Articles

ATHENS INSTITUTE FOR EDUCATION AND RESEARCH
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Mission

ATINER is a *World Non-Profit Association* of Academics and Researchers based in Athens. ATINER is an independent **Association** with a **Mission** to become a forum where Academics and Researchers from all over the world can meet in Athens, exchange ideas on their research and discuss future developments in their disciplines, **as well as engage with professionals from other fields**. Athens was chosen because of its long history of academic gatherings, which go back thousands of years to *Plato's Academy* and *Aristotle's Lyceum.* Both these historic places are within walking distance from ATINER's downtown offices. Since antiquity, Athens was an open city. In the words of Pericles, **Athens"...*is open to the world, we never expel a foreigner from learning or seeing".* (**"Pericles' Funeral Oration", in Thucydides, *The History of the Peloponnesian War).* It is ATINER's **mission** to revive the glory of Ancient Athens by inviting the World Academic Community to the city, to learn from each other in an environment of freedom and respect for other people's opinions and beliefs. After all, the free expression of one's opinion formed the basis for the development of democracy, and Athens was its cradle. As it turned out, the Golden Age of Athens was in fact, the Golden Age of the Western Civilization. *Education* and *(Re)searching* for the 'truth' are the pillars of any free (democratic) society. This is the reason why *Education* and *Research* are the two core words in ATINER's name.

Athens Journal of Business & Economics
Editorial and Reviewers' Board

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Before you submit, please make sure your paper meets some basic academic standards, which include proper English. Some articles will be selected from the numerous papers that have been presented at the various annual international academic conferences organized by the different divisions and units of the Athens Institute for Education and Research.

The plethora of papers presented every year will enable the editorial board of each journal to select the best ones, and in so doing, to produce a quality academic journal. In addition to papers presented, ATINER encourages the independent submission of papers to be evaluated for publication.

The current issue of the Athens Journal of Business and Economics (AJBE) is the third issue of the fifth volume (2019). The reader will notice some changes compared with the previous issues, which I hope is an improvement. An effort has been made to include papers which fall within in one of the subfields of business and economics.

Gregory T. Papanikos, President
Athens Institute for Education and Research

Athens Institute for Education and Research
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14ᵗʰ Annual International Symposium on Economic Theory, Policy and Applications 1-4 July 2019, Athens, Greece

The [Economics Unit](#) of ATINER, will hold its **14ᵗʰ Annual International Symposium on Economic Theory, Policy and Applications 1-4 July 2019, Athens, Greece** sponsored by the [Athens Journal of Business & Economics](#). The aim of the conference is to bring together academics and researchers of all areas of economics and other related disciplines. You may participate as panel organizer, presenter of one paper, chair a session or observer. Please submit a proposal using the form available (https://www.atiner.gr/2019/FORM-ECO.doc).

Academic Members Responsible for the Conference

- **Dr. Gregory T. Papanikos, President, ATINER & Honorary Professor, University of Stirling, UK.**
- **Dr. Chris Sakellariou, Head, Economics Unit & Associate Professor of Economics, Nanyang Technological University, Singapore.**

Important Dates

- Abstract Submission: **DEALINE CLOSED**
- Acceptance of Abstract: 4 Weeks after Submission
- Submission of Paper: **DEALINE CLOSED**

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- Athens Sightseeing: Old and New-An Educational Urban Walk
- Social Dinner
- Mycenae Visit
- Exploration of the Aegean Islands
- Delphi Visit
- Ancient Corinth and Cape Sounion

Conference Fees

Conference fees vary from 400€ to 2000€
Details can be found at: https://www.atiner.gr/2019fees

Athens Institute for Education and Research
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7ᵗʰ Annual International Conference on Business, Law & Economics
4-7 May 2020, Athens, Greece

The Business, Economics and Law Division (BLRD) of ATINER is organizing its **7ᵗʰ Annual International Conference on Business, Law & Economics, 4-7 May 2020, Athens, Greece,** sponsored by the Athens Journal of Business & Economics and the Athens Journal of Law. In the past, the six units of BLRD have organized more than 45 annual international conferences on accounting, finance, management, marketing, law and economics. This annual international conference offers an opportunity for cross disciplinary presentations on all aspects of business, law and economics. This annual international conference offers an opportunity for cross disciplinary presentations on all aspects of business, law and economics. Please submit an abstract (email only) to: atiner@atiner.gr, using the abstract submission form (https://www.atiner.gr/2020/FORM-BLE.doc)

Important Dates
- Abstract Submission: **1 October 2019**
- Acceptance of Abstract: 4 Weeks after Submission
- Submission of Paper: **6 April 2020**

Academic Member Responsible for the Conference
- **Dr. Gregory T. Papanikos**, President, ATINER.
- **Dr. Michael P. Malloy**, Director, Business, Economics and Law Division, ATINER & Distinguished Professor & Scholar, University of the Pacific, USA.
- **Dr. David A. Frenkel**, LL.D., Head, Law Research Unit, ATINER & Emeritus Professor, Law Area, Guilford Glazer Faculty of Business and Management, Ben-Gurion University of the Negev, Beer-Sheva, Israel.

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Opening Argentina to Public-Private Partnerships: Opportunities and Risks for Government Entities and Private Investors

*By Ulrich Schüle[*], Franz Liening-Ewert[†], Daniel Schäffer[‡]
& Edith Zeppenfeld[°]*

Since the presidential elections in November 2015, Argentina's economic system has shifted back to a more neo-liberal paradigm. After more than 15 years of "neodesarrollismo" characterized by large scepticism towards inward FDI, the country opens up to international investment into infrastructure. With a new law adopted in early 2017, Argentina promotes public-private-partnership (PPP) projects. The expectations in Argentina vary from the belief that inward FDI will significantly contribute to the modernization of infrastructure to the fear that PPP projects will surrender the country to the interest of international capital. Even though the government believes that the ambitious National Infrastructure Plan with intended investment of US-$69bn in transport and energy infrastructure cannot be achieved without PPP projects, a critical analysis of the conditions under which PPP projects may be successfully applied in Argentina, is yet missing. In order to identify such conditions, a triangulation of three research methods was chosen: First, cases in Europe and Latin America were analysed in order to identify key success factors and arrangements correlated with project deficiencies. The focus was on contractual arrangements of risk distribution between stake holders and impediments to cash flow analysis. Second, documentary analysis was applied to examine the regulatory and institutional environment in Argentina. Third, in-depth interviews with 22 experts from Europe and Latin America were conducted. The experts represented the major stake holders in PPP projects: officials from government procurement, lawyers, bank representatives, and managers of project companies and major suppliers. As a result, conditions for a successful application of the PPP concept in Argentina's road and underground railway infrastructure as well as in integrated waste management systems were derived. The research was carried out in the framework of a bi-national Master program in International Business run by the Hochschule Mainz (Germany) and UCES, Buenos Aires.

