus on innovation, technology adoption and knowledge diffusion, as well as links between intellectual property rights and innovation. He also worked on a project sponsored by the Food Standards Agency on the effectiveness of the Reduced Salt Campaign.

### PUBLIC INTEREST STATEMENT

The Great Recession of 2007–2009 and financial crisis led to much greater scrutiny of the financial and banking industry in general, and the role of government regulation in particular. Real and perceived excesses by financial managers have contributed to an ongoing critique of regulation and governance of the financial industry and the impact of unethical behaviour. Financial trading platforms such as Bloomberg Professional can play an important dual role, both in terms of demonstrating “real life” financial decision-making and the power of real-time data for informing decisions to student audiences, as well as highlighting the consequences of irresponsible or unethical decision-making. Trading rooms can ground learning within a real-life financial context and enable educators and students to evaluate the consequences of both good and bad decisions in a more realistic setting, thereby enabling learning and hopefully stimulating positive changes in behaviour.

## 1. Introduction

The use of statistical and econometric software packages is becoming increasingly widespread for economics and finance teaching internationally, but especially in the United States and the United Kingdom. Such resources are often used in conjunction with powerful data resources and specialist software platforms. Within finance and economics, a number of universities on both sides of the pond have been investing in dedicated resources to simulate “real life” trading scenarios within a University setting in order to provide students a feel for decision-making within the business context as well as provide access to real-time data. At the same time, academic objectives include the desire to encourage students to link theory and formal concepts to the applied context, and to encourage responsible decision-making.

This paper provides an overview of the options available to university-based academics for using powerful tools to deliver research-led teaching and to provide valuable skills to students which would hopefully enhance student employability and foster a more nuanced approach to economic and financial decision-making. We first provide a brief survey of the nascent and emerging literature on use of trading rooms. We then provide an overview of Bloomberg Professional<sup>1</sup> which is by far the largest trading platform and trading tool that is deployed widely throughout the international financial and banking industry.<sup>2</sup> We also assess the deployment of trading room labs within UK universities. The next section presents particulars of deployment of Bloomberg Professional within the Bradford University School of Management and use of related tools for instruction. Thereafter, we provide a critical overview of use of such resources within universities and within higher education in general. The final section concludes.

## 2. A brief literature survey

There is a large and growing literature covering various aspects related to economics education (Blank, 2000; Kasper, 1991) and teaching economics such as gender differences within economics student cohorts (Ferber, 1995; Jensen & Owen, 2000), teaching assistants and academic performance by economics undergraduates (Borjas, 2007), use of various types of assessments within economics (Chan & Kennedy, 2002; Walstad & Becker, 1994) and general strategies for teaching economics students (Becker, 2000; Becker & Watts, 2001; Gelman, 2008; Hamermesh, 2002). Seiver (1983) presents an interesting and early example of a simulation game based on a stylised economy of a developing country for teaching development economics using computers based on FORTRAN. However, use of trading rooms is relatively underexplored within the economics and finance literature. There are papers which consider the use of simulation methods and particular approaches for explaining important formal concepts within economics and econometrics (Becker & Greene, 2001; Dunlap & Studstill, 2013), but an examination of trading rooms in general and Bloomberg in particular is extremely sparse within the literature.

There are a number of cognate papers within the literature which investigate extremely important aspects of significance to use of trading rooms. Ballard and Johnson (2004) identify the need for adequate knowledge of basic maths, particularly basic algebra, for improving performance on introductory economics classes such as microeconomics. These type of threshold skills are extremely important for effective deployment of trading room software. Knowledge of basic concepts is essential for enabling students to improve their performance overall but particularly in relation to elements requiring technical skills within a trading room context. Anderson, Benjamin, and Fuss (1994) identify knowledge of calculus and gender as important determinants of success in introductory economics courses. Navarro (2000) argues that in future most learning will take place through mechanisms mediated by the internet and through online resources with technology playing an increasingly important role in facilitating learning. He makes an argument for integration of curriculum with the most up-to-date and appropriate technologies available. In a provocative paper, Romer (1993) considers the role of classroom attendance and academic performance. He focuses on widespread absenteeism in US universities and the consequent impact on student performance and considers various strategies for making attendance non-optional. Meulenbroek and van den Bogaard (2013) show that the pass rate for students attending classes regularly is much higher than for those not

attending a university calculus module. Palocsay, Markham, and Markham (2010) contend that Excel is particularly suitable as an introductory tool for business intelligence and decision support systems, and it would fit in extremely well with user preferences. Excel also works very well in conjunction with trading room software such as Bloomberg, especially given that default options for export of data from Bloomberg and Eikon include Excel formats (see also Zhang, 2014).