Keywords: *Argentina, FDI, infrastructure, multiple case study, Public-Private-Partnership (PPP), risk allocation*

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Introduction

After more than 15 years of scepticism towards inward FDI, Argentina's economic system shifted back to a more neo-liberal paradigm. The new government, in office since end of 2015, opens up the country to international investment into infrastructure.

As Argentina invested around 2% of GDP into infrastructure between 2008 and 2013, a figure clearly below South America's average (The Economist Intelligence Unit 2017: 18), the investment backlog is obvious so that the government intends to increase the annual expenditure for infrastructure to 6% of GDP (Delgado 2016). However, with an already high budget deficit, Argentina urgently needs private domestic and foreign capital for achieving this figure. Therefore, the government aims at increasing inward FDI as a means of modernizing Argentina's transportation and energy infrastructure. Moreover, investment in a more efficient and environment-friendly waste disposal management is needed. In particular, investment is needed in order to improve recycling activities (Schejtman and Irurita 2012).

As a vehicle to funnel national and international private investment into public infrastructure, Argentina adopted a new law (Ley 27328) on public-private partnership (PPP) projects in early 2017.

Unfortunately, there is no commonly used definition of PPP. The expression "has become an extremely heterogeneous concept" (Kwame-Sundaram et al. 2016: 3). In practice, the definition "varies depending on the degree of ownership of assets and capital expenditure by the private partners" (ibid.). In the context of this paper, PPP agreements "refer to arrangements under which the private sector supplies infrastructure assets and infrastructure-based services that traditionally have been provided by the government. PPPs are used for a wide range of economic and social infrastructure projects, but they are mainly used to build and operate roads, bridges and tunnels, light rail networks, airports and air traffic control systems, prisons, water and sanitation plants, hospitals, schools, and public buildings" (IMF 2006: 1). However, in the context of this study, concession contracts and outsourcing contracts are not seen as PPP.

Even though the government in Buenos Aires believes that the ambitious National Infrastructure Plan cannot be achieved without incoming FDI in form of PPP projects, a critical analysis of the conditions under which PPP projects may be successfully applied in Argentina, is yet missing.

By analysing case studies on PPP projects in Europe and Latin America, examining the regulatory and institutional environment in Argentina, and interviewing 22 experts from Europe and Latin America, the authors identify some of these conditions.

Conceptual Framework

PPP Characteristics

PPP models may be classified in three different ways. The first approach characterises PPPs according to their institutional arrangement, differentiating between PPPs that establish a project company described as Special Purpose Vehicle (SPV), and PPPs that consist of purely contractual agreements. The second approach is to classify PPPs by the different phases of the project's life cycle (Design, Construct, Operate, Maintain). The third approach typifies them according to certain functions such as Design, Built, Finance, Operate, Maintain, Own, Transfer, Lease, Develop, and Buy. Hence, PPP models may vary from Design-Built-Operate (DBO), Design-Build-Finance-Operate-Maintain (DBFOM), Build-Operate-Transfer (BOT), Build-Operate-Own (BOO) to Build-Own-Operate- Transfer (BOOT) models. Thus, a wide spectrum of PPP arrangements allows to adapt to project-specific characteristics. Institutional designs typically put a Special Purpose Vehicle (SPV) in the core of the arrangements (figure 1).

Figure 1. *Typical "Non-Recourse" PPP Arrangement*
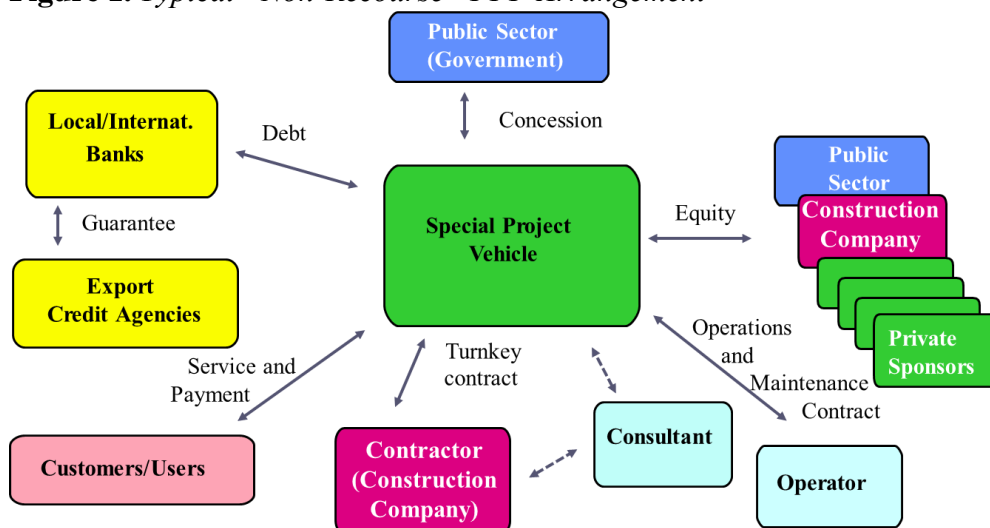
Source: Author.

The construction company (contractor) not only builds the infrastructure complex (for example a motorway) but also invests into the legal owner of the infrastructure, the SPV. Additional equity holders are often government agencies and private investors. In most PPPs, the larger part of capital is provided in form of loans by local and international banks, the latter typically requiring guarantees issued by export credit agencies. As the construction company is not only the seller of the construction service but also partly owner of the principal (SPV), inspection and quality control should be transferred to a private consulting company. This reduces the inherent conflict of interests. The project is operated by a subsidiary of the construction company or an independent operator. Operations

are based on a concession agreement with which the government assigns the right of operations to the SPV.

Deviations from this standard model are common; reasons for deviations are manifold, but mostly related to the issue of assigning risks appropriately to different stakeholders. In non-recourse arrangements, the investors' liability is restricted to the invested equity whereas full-recourse arrangements make sponsors liable with their complete balance sheet work. Thus, full-recourse arrangements would work without SPVs. In some cases, investors' finance PPP projects with their own resources and later, after construction is completed, issue project bonds to the financial markets (World Bank 2018a).

Risk Allocation

Mandri-Perrot (2010) describes fair risk allocation as one of four fundamental success factors for PPPs, besides government commitment, a well-prepared PPP model and tender process, and an appropriate regulatory and legal framework. Grimsey and Lewis (2007) point out that risk allocation is the core issue of PPP. Ford, Damnjanovic and Johnson (2015) state that achieving "a balanced and fair allocation of risk between the public and the private partners is critical to project success. If too much risk is borne by the private partner the cost becomes higher than necessary and the public agency may be forced to take premature ownership from a failed developer/operator; if too little is borne by the private partner public funds are wasted" (p. 120).

Principle-Agent Theory may serve as conceptual background for the analysis of risk allocation. The public sector as the principal engages the private sector as agent. The contracts are signed in an environment of asymmetric information and high degrees of uncertainties. Likewise, the contract partners are highly influenced by third parties' interest. Therefore, explicit and rational risk allocation is needed to avoid moral hazard and adverse selection (Oudot 2005). Adverse selection implies that one of the parties conceals information in order to benefit from the information advantage. Moral hazard occurs as the result of one party's action creating risk knowing that the other party will incur the costs. For example, private partners may calculate with unrealistic low costs in the bidding process, referred to as "aggressive bidding", if the public sector assumes the risk of cost overrun.

Firmenich (2014) points out that risk allocation occurs at two levels. The first level is characterised by the risk transfer from the public client to the SPV as representative of the private consortium. At the second level, risks are transferred from the SPV to the consortium members, in particular to the contractor and the operator. This risk transfer is usually conducted with a back-to-back contractual arrangement. However, if the risk recipient fails completely, the responsibilities will fall back to the original risk sender.

Risk allocation takes place before and after the conclusion of the contract. In the first phase, feasibility and risk evaluation are done by public entities in rather qualitative forms. In the next phase, the public entity assesses the project risks based on the quantity of potential losses and the probability of occurrence. In this phase, the decision between conventional public investment and PPP is made.

Rational governments opt for PPP only if the assumed higher efficiency of private entities overcompensates the high transaction costs of such projects. The capability of successfully carrying out such risk evaluations depends on previous experience with such processes. In case of a lack of experience, governments may better outsource this activity.

The core phase of selecting private partners and negotiating the risk allocation takes place during the tender process. It is crucial that the public institution shares all information. Otherwise, all disadvantages of asymmetric information may occur. It is also recommendable to require evidence from private bidders that they dispose of enough resources to handle the risks if they materialise.

After the conclusion of the contracts, continuous monitoring of the risks over the project's entire lifecycle is essential. If unforeseen and new risks occur, a re-negotiation of risk allocation is necessary. According to Guasch et el. (2014), around 78% of transport infrastructure PPP projects in Latin America had to be re-negotiated within the first three years. However, it could also be shown that with growing experience countries were able to improve re-negotiation practices.

According to Li et al. (2002), risks can be classified and may occur at the macro, meso, and the micro level. Macro risks range from changes in legislation and the regulatory framework, often combined with a change in government, social unrest, force majeure, and economic instability leading to unforeseeable changes in interest rates, inflation, and foreign exchange. Risks at the meso level are those related to the nature of the project, like design errors, delays and cost overruns during the construction phase, malfunction in operations and maintenance, and, in particular, the forecast of customers/users. Micro level risks are for example contractual risks providing loopholes for opportunistic behaviour, anticipated contract termination, lack of a party's dedication, and conflicts of interest.

The most common risk lies in an inadequate forecast of demand, for instance an overoptimistic forecast of cars using a PPP's highway. Projects' cash flows heavily depend on future revenue. As demand for infrastructure may be altered by many factors which are not under the control of project management and government, projects are heavily vulnerable if the future demand is estimated too optimistically. In addition, project forecasts in public transportation and waste collection must consider potential free-rider and shirking effects. Therefore, the matter of cash flow analysis and forecast belongs to the core issues of PPP planning (Turley and Semple 2013).

Cash Flow Analysis

Whereas traditional cost-benefit analysis of public infrastructure focuses on monetizing external effects and the social return on investment (Boardman et. al. 2018), private investors, in particular those investing equity into the SPV, emphasise the Internal Rate of Return (IRR). The IRR depends on the size of the initial investment into SPE equity, the dividends earned throughout the life cycle of the project, and the SPE's residual value (Yescombe 2007).

The required Equity IRR is composed of the risk-free interest rate and the project-specific risk premium which may vary between the different project phases. In the construction phase, anticipated delays and cost overruns mainly determine the risk premium; in the operation phases, it is rather influenced by increasing uncertainties concerning the predictability of user numbers and revenues. The larger the second effect the more likely private investors may wish to transfer this risk to the government.

In addition to the required Equity IRR, project sponsors need to calculate the cost of debt. As SPVs are typically financed with debt ratios of 80% and more, the cost of debt plays a dominant role in the cash flow analysis. The Annual Debt Service Cover Ratio as the relation between net operating profits and debt service is commonly used for calculating the required minimum revenues. Other common ratios used for analysing whether the projected cash flow is sufficient to pay the debt service are the Loan Life Cover Ratio and Project Life Cover Ratio (Vinter et al. 2013).