There is an emerging literature on use of trading rooms and trading software platforms, as well as papers covering related aspects such as the role of training. In an important contribution Abdolmohammadi and Sultan (2002) find that there is a positive relationship between ethical reasoning and ethical behaviour within a trading room context. They underscore the importance of suitable ethics training for achieving desirable outcomes within financial trading. Drumwright, Prentice, and Biasucci (2015) also find evidence supporting the premise that suitable ethics training leads to more ethical decision-making by students. Danielson and Lipton (2010) provide an interesting application based on time value of money and the consequences of unscrupulous valuations by agents.

Moffit, Stull, and McKinney (2010) provide an illustration of an equity trading simulation across three different classes within a liberal arts college in the US and report significant improvements in student performance and satisfaction through use of trading room resources. Stewart, Houghton, and Rogers (2012) report a positive impact on student learning outcomes which arise as a result of active learning within a trading room environment particularly relating to financial knowledge and even when controlling for gender and subject area. Huffman, Beyer, and Schellenger (2012) argue for the use of an integrated approach to use of trading room resources, using a combination of individual and group-based assignments in order to achieve enhanced educational value. Noguera, Budden, and Silva (2011) present the results of use of trading rooms which enable access to real-time data and analysis of such data (referred to as finance labs). They conclude that significant investment is required in such facilities and students value trading rooms very highly, but students tend to underutilise the resources provided. Ottaviano (2014) provides a number of useful and important recommendations for providing suitable support for Bloomberg within university libraries.

Chou and Liu (2013) assess the use of trading simulations in order to increase students' knowledge of foreign exchange markets. They find that simulation games enhance understanding and awareness of foreign exchange markets as the simulation game progresses. Seiver (2013) presents an example from international business finance whereby students are able to engage in real-time trading of foreign exchange round the clock by using a free platform similar to one used by actual real-money foreign exchange traders (Oanda). Oanda is an online foreign exchange trading portal. Kazemi (2013) provides a useful case study of use of Bloomberg for teaching economics and highlights a number of its features and their applicability for teaching within economics modules. Holowczak (2005) discusses integration of real-time financial data in business curricula using Bloomberg or Eikon and observes the following which summarises some key challenges succinctly:

New technological enhancements to business curricula seem to appear every day, and incorporating educational technology of any kind into a curriculum has never been a trivial task. In business education, the ability to work with Internet and Web resources as well as office productivity tools, including spreadsheets, is virtually mandatory for every student. While there are some pitfalls encountered when working with Internet and Web resources, assignments and projects that use such resources are becoming commonplace (p. 7).

### 3. Overview of Bloomberg Professional and its deployment within universities

Michael Bloomberg founded Bloomberg L.P. in 1981 in collaboration with Thomas Secunda, Duncan MacMillan and Charles Zegar. Since then, their ubiquitous trading platform named Bloomberg Professional has enjoyed explosive growth in its user base. Bloomberg Professional provides a robust platform which enables users to obtain real-time financial and other data, carry out analytics, obtain news and make financial decisions. Loomis (2007) describes Bloomberg as "a Wall Street juggernaut that has pummelled competitors and changed the way financial information is provided to customers".

Bloomberg Professional (<http://www.bloomberg.com/professional/>) offers a feature rich environment with a wide range of data classes whereby students have access to data used in decision-making in important areas such as macroeconomic policy-making, central banking, portfolio management, equities, insurance, foreign exchange trading, risk analysis and so on. Bloomberg Professional focuses on five main themes which include: (i) markets such as commodities, derivatives, equities and foreign exchange; (ii) specialist financial areas such as asset management, credit analysis, emerging markets, hedge funds, regulation, risk and treasury operations; (iii) analytical tools including graphing and charts, instant messaging, portfolio and risk analytics and collaborative tools; (iv) news feeds and (v) research products such as reports produced by Bloomberg Intelligence. Bloomberg Professional is an industry standard market information software package that is used widely internationally. It is used by a majority of organisations engaged in finance, banking and investment analysis.