All of these financial ratios have one characteristic in common: Future operating profits – and this means revenues and costs – must be discounted in order to compute net present values. The longer the time horizon and the less stable the country's macroeconomic environment, the more difficult is the cash flow forecast. This is particular true for unpredictable inflation rates. Possible solutions may consist of price indexation and the use of foreign currencies.

Lenders' Risks

As the SPV's equity basis is rather small and infrastructure assets cannot be confiscated in case of bankruptcy, so that SPVs do not provide sufficient collateral, also lenders rely on the forecasted cash-flow.

Thus, international banks may be prone to transfer the risk of the project's default to the public sector. A standard tool used in the construction phase is guarantees issued by public export credit agencies in the contractor's country. Thus, a German company involved in the construction of a highway in Argentina may apply for the public export credit insurance of the German Euler-Hermes agency. The latter then covers the default risk of German banks lending to the SPV.

Moreover, lenders may insist on full-recourse project structures or require guarantees from the government in the SPV's country. Private financial institutions may also prefer projects in which international development banks and the World Bank Group, in the case of PPP projects most probably the IFC, is involved (Verdouw et al. 2015).

PPP Projects in Argentina

Even though Argentina was one of the Latin American countries that initiated private co-financing of infrastructure projects in the early 1990s, the majority of these projects seem to be pure concession contracts or failed in the wake of the country's financial crisis of 2001. The post-crisis period under the Kirchner

governments was then characterized by scepticism towards inward FDI and private participation in financing public infrastructure. The overall investment climate declined and practically impeded international private investment in new projects (Schüle 2015). In complete contrast to the last 15 years, the new Macri government, in office since end of 2015, tries to funnel national and international private investment into public infrastructure. In 2017, the new law (Ley 27328) on PPP was passed at the national level and province-level regulations on public procurement adapted. A sub-secretary for PPP was established in the Ministry of Finance, 60 projects with a volume of USD 26bn defined (Presidencia de la Nación 2017), and workshops in cooperation with the World Bank organized (Subsecretaría de Participación Público Privada 2018). In early 2018, the Inter-American Development Bank approved a USD 500m investment guarantee facility for PPP projects in Argentina (La Nación 2018).

Methodology

This study is a first approach to analyse conditions under which PPP projects may be successfully applied in Argentina. It concentrates on projects in road and underground rail transportation, additionally transferring the results to waste collection in Greater Buenos Aires. A triangulation of three research methods was chosen.

Multiple Case Study

First, cases in Europe and Latin America were analysed in order to identify key success factors and contract arrangements correlated with project deficiencies. The focus was on contractual arrangements of risk distribution between stake holders and impediments to cash flow analysis. The cases were selected from the sectors road and underground transportation. As basic precondition, the selected cases had to be well-documented by the project consortia and independent researchers. Moreover, they should be characterised by different forms of contractual arrangements and risk allocation:

- The Herrentunnel Lübeck in Germany is part of a federal highway connecting the city of Lübeck with Travemünde. The tunnel was built to replace a former bascule bridge. The tender was initiated in 1997, construction started in 2001 and operations in 2005. The basic design of the PPP contract is a BOT model. The SPV's cash inflow mainly stems from toll revenues.
- A8 Augsburg-Munich (Germany) is a 53km part of a motorway serving as principal traffic route in Southern Germany with high relevance for European transit. The project consisted of expanding the existing motorway to six lanes while traffic with up to 100,000 vehicles per day continued. Since 2010, the 6-lane-motorway has been run by a SPV paid in form of "shadow tolls" based on actual traffic volume.

- Autopistas Armería-Manzanillo and Ecatepec-Pirámides (Mexico), one of them close to Mexico City, one of them in the state of Colima, are classical toll roads owned by the Tribasa Group. The group established a SPV in form of two subsidiaries and later refinanced the investment via bonds in the U.S. capital market.
- The Ruta 5 in Chile is one of the country's principal transport axes. The section Los Vilos-La Serena is 229 km long. The tender was initiated in 1996, the four-lane road opened in 2002.
- London Underground entered into three PPP projects with the private consortia Metronet and Tube Lines. In 2007, only four years after the project start, Metronet declared insolvency, the company's responsibilities were transferred back into public ownership. The PPP with Tube Lines was prematurely terminated in 2010: Since then, London Underground has been purely publicly run again.
- Lima Línea 2 is Peru's largest PPP agreement, signed as a DBFOM project between the Ministry of Transport and Communication and an international private consortium in 2014. Although the project is still too young to be entirely evaluated, it serves as an example for metro projects in Latin America.

Documentary Analysis

Second, documentary analysis was applied to examine the regulatory and institutional environment in Argentina. As the adaptations of province regulations during the year 2017 did not create deviations from the national law but only facilitate the application of national law, analysis was restricted to Law 27328. In addition, the legal frameworks of Germany, Mexico, Peru, and Chile were studied. Moreover, project companies' balance sheets – if available - were analysed.

In-Depth-Interviews

Third, in-depth interviews with 22 experts from Europe and Latin America were conducted. The experts represented the major stake holders in PPP projects: government procurement officials, lawyers, bank representatives, and managers of project companies and major suppliers. Five different interview guides were elaborated focusing on the following expertise:

- Experts of Argentina's political, economic and juridical system
- Lawyers involved in the design and wording of the PPP law 27328
- Experts involved in the design and administration of PPP projects
- Experts of the underground system in Buenos Aires
- Experts in the waste management system of greater Buenos Aires.

The last category of interviews aimed at identifying possibilities for transferring the results to the sector of waste management.

Findings

Case studies as well as interviews confirm the importance of risk allocation and realistic cash flow forecasts. Whereas in the analysed cases nearly all macro level risks were allocated correctly, misalignments at the meso and micro level proved to be harmful.