In general, university-based trading rooms typically involve use of either Bloomberg Professional or its main rival offering, Thomson Reuters Eikon (<http://thomsonreuters.com/en/products-services/financial/trading-platforms/thomson-reuters-eikon.html>). Bloomberg and Eikon effectively form a duopoly within the market for professional trading platforms for trading within the financial industry. Bloomberg Professional is by far the more established and the larger of the two trading platforms. Several academic institutions make use of a number of less sophisticated web-based and other software packages such as StockTrak (<http://www.stocktrak.com/>) or TraderEx (<http://www.etraderex.net/>) or WealthLab (<http://www.wealth-lab.com/>). Academic and university licences for both Bloomberg and Eikon typically prohibit “real” trading and use of the platforms for carrying out actual trades. Therefore, a number of universities use simulation software in conjunction with trading platforms such as Bloomberg Professional and Eikon. Web-based software packages typically have a more basic user interface and considerably less data available, with real-time data often being unavailable to users. Web-based alternatives such as StockTrak are unable to fully simulate “real” life trading situations encountered by bankers, finance professionals and analysts, and they usually offer a greatly reduced user experience in comparison to Eikon and Bloomberg Professional. Nonetheless, several such software packages are perfectly adequate for illustrating some key points and for use in teaching. Web-based software packages have their own strengths. For instance, TraderEx allows significant functionality for simulations related to market microstructure and interactions between agents, within a trading context. At the Bradford University School of Management, we employ Bloomberg Professional in conjunction with a simulation software called Financial Trading Systems (FTS: <http://www.ftsweb.com/>), which makes for a very effective combination. FTS is a very widely used simulation software and its usage is ubiquitous, particularly in North America. Usually, the main reason for forgoing Eikon and Bloomberg Professional and using alternatives such as StockTrak is cost. This is because even though university licences are heavily discounted compared to their commercial counterparts, licences for Bloomberg Professional and Eikon involve a significant cost. Both Bloomberg Professional and Eikon also have onerous licencing conditions necessitating a licence administrator or manager to manage administrative issues. Typically, access to Bloomberg and Eikon is only (or mainly) available onsite at university trading rooms.

There are a range of UK users who employ a number of options for use in instruction in trading room labs. Table 1 provides a snapshot of use profiles by a sample of UK universities, as indicated by information available on their respective websites. For instance, the ICMA Centre at the University of Reading and the Cardiff Business School make use of trading room resources across a range of modules at UG and PG levels. The size of user groups can vary between undergraduate and postgraduate levels, and numbers can vary between 20 and 300 i.e. relatively small groups to large cohorts. Typically, modules on which trading room resources are used include those within finance, economics and econometrics. At postgraduate level, such modules include quantitative methods in finance, financial econometrics, quantitative methods, portfolio management, asset pricing, corporate finance, macroeconomics/economic environment for business, derivatives, bond pricing, international finance and business economics, to name a few. The ICMA Centre at Reading and the Cardiff Business School trading lab have amongst the best established trading room resources in the UK.

**Table 1. Snapshot as of 2015—UK Universities with a trading room**

Universities with trading rooms	UG level usage	PG level usage	Other information
Aston	NA	Y	Eikon
Bedfordshire	Y	Y	Two labs
Bolton	Y	N	NA
Bradford	N	Y	Bloomberg
Brighton	Y	Y	Terminals
Brunel	NA	Y	Bloomberg
CASS (City Univ)	N	Y	Eikon and Bloomberg
Cambridge Judge School	NA	Y	Bloomberg
Cardiff	Y	Y	Eikon and Bloomberg
Coventry	N	Y (London campus)	NA
Glasgow	N	Y	NA
Keele	N	Y	Bloomberg
Kent	N	Y	Bloomberg
Kingston	Y	Y	Terminals
Leicester	Y	Y	Bloomberg
Manchester	N	Y	Eikon
Northumbria	Y	Y	NA
Queen Mary UOL	NA	Y	Bloomberg and Eikon
Queens	NA	NA	Bloomberg
Reading (Henley ICMA)	N	Y	Bloomberg and Eikon
Sheffield	NA	Y	Recently launched
University of the West of England	NA	Y	NA
Xian Jiaotong Liverpool University	N	Y	Eikon

Note: Some universities have Bloomberg/Eikon as a part of their library resources and may not have a separate, dedicated trading room.

They also have a high number of appropriately trained staff members in both finance and economics who make appropriate use of trading room resources. As can be seen from Table 1, a number of UK universities have established trading room labs (several more are in the process of establishing them). Bloomberg and Thomson Reuters are also aggressively promoting and marketing such resources to universities. However, as we will argue later, there are significant differences and considerable heterogeneities in integration of such resources with academic curricula across universities, as well as availability of technically trained staff who are in a position to make effective use of such resources.

#### 4. Use of Bloomberg Professional at the Bradford University School of Management

At the Bradford University School of Management, our aim is to make use of our trading room to enable students to gain exposure to, and receive training in, dealing with “real life” financial and economic markets through appropriate exercises and applications making use of Bloomberg Professional. By access to specialist resources within our trading room and through use of relatively scarce resources such as Bloomberg Professional, students are able to gain hands on experience in a simulated trading environment, as well as get a feel for “real” financial decisions made in industry.

The Bradford University School of Management’s trading room is located in the Airedale Building which is a dedicated lab with 25 computer terminals. The lab has a whiteboard, an instructor computer terminal, a touch enabled Smartboard and two external display monitors, which can either



mirror output or provide a ticker type display of recent market-related information which is conventionally deployed in “real” trading rooms in industry.

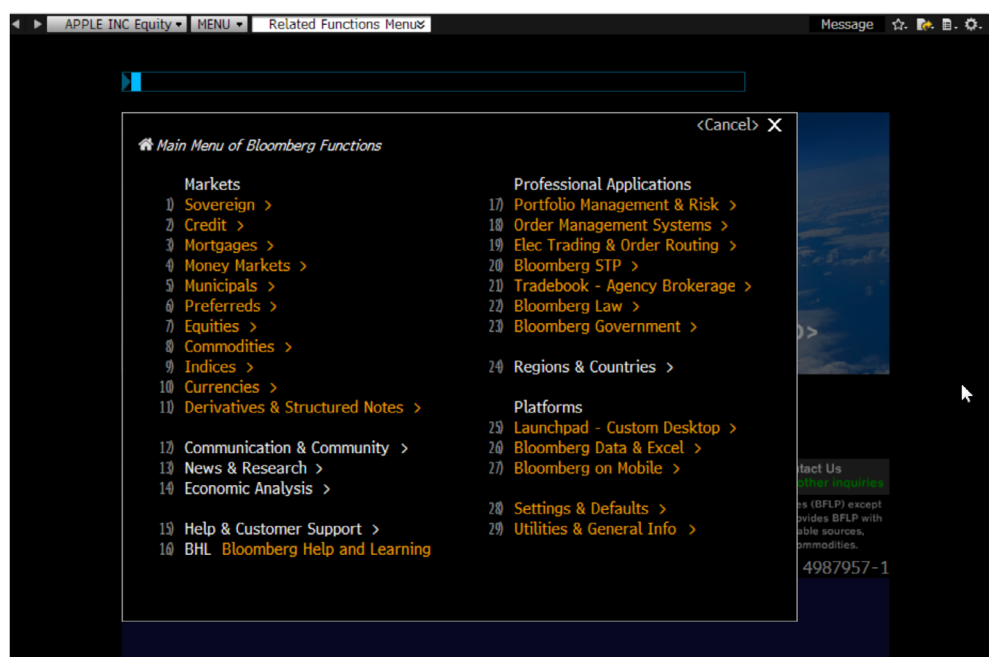
We have a subscription for 12 licences for Bloomberg Professional (please see screenshot in Figure 1) and a site licence for Financial Trading Systems (screenshot in Figure 2), which is a simulation and training suite with powerful academic and industry-related applications. Bloomberg Professional provides rich data-sets in areas such as bonds, equities, currencies, commodities, indices and derivatives, and provides tools for economic analysis, portfolio management and risk analysis as well as credit analysis. Financial Trading Systems allows instructors to set up games using simulated market conditions and nominal currency units thereby enabling trades to be completed within a simulated environment. FTS modules cover a number of simulation exercises grounded on robust academic foundations. Financial Training Systems enables simulation of real-life business situations with particular applications in finance, economics and management. Figure 1 shows the Bloomberg Professional Home Screen which lists the various classes of data and information available to users such as currencies, derivatives, equities and so on. Economic analysis and news is also made available. Bloomberg provides excellent help tools and guidance notes, and we have found technical support to be very professional and prompt.

#### 4.1. Examples of use

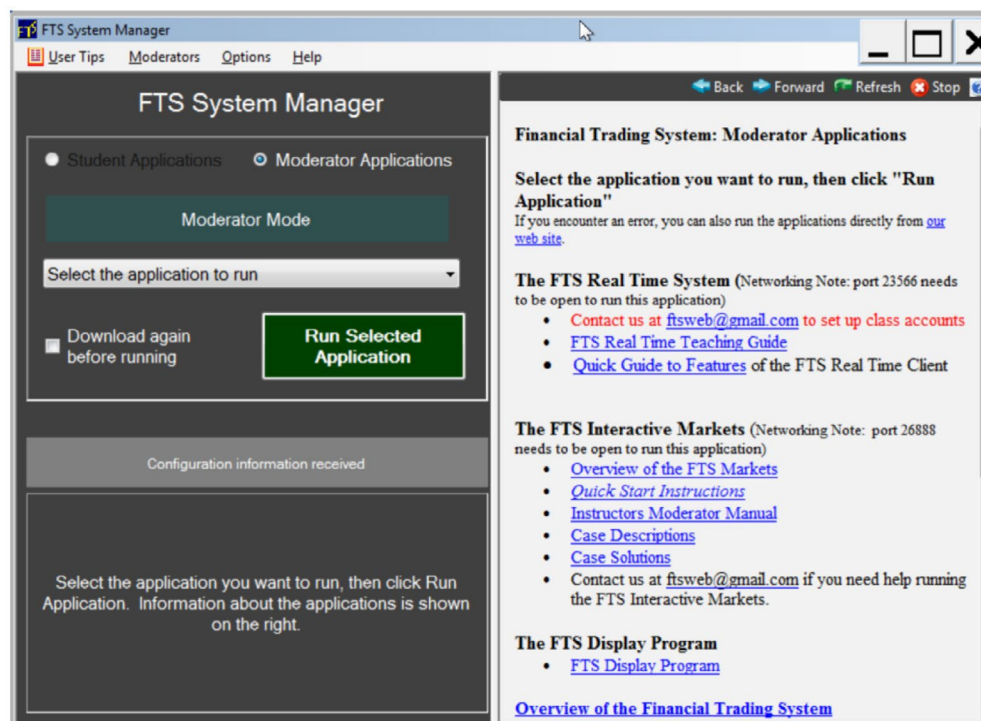
Typical exercises involving Financial Trading Systems include portfolio optimisation games, market microstructure, bond valuation, option pricing and a consideration of the impact of unethical behaviour on firms and society. For example, it is fairly straightforward to set up a simple portfolio optimisation game or trading game whereby participants or groups can be given a certain amount of fictitious money (say 1 million pounds each) and trading rules can be set up as appropriate. One simple example would be to require students to carry out trades on equities contained within the FTSE100 with the requirement of carrying out, say, 10 trades per week over a period of 10 weeks. Thus, students can either invest in equities on the FTSE100 or hold cash, with an overall aim of maximising their portfolio value at the end of the trading period. The first week or week zero can be set to allow participants to learn trading by trial and error. Consequently, at the end of week zero participants’ balances are reset to 1 million pounds. Students, or groups of students, then trade over a period of (say) 10 weeks and the group with the highest realised portfolio value wins. At the end of