Inadequate Risk Allocation

The failure of the well-documented Metronet PPP (London underground) shows how inadequate risk allocation jeopardises projects' long-term viability. While the risk of adequate traffic forecast was allocated appropriately to the public sector, inadequate risk allocation at meso and micro level caused the project's failure. Main characteristics were cost overruns, the abuse of the SPV to funnel financial means to capital owners, neglected monitoring by lenders, and an inefficient approval process.

Cost Overruns and SPV Exploitation

The rules on cost overruns included a £50m materiality threshold in a pre-defined 7.5-year period. The risks of cost overruns up to this threshold were allocated to the Metronet owners. Any additional costs, if incurred in an economic and efficient manner, were guaranteed by the public. Therefore, as soon as overrun costs exceeded the threshold of £50m, the SPV and their owners had no incentive to keep cost under control. As a result, the Metronet owners created a value chain system which allowed them to deliberately create cost overruns and, thus, pump financial means from the public. In order to do so, four of the five Metronet owners (figure 2) – also being simultaneously major suppliers to the SPV – formed a second SPV called Trans4m. Trans4m signed an agreement with Metronet which made it a privileged supplier to Metronet in carrying out station renovation. Even though a back-to-back arrangement would have transferred the risk of overrun costs to Trans4m, the agreement seems to have been used for funnelling funds from Metronet to the capital owners. In addition, Bombardier had a de-facto monopoly in supplying trains and signalling systems to Metronet. The contractual arrangement "gave Metronet very little in the way of enforcement levers and Metronet had little opportunity to contract work elsewhere on more reasonable terms" (Hart 2015, p. 279).

Figure 2. *The Metronet Supply Chain Structure*
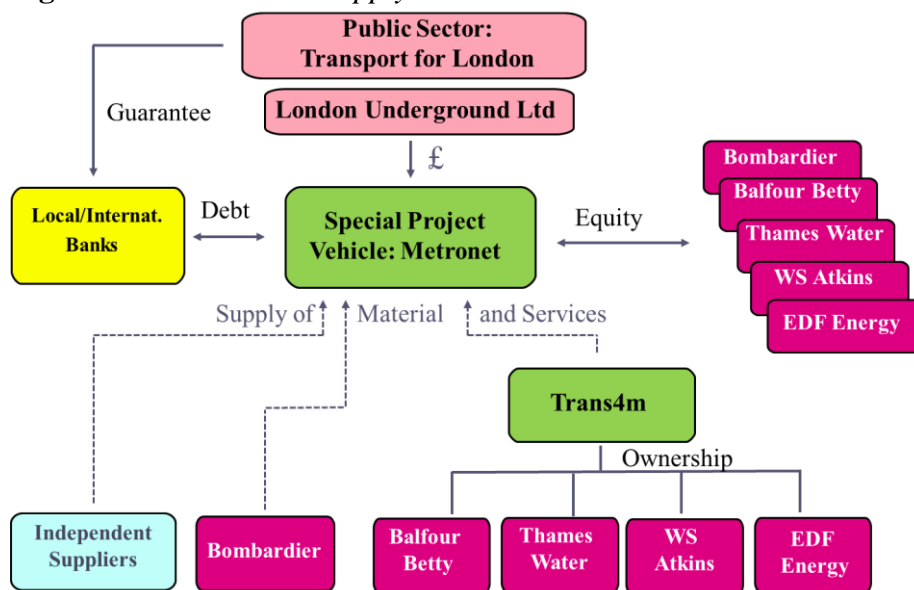
Source: Author.

Neglected Monitoring

Moreover, bank loans were guaranteed by the government. In the beginning, the amount was set at 90% of the amount lent to Metronet; later, the guarantee was increased to 95%. Thus, lenders had no incentive to rigorously monitor Metronet's financial behaviour.

Inefficient Approval Process

On the other hand, cost overruns occurred because the effects of delayed construction permits and work inspections were not clearly enough allocated to the project partners. Although the contracts obliged Metronet to submit individual construction plans and committed the public planning entities (London Underground Ltd.) to fast-track approval processes, overlapping authorities and a multitude of decision makers significantly delayed construction works.

Over-Optimistic Cash Flow Forecast

Ideally, public investment starts with the identification of the need, a careful demand study revealing the demand's willingness to pay, and a thorough estimation of positive as well as negative externalities. However, overestimations of future demand seem to be common. The "optimism bias" may occur in public planning institutions first; but also private companies in search for new projects may tend to be overly optimistic. Whereas Trujillo et al. (2002) argued that privatization – and so PPP models – increase the number of players and, thus, scope for "strategic" behaviour, Flyvberg (2014) claimed that "private investors place their own funds at risk; therefore, funds and banks can be observed to not

automatically accept at face value the cost and revenue forecasts of project managers and promoters" (p. 16). The cases analyzed in this study as well as the undertaken expert interviews show that this "optimism bias" may occur unless tackled with non-traditional risk allocation.

Substitution Processes in Traditional Toll Systems

The German Herrentunnel may serve as example for projects in which the public planning authorities overestimate future user numbers and transfer the risk to the private PPP partners.

As the tunnel replaced an outdated toll-free bascule bridge, cash flow forecasts were based on a modified extrapolation of already existing traffic. However, planners failed to estimate potential changes in user behaviour. Instead of paying the toll for the new 866-meter-tunnel, many users opted for a 5 km longer toll-free highway accepting a few minutes more in travelling time.

The project's participants agreed on a BOT scheme, so that a large part of the risks, including the traffic demand risk, was transferred to the SPV. In deviation from figure 1, the SPV was exclusively owned by the two companies in charge of construction ("contractors"). Construction was completed on time in 2005. Since then, the project's success has depended nearly exclusively on the toll revenues collected at a toll station in front of the tunnel.

Based on an estimation of 40,000 vehicles using the tunnel daily, the project's objective was to reach an Equity IRR of approximately 12%.