**Figure 1. Bloomberg Professional—Home screen.**

Note: Used with permission of Bloomberg Finance L.P.



**Figure 2. Financial trading systems—System manager.**



the 10-week period, students are required to hand in a short report justifying the basis for their trades. FTS provides period updates on student or group activity to instructors and instructors can intervene as necessary and if appropriate. Students are expected to keep abreast of news and events (reported within Bloomberg and elsewhere), look at company reports and intelligence reports from Bloomberg Professional on the FTSE100 firms, evaluate investment recommendations reported by star traders as shown within Bloomberg as well as consider related data or information using Bloomberg as a basis for informing their decision-making.

Another example of use of Bloomberg Professional can be taken from a core module, on the MSc Finance and Investment viz. Quantitative Methods in Finance. This module covers the classical linear regression model, deviations from the classical linear regression model and the basics of time series analysis with emphasis on applications to finance and investment. As a part of this module, students are required to complete an assessed group coursework weighted at 30% of the total mark. Bloomberg Professional enables instructors to make use of customised data-sets for various student groups with relative ease, thereby reducing issues relating to academic standards and possible plagiarism. It also enables students to exercise considerable choice in terms of their assessed coursework and allows better matching of coursework undertaken with students' own skills and preferences. A typical assessment question requires students to use their knowledge of time series econometrics to estimate a number of alternative econometric models to analyse foreign exchange rates or stock prices (equities). Students are expected to refer to and make use of appropriate theory while specifying and estimating their econometrics models. For analysis of foreign exchange rates, students typically also include measures of model fit and forecasts. Bloomberg provides a ready resource whereby long-term data series, information on news and events, company reports and economic analysis for individual and global economies is readily available to contextualise formal analysis and provide detailed supporting information which is very helpful in explaining econometric results. An example of data-sets used at Bradford for the Quantitative Methods in Finance module is provided in Table 2.

As can be seen from Table 2, each group (with a maximum of five students) is assigned one foreign exchange rate and four stock price series (two from the US and two from the UK, plus FTSE100 and



**Table 2. Groups and assigned data-sets—MSc QMIF module**

Group No.	Exchange rate	Symbol (US stock 1)	US stock 1	Symbol (US stock 2)	US stock 2
1	US/Euro	AAPL	Apple	MCD	Macdonalds
2	Japan/US	MMM	3M	MOT	Motorola
3	US/UK	ABT	Abbott Labs	NYT	New York Times
4	Canada/US	BA	Boeing	ORCL	Oracle
5	Switzerland/US	C	Citigroup Inc	PG	Procter and Gamble
6	US/Australia	CL	Colgate Palmo-live	TIF	Tiffany and Co.
7	India/US	CSCO	Cisco Systems	SBUX	Starbucks
Group No.		Symbol (UK stock 1)	UK stock 1	Symbol (UK stock 2)	UK stock 2
1		BA.L	BAE Systems	PERSON.L	Pearson
2		BARC.L	Barclays	RB.L	Reckitt Benck Grp
3		BATS.L	Brit Amer Tobacco	RSA.L	RSA Insur Grp
4		BT-A.L	BT Group	STAN.L	Standard Chartered
5		CNA.L	Centrica	RBS.L	Royal BK Scotl GR
6		CNE.L	Cairn Energy	SAB.L	Sabmiller
7		DGE.L	Diageo	SBRY.L	Sainsbury

Notes: Please ensure that you only use the data-sets assigned to your group. Also ensure that your R history command includes a command summary indicating how you obtained and transformed the data. For stocks, please use the closing price ("close").