Upon completion of the works, less than 60% of the traffic on the former bridge used the tunnel whereas traffic on the nearby toll-free highway increased correspondingly. In 2015, the number of daily traffic was slightly above 16,000. In a nutshell, the project generated enough revenues to pay interest rates on loans but did not produce significant returns to the capital owners. Therefore, toll rates were increased. However, this boosted the incentive to use the toll-free alternative. As a result, the SPV ran losses from year to year, the project needed, and probably still needs, to be re-negotiated. As the main result of a first re-negotiation round, the operation time was extended to 40 instead of the originally agreed 30 years.

Similar substitution processes occurred in Mexican motorway projects. In the 1990s, the Tribasa group had taken over two already existing motorways. From that moment on, road tolls were charged at toll stations which caused an unforeseen decline in user figures – in particular during the Tequila Crisis in 1994/95. It took around six years until traffic figures re-covered to the pre-crisis level. While the crisis decreased traffic volumes in total, users also switched to nearby toll-free roads accepting 20 minutes of additional travelling time in the case of the 47km-Armería-Manzanillo motorway or 48 minutes in the case of the Ecatepec-Pirámides sector.

Shadow Tolls and Availability Models

Based on the rather disappointing experience with substitution processes, new PPP concepts in road transportation were developed. More recent PPP projects are

based on availability and road quality. The World Bank's definition of availability-based payments includes shadow toll systems (World Bank 2018b). One example for such a model is the German A8 motorway section Augsburg-Munich. The 53km section is run by the SPV "autobahnplus A8 GmbH" which itself was formed by a consortium of a Dutch and a Luxembourg-based infrastructure company and two European construction companies. In Germany, trucks pay tolls per km whereas passenger vehicles use motorways toll-free.[1] The truck toll is set by law and collected electronically based on GPS and GSM transmission. Revenues are transferred to the public budget daily. This system applies to all motorways, regardless of public or private ownership. "autobahnplus A8 GmbH" is remunerated by the government based on the collected truck toll combined with an availability component. So, if excessive repair work reduces the availability of lanes more than expected in the maintenance forecasts, the public authority has the right to reduce the payment of the "shadow toll" and may even charge penalties. Penalties may also be charged if the motorway's quality does not meet the requirements set in the specifications. Therefore, an independent engineering company regularly assesses the motorway's quality. The risk of declining traffic demand is low as toll-free highways are crowded and partly closed for transit truck traffic.

As an alternative model, the SPV may be paid by the government independent from traffic numbers, based exclusively on availability and quality. Thus, the risk of overestimated traffic figures is entirely taken by the government.

Actually, the "Tribasa" PPPs in Mexico combined such an availability and quality component with the traditional toll system. The quality component with its constant revenue flows may have saved the SPV from larger financial stress when traffic figures decreased and stayed low in the 1990s.

Subsidies and Minimum Traffic Fee

Other arrangements use direct subsidies and minimum traffic fees. The latter are calculated on the basis of a guaranteed number of users, regardless of the actual utilization. Thus, they resemble the traditional Take or Pay" agreements in the energy sector.

The analysed case in Chile combines direct subsidies with a minimum traffic guarantee. As quid pro quo, the SPV must transfer 50% of the revenues to the government if the Equity IRR exceeds 15% (Elqui Abertis 2015: 10).

Externality and Freerider Problem

Toll systems work only if non-payers can be excluded from consumption at reasonable cost. Otherwise, freerider problems occur. They are of particular relevance as soon as urban road transportation and waste collection are considered. Excludability in public bus and tram systems can be enforced only with high control costs, for example through video surveillance or access controls. If cities

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[1]A toll for passenger cars is planned for the future. This would be charged in form of a yearly flat rate for residents and 10-day rates for transit traffic.

wish to attract car users to the public transportation system in order to fight the daily traffic collapse, opportunity costs of enforcing ticket purchasing may be too high. Even more, it would not make sense to exclude non-paying consumers from the use of waste collection systems. Experience in countries where waste collection fees were allocated to the actual quantity of waste is not promising. Substitution in this context means that users may dispose waste illegally, thus transforming public places to waste deposits. Instead of establishing PPP projects in these sectors governments may rather opt for traditional concession models.

The issue of quantity-related remuneration also played a significant role in the waste collection system of Greater Buenos Aires. Concession holders used to be paid according to the quantity of waste collected. In 2005, payment was changed to a system in which the cleanness of the streets became an important determinant of payment. Similar to the models in traffic PPP, frustration about inadequate risk allocation between the public and the private sector led to the new remuneration system in the concession models of waste collection. On the one hand, the public sector negotiated for modifications as the previous quantity-related system had been abused by the concession holders: as quantity was measured in weight, they watered the collected waste in order to increase weight and remuneration. On the other hand, the private concession holders complained that the government had opened waste collection to the informal sector which reduced the quantity they could collect (Clarín 2003).

Inflation and Interest Rate

Most of the PPP projects include provisions protecting private investors from negative effects of inflation.

The projects in Mexico provide the SPV with the right to increase toll rates without further government approval as soon as the official inflation rate exceeds 5%. In case of lower inflation rates, the SPV may apply for higher toll rates to be approved by the government.

Chile introduced the Unidad de Fomento (UF) in 1967. The UF was first used as a shadow currency to revalue international secured loans and interest rates according to variations in the country's inflation. Nowadays, the UF is commonly used for calculating long-term domestic contracts in real terms and for real estate prices. The UF represents an inflation-adjusted peso value and is calculated on a daily basis.

In the London Metronet case, the Infrastructure Service Charge paid to the SPV had to be increased if the actual inflation rate exceeded the forecasted 2.5% by at least one percentage point.[2]

Thus, the inflation risk is typically assumed by the public sector. All interview partners pointed out that this is of great importance in Latin America as all countries experienced high and fluctuating rates of inflation in the not so distant past, and nobody would exclude the possibility of future periods with higher inflation rates.

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[2]In the low-inflation environment of Germany, such an indexation is not common. In particular, availability models exclude such price escalator clauses (Altmüller 2012).