SP500 market indices). Using Bloomberg, students are required to either make use of foreign exchange data or stock prices (for the US or the UK or both, as appropriate). They are required to justify their choice of data, time periods chosen for analysis and the subsequent econometric strategy that they adopt for carrying out their empirical analysis. Students are required to make use of R for carrying out their econometric analysis since R is a widely used statistical and econometric resource with extremely wide applications in industry, including finance, banking and the wider corporate world. R is completely free to use which means all students can install a personal copy on their computers and they can work off campus. The expectation is that they would consider the methods and econometric models that have been taught in this module in order to inform their own analysis. They are also expected to make use of information available on Bloomberg in order to provide sound interpretation for their main findings. Since each group is required to only use data assigned for its use, problems related to academic misconduct or plagiarism are greatly reduced since the context of the analysis is different for each group and empirical results obtained are also likely to be quite distinct. Students and groups are encouraged to work with each other and to assist their peers, as long as no collusion takes place and no unfair means are adopted. In our experience, this assessment strategy has worked very well for our student cohorts.

In general, our trading room is used for teaching on a number of postgraduate modules, especially on our specialist MSc in Finance and Investment and on our MBA. It is also used by PhD students and researchers at the School, particularly for access to data and company reports. Our trading room and our emphasis on ethical financial decision-making has also been featured in *The Times* MBA supplement. By making use of Bloomberg Professional and FTS and through use of appropriate industry standard computational software packages such as Matlab, R and Stata for analysis of financial, economic and banking data, students are able to gain a better understanding of the underlying academic concepts in preparation for future careers in finance, banking, economic policy-

making and management (Matlab: <http://uk.mathworks.com/products/matlab/>, R: <http://www.r-project.org/>, Stata: <http://www.stata.com/>). Proficiency in use of such software packages is a significant positive signal that enhances student employability. Feedback received from students is extremely positive and in general we have found students to be very keen to learn further and students are eager to develop their skills further.

Our principal objective is to produce ethically responsible specialists who have a strong financial and banking perspective in relation to corporate activity, pension fund behaviour, international banking decisions, the economy and international financial markets, through appropriate instruction. This premise is strongly supported by research evidence (see for example Abdolmohammadi & Sultan, 2002; Drumwright et al., 2015). Throughout our specialist postgraduate programmes, there is intensive use of the financial software packages that are most widely utilised in industry and the City of London (as well as other important financial centres), e.g. R and Bloomberg Professional. There is also strong emphasis on sustainability and ethical issues in the finance, economics and banking sectors.

We have recently moved to Bloomberg Professional from Thomson Reuters Eikon from 2014–2015 onwards. Our members of staff are in the process of receiving further training in use of specialist resources and we hope to integrate these resource into teaching, wherever appropriate. One possible improvement to our trading room in the medium run could be a move to a more flexible teaching space where students can work in clusters, rather than in rows, to enable greater interaction and participative activity.

Trading room resources link very closely to modules taught on our specialist MSc programmes, particularly the MSc in Finance and Investment and our MSc in Financial Management (launching in Autumn 2016). Our endeavour is to enhance the use of Bloomberg Professional across a range of PG taught and research programmes, especially MSc Finance, MBA and PhD. Our survey of over 100 UK-based higher education institutions shows that there are several other trading rooms in the country which are similar in size to us, but a large number of trading room labs are much smaller. Several large universities currently do not have a trading room at all. Since both Bloomberg and Thomson Reuters are aggressively marketing software to universities, the situation is likely to change very soon.

### **5. Use of Bloomberg for university teaching: an evaluation**

At Bradford we believe that we are using an effective combination of software packages which is not always deployed within the UK viz. Bloomberg Professional and Financial Trading Systems (FTS), alongside Stata and R. FTS is a very well-established simulation software which allows a range of scenarios/concepts to be taught in a rigorous and academically sound manner. As mentioned, there are (less effective) alternatives to FTS. For instance, other universities deploy StockTrak which does the job but is not as powerful or as thoroughly grounded in theory as FTS is. FTS also has a suite of custom modules including on areas such as bond pricing, binomial lattices, time value of money, capital asset pricing model, delta hedging and swaps, which enable students to understand core concepts within well-designed simulation modules using a variety of applied examples. A site licence to FTS is good value for money and it enables all students to have a copy of FTS on their computers or mobile devices enabling them to work off-campus with ease. We also make use of both R and Stata which are excellent statistical software packages that enable effective analysis of trading room data, particularly R which is widely used in industry.

One of the main constraints to further adoption of trading room resources on postgraduate programmes and programmes such as the MBA is the need to have a threshold level of coverage of topics involving quantitative methods/business decisions/introductory economics and finance courses in order to ensure that students have adequate knowledge of basics in order to be able to make effective use of trading room resources. Since UK postgraduate programmes including the

MBA are often of 12 months duration, there is limited time to facilitate catch-up especially given heterogeneous skills and prior levels of knowledge of student cohorts within non-finance and non-economics streams. Bloomberg Professional is a very useful tool for use on both MSc Finance (and related) dissertations and MBA dissertations, given the quality and range of data provided. A key challenge faced sector wide is facilitating further, effective use of trading room resources and ensuring greater take-up on modules and programmes.

### **5.1. Staffing and use of trading room**

A well-established stylised fact on trading room use is that high costs notwithstanding, it is relatively easy to deploy trading room software and put the physical infrastructure in place. However, the key challenge—even for the very best universities and business schools—is to ensure effective and intensive use of facilities, in conjunction with deploying suitably trained (and motivated) academic staff. While software, hardware and lab costs can be significant, these can be resolved; but the key issues of integration of such tools and resources into the academic curriculum and ensuring sufficiently high take up by academic staff can be a significant challenge, especially given the need for training and appropriate integration within modules. Take up issues, technological aversion and skills mismatch amongst faculty are well-known hindrances to effective use of such resources. The best schools essentially make better/more effective use of resources, both for teaching and research and don't necessarily differ significantly in terms of facilities and software. There is also a need to match up faculty skills sets with teaching and technical requirements when new staff members are appointed. This would help to ensure that, as far as is possible, staff members with some prior training in or knowledge of use of trading room software and/or quantitative based software are appointed, so that use of the trading room resources can be optimised. Faculty members do need to develop both new teaching and instructional material, as well as acquire new skills in order to make use of these tools effectively. Take-up can be better incentivised through adjustments to faculty and academic workloads when new material is being designed or new skills are being acquired. Without an acknowledgement of the time and resource constraints involved, there is a tendency on the part of some faculty colleagues to defer use of these resources mainly on account of time limitations and other pressing commitments. It would also help to encourage more effective use of this resource by other subject areas within business schools which can make effective use of such resources such as international business, accounting, entrepreneurship, marketing and so on, assuming of course that use of trading room software would be beneficial and academically justified.

### **5.2. Trading room and space constraints**

Space constraints are likely to be faced, especially in the initial phases of trading room set-up, especially given the need to calibrate capacity in line with likely usage and costs involved in scaling up facilities. A number of business schools place emphasis on ensuring maximum take-up on postgraduate programmes and thus have relatively smaller trading rooms and subscriptions to a limited number of licences for Bloomberg or Eikon. However, there can be significant scale and capacity issues for use at undergraduate level given that there are typically much higher average class sizes especially in Levels 1 and 2. Constraints faced relate both to capacity constraints and to student capabilities (see below also). For example, a single lab can typically accommodate up to 22–24 students in the trading room, assuming a standard configuration of 12 licences and two students per terminal. This means that for a class size of about 150, there would be a need for 6 tutorials or lab sessions, none of which can be time-tabled simultaneously. In addition, there would be a need to either have a mix of suitably trained tutors to provide classroom instruction and/or one (or a few) tutors would have to sign up for fairly intensive teaching, particularly at undergraduate level. Therefore, it makes sense to first roll out use of such resources at postgraduate level followed by deployment at undergraduate levels for reasons outlined above.

### **5.3. Trading room, student capabilities and further integration into teaching and research**

It is very important to ensure use of trading room resources is closely aligned to programme and module objectives and learning outcomes. For a number of modules on programmes such as an MSc in Finance or MSc in Finance and Investment as well as on the MBA, there are strong synergies in use of Bloomberg Professional in support of teaching activity. Use of trading room resources could include:

- (1) Inclusion of data-sets or cases or company studies for use in group or individual coursework.
- (2) Use of data or cases or company data in support of one or more tutorial/seminar activities.
- (3) Use of resources in support of lecture material or module material.
- (4) Completion of self-study and online assessments to earn a Training Certificate from Bloomberg (BESS or Bloomberg Essentials Training programme<sup>3</sup>).

Students are highly aware of the employability impact of such training and the benefits that result from developing suitable skills in the use of such scarce and technical tools. At Bradford, both formal and informal student feedback for postgraduate modules (MBA and MSc Finance) strongly indicates that students strongly value training in and opportunities for use of trading room resources.