Interest rate risks are related to lending. "Project finance debt tends to be fixed rate. This helps provide a foreseeable, or at least somewhat stable, repayment profile over time to reduce fluctuations in the cost of infrastructure services." (World Bank 2018c). If floating rates are used, hedging is necessary. Two of the interviewed experts pointed out that the related risks are higher in countries with higher inflation rates, such as Argentina.

Currency and Exchange Rate

Closely related to the inflation risk are currency and exchange rate risks. This risk is particularly virulent if capital infusion and debt are in foreign currency. "The tension between local and foreign currency debt is often a question of balancing fixed rate debt with foreign exchange rate risk" (World Bank 2018c). The interviewed experts point out that the exchange rate risks are to be borne by the government. One expert states that the government in Argentina should collect the tolls in pesos and pay the concession holders in dollars.

Implications for PPP Projects in Argentina

In the following, the results of our analysis are used to discuss implications for PPP projects in Argentina. We first focus on the macro level, and then later discuss meso and micro level aspects.

Macro Level

There is a consensus in all expert interviews that the macro level risks of political instability, expropriation, changes in the legal environment, social unrest, inflation, and manipulated exchange rates should be allocated to the public sector. The current government in Argentina follows this idea. Law 27328 on PPP provides the framework for such protection of private investors from changes in the legal environment. However, Argentina's recent history – in particular the expropriation of YPF[3], the handling of courts' decisions in the context of the "vulture funds" episode (Guzman and Stiglitz 2016)[4], and the high number of ICSID cases Argentina lost during the Kirchner governments[5] – shows that governments not always comply with the "pacta sunt servanda" principle.

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[3]YPF (Yacimientos Petrolíferos Fiscales) is a vertically integrated Argentine energy company, formerly owned by Repsol (Spain) and re-nationalised in 2012/13.

[4]In 2001, Argentina defaulted on $132bn in loans during its financial crisis. Argentina re-structured its debt in two rounds of negotiations. 93% of the creditors accepted the deal. A small minority who had acquired the bonds with huge discounts, refused the deal and were named "holdouts" or "vulture funds". As Argentina first was not able and later not willing to pay the holdouts, a more than decade-long legal dispute kept Argentina isolated from international investment flows. As the government bonds were subject to New York law and the U.S., Argentina had to accept that the dispute was set by U.S. courts.

[5] ICSID is the world's leading institution devoted to international investment dispute settlement initiated and administered by the World Bank.

Moreover, political manipulations of the exchange rate which not only jeopardised Argentina's competitiveness but also stood for "clandestine expropriations" of foreign capital (Archimbal 2015), and obvious misconduct in calculating inflation rates ruined the country's attractiveness for foreign investors (Piazolo 2015). So even if international investors may trust in the new government, PPP contracts with durations of up to 30 years may be at risk in case of future changes in government.

In order to mitigate the risk of national court systems being politically forced to bend the law, contracts relegate law disputes to foreign or international arbitration courts. Argentina's new law allows for such arbitration and states basic conditions for such relegation. However, public discussion in Argentina's context with the "holdouts" and in Germany in the context of the eventually failed TTIP negotiations show that such relegation is increasingly questioned (BBC 2016). Thus, it seems to be crucial that only such arbitration courts are chosen that still seem to be accepted as "neutral" – such as the World Bank's ICSID.

Private investment may reduce the degree of corruption. One simple instrument is that PPP projects require a higher degree of transparency. Capital investors require more documentation of the underlying user and cash flow forecasts than needed in traditional government procurement. Law 27328 includes an own section on anti-corruption rules and states several requirements for documentation. Nevertheless, if Argentina wishes to attract international capital for PPPs, the country needs success in fighting corruption.

Moreover, the new government lifted the exchange control system introduced in 2011. This system impeded the repatriation of profits as the exchange of peso revenues into hard currencies had to be approved by government officials.

In addition, more fiscal and economic stability would facilitate international investment. As it could be shown, low inflation rates and indexation systems which stabilise the real value of PPP revenues are helpful. Even though the government managed to lower inflation significantly from around 40% in 2016, the current level of more than 20% is still high and provokes substantial risk premiums to be paid to investors. The recent call for IMF assistance loans and the resulting 50%-depreciation of the peso in the second and third quarter of 2018 will rather increase than decrease Argentina's macro level risks.

Meso Level

As long as the macroeconomic environment is characterised by fiscal deficits and significant inflation rates, indexation rules are essential. Concession agreements signed in 2018 stipulate such indexation. For example, the Abertis group, headquartered in Spain, operating motorways in Argentina, received the right to increase motorway tolls twice a year, corresponding to the "Coeficiente de Estabilización de Referencia", a daily calculation of real prices based on the consumer price index (Sanguinetti 2018). This index was initially established in 2002 when in the context of Argentina's financial crisis dollar-denominated credits and debts were transferred into pesos ("pesificación") and the latter devalued dramatically. Later, price indexation was suspended and substituted by mutual

negotiations between companies and government. The re-established coefficient mechanism seems to be similar to the indexation system in Chile and quite different from the contractual rules applied in Mexico. Interestingly enough, even though all experts stressed the importance of inflation and also exchange rate indexation, this coefficient was not mentioned by any of the interviewed experts.

Besides indexation, PPP contracts must allocate risks related to user and cash flow forecasts appropriately. Here also, Argentina seems to follow the approach of Chile. Article 9k of Law 27328 explicitly refers to minimum revenues which may be guaranteed. The law also opens the possibility of re-negotiating the project duration, a common means of risk reduction for the investors – for example applied in Germany's Herrentunnel and the described Mexican projects. The expert interviews revealed the high risk of over-optimistic user forecasts. They pointed out that the projects need to include the flexibility of prolonging the contract duration in case of lower user numbers. They stated as minimum requirement that the government should provide the SPV with guaranteed minimum revenue, for example in form of subsidies based on a minimum user number. This guaranteed revenue should at least enable the SPV to pay the interest rates on debt (loans). On the other hand, the government should participate in excess revenues created by user numbers higher than projected. However, an increase in demand may also create higher maintenance costs. This aspect must be considered in the negotiations.