This in turn links to an important limitation in use of trading room tools, which is more pronounced at undergraduate level than at postgraduate level. For effective use of trading room software, especially Bloomberg Professional, there is a threshold level of core knowledge that is needed which includes basics of finance, economics and simple quantitative methods. In the absence of knowledge of basic underlying concepts, it becomes difficult to deploy such resources effectively and instructors face the dilemma of the need to focus on course topics to ensure proper module coverage as against the need to provide training on aspects or topics not directly related to the module (such as basic statistical concepts/basic market or trading theory/basic finance or macroeconomic theory) which may well be far removed from the syllabus on which trading room tools are intended to be used. This implies that trading rooms can often be most effectively deployed on modules within programmes where students have prior training up to a certain threshold, such as specialist MScs and the MBA, and some undergraduate modules at Level 2 or Level 3. This constraint also applies to the MBA albeit to a lesser degree. In order to maximise uptake and more effective use of trading room resources, it would help if programme design on relevant programmes, especially those programmes which wish to make use of trading room resources, ensures that a threshold level of skills (mainly quantitative skills) is provided so that adoption of such tools is made easier. With proper training and more effective use, Bloomberg Professional has the potential to be of great use to researchers, both members of staff and PhD students. By providing suitable training and demonstration sessions for both members of staff and for PhD students, universities should be able to encourage more effective use of these resources in research activities in addition to teaching.

### **5.4. Postgraduate theses (MSc/MA/MBA)**

Bloomberg Professional provides a significant amount of data and materials that are highly relevant to postgraduate taught students and postgraduate research students, especially those students who choose topics within finance and economics. It is common for MSc or MA or MBA students to make use of secondary data for applied empirical projects, particularly given that they only have 10–12 weeks in which they are expected to complete their dissertations. Bloomberg has rich data-sets for use in theses on other subject areas such as accounting, international business and marketing, as well as theses involving country or company case studies. For instance, Bloomberg provides digitised annual reports for a number of prominent firms in electronic (Excel) format with clear annotations about data sources and any data transformations, thereby providing access to usable data without the need to manually collect annual reports from company websites, or extract and transform data manually.

### 5.5. Student recruitment and overseas collaborations

Trading room resources can be potentially very useful both for student recruitment and for facilitating overseas collaborations with partners of good standing. As mentioned previously, a significant proportion of university students at all levels of study are strongly interested in acquiring specialist technical skills, trading skills and data analysis skills which have a clear link to employability and career progression. Appropriate use of such capabilities can be a significant resource in enhancing the student learning experience and making appropriate programmes of study more attractive to potential students. A significant contribution could be made to recruitment and outreach activities through use of cutting edge econometric techniques in finance in conjunction with use of Bloomberg Professional for simulating real-life scenarios in investment, banking and finance generally. Such aspects would be of significant appeal to current and prospective students and overseas faculty colleagues, thereby helping facilitate exchanges related to both teaching and research activities.

### 6. Conclusion

Trading rooms are very useful and powerful resources with strong potential for delivering an enhanced student experience as well strengthening employability skills in an effective manner. Trading rooms also provides academics with a valuable research tool which can potentially strengthen research performance as well as enable better support for postgraduate research students. Trading rooms also make it more easy to showcase skills valuable to industry and facilitate research-led teaching.

The key challenge in use of trading rooms is to ensure effective and intensive use of such facilities, as well as ensure deployment of suitably trained (and motivated) academic staff. Appropriate staff training and intensive use across a range of modules on relevant programmes is necessary to justify the outlay on acquisition of software and hardware resources, as well as provision of lab facilities. This would also enable scaling up of trading room labs as their use becomes more widespread. Take up issues, technological aversion and skills mismatch amongst faculty can act as hindrances to effective use of such resources, but with an appropriate staff recruitment strategy as well as skills development strategy, universities should be able to facilitate more effective use of such resources. There is a need for leadership in order to motivate and incentivise academic faculty in order to align objectives in order to make effective use of such technologies. The best schools essentially make more effective use of trading room resources, both for teaching and research, and don't necessarily differ significantly in terms of facilities and software that are available to them. Thus, effective deployment of such tools can become an important differentiator in a crowded marketplace where several higher education providers are attempting to attract high quality students to the programmes they offer, especially on specialist MScs and MBAs. They are also extremely important for enhancing the student learning experience and providing students with meaningful and valuable skills that enhance their employability. This is increasingly a significant factor given that students take on substantial debts to fund their university education and repaying such debts is directly linked to post-education employment opportunities that become available to them. Trading rooms also provide an opportunity to academics to emphasise the importance of responsible financial decision-making in the post-financial crisis world that we live and work in.

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#### Author details

Abhijit Sharma<sup>1</sup>

E-mail: [A.Sharma12@bradford.ac.uk](mailto:A.Sharma12@bradford.ac.uk)

<sup>1</sup> Accounting, Finance and Economics Group, University of Bradford School of Management, Emm Lane, Bradford BD 9 4JL, UK.

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#### Notes

1. Bloomberg Professional is a registered trademark of Bloomberg Finance L.P.
2. Bloomberg Finance L.P claim to have 325,000+ subscriptions to Bloomberg Professional. Source: [http://www.bloomberg.com/company/bloomberg-facts/?utm\\_source=bloomberg-menu](http://www.bloomberg.com/company/bloomberg-facts/?utm_source=bloomberg-menu).
3. <http://www.bloomberg.com/professional/education/>.

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