Some of the experts critically discussed the imponderables that defy a scientific, reproducible, comprehensive forecast. Thus, they would not apply PPP models with remuneration based on user numbers to innovative projects with unknown and insecure future. In such cases, remuneration models based on availability and quality manage the risk more appropriately. Moreover, projects with significant positive externalities should include a lump sum component in the SPV's remuneration. In general, PPP projects are considered as superior to traditional public projects only if planning, construction and operations resemble each other so that a certain "standard" approach can be applied.

As the above analysis showed, substitution processes between toll roads and toll-free highways jeopardised the projects' success. It is strongly recommended to analyse the possibility of such substitution processes in the planning process. This applies in particular to road construction, bridges and tunnels, where individual traffic may by-pass the toll. However, one might also consider the substitution between different forms of traffic. It needs to be analysed how, for example, new underground lines may deviate or even create traffic.[6]

Substitution and free rider behaviour seem to be significant in case of waste disposal and recycling. In particular, as the principle of excludability for non-paying customers cannot and should not be applied, PPP projects are unlikely to be successful – even more in the case of Argentina where parts of waste collection are in the hands of the informal economy. Expert interviews revealed the difficulty for governments to meet the different targets of waste collection and transportation, final waste disposal, and recycling. While theoretically PPP models

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[6]The availability of train systems may significantly increase commuter flows so that road traffic to and from the railway stations rises.

may be used for building and operating recycling plants, the risk that an inefficient waste collection system fails to deliver recyclable solid waste separate from organic residuals is so high that neither the public nor private investors are currently able to cover it. Therefore, other, more innovative, models need to be developed in this sector.

Cash flow forecasts also include costs. The Metronet case clearly shows that excessive government guarantees may cause harm. As project costs are generally more under control of the private sector, the risk of cost overruns should be allocated to the private project partners. Government guarantees should be limited to those cost overruns clearly caused by government actions, such as unjustified delays in project approvals. In addition, the lesson of the Metronet case is that SPVs owned exclusively by the construction and service providers bear the inherent risk of inefficient service contracts between provider and SPV. Therefore, it is recommendable to include additional sponsors as SPV equity owners. As they would monitor the efficiency of the entire supply chain, they form a built-in control of the SPV procurement behaviour. If this is not feasible, government must insist on contractual arrangements with independent engineering and consulting companies. For example, the German A8 project would not be possible without an independent partner who assesses availability and quality of the motorway. The expression "independent" must be stressed. This company must not have any political, cultural or economic relationship to either the public sector or the private investors.

Lenders play an important control function unless their risk is (nearly) completely mitigated by public guarantees. However, increased risk of default taken by the lenders and international credit insurance agencies results in risk premiums. Argentina may have to live with this trade-off. Probably, the participation of World Bank institutions and development banks lowers the risk premium charged by private lenders as they know that governments handle such projects with priority.

Micro Level

Appropriate risk allocation and cash flow analysis requires experience and experts. All project partners need profound knowledge of the legal, financial, and organizational specificities of PPP projects. The impression gained from analysing cases from different countries and expert interviews is that multinational companies, financial institutions and service providers learned in a 30-year process of "trial and error". In contrast, Argentina's public sector is rather unexperienced in designing PPP projects. This may also apply to local banks and the juridical system. Therefore, it is indispensable that Argentina's public sector acquires knowledge before entering into negotiations. Although Argentina shows substantial progress in forming the necessary competence centre – the already mentioned sub-secretary on PPP – the process of institution building and training requires time. Moreover, small-scale projects can be organised with competitive bidding whereas large, complex projects require negotiations, adaptation, and re-negotiations (Estache and Saussier 2014). Therefore, it is recommendable that the project

partners from Argentina – public as well as private – use the expertise of international and independent experts in form of consultants. Otherwise, the scenario feared by one of the interviewees would come true: "At least in the first two or three projects, Argentina will pay dearly".

Risk allocation at the micro level plays a crucial role, as it basically deals with the fundamental nature of PPP arrangements. Designing an efficient arrangement is a prerequisite for achieving higher value for money than traditional procurement. Micro level risks like premature contract termination or internal conflicts of interest have the potential to ruin entire multibillion projects. Micro level risks should be principally shared between the public and private sector. This is reasonable as both parties rely on the smooth function of the contract throughout the entire projects life cycle to achieve the required rate of return and value for money.

Peru's PPP underground metro project Lima Linea 2 efficiently manages the risk of premature contract termination as well as the risk of lack of dedication by implementing a performance guarantee, named *fiel cumplimiento*. Here the private sector has to deposit significant amounts that will be paid back over the project's lifecycle. In the event of ruthless premature contract termination or a lack of dedication to perform efficiently, the public authority has the leverage to retain the deposits. On the other hand, the contract regulates that if premature contract termination caused by unreasonable government action, the private sector has to be compensated for all incurred expenses and losses. Furthermore, the performance guarantee deposits also manage the risk of frequent changes in stakeholders and contracting parties. A frequent change in stakeholders, for example replacing the original competent construction company with an incompetent and inefficient one, would substantially jeopardise the performance of the project. Deposits lower that risk. For instance, if the original contractor of the SPV wants to leave the PPP contract, he only might be allowed to do so, if he finds an adequate replacement that also pays the entire amount of the deposit that was borne by the original constructor.

While the investment environment in Argentina is on a rise, interviews show that there is still a considerable low level of investor confidence. Hence, high deposits might discourage investors to engage themselves with long-term PPP contracts. Nevertheless, the success of PPP projects depends critically on the right incentivization. The dedication of all participants to perform in the best possible way is absolutely critical to the project's success. Thus, the responsible government authorities have to assess whether incentives can be set at acceptable risk premiums or not. It is recommendable to switch to other procurement methods if one of the two, incentives or risk premiums, is inefficient.

Conclusions

This paper analysed conditions for PPP projects in Argentina. As the country was isolated from international capital markets for around 15 years, these conditions differ from other countries. At the macro level, Argentina still suffers

from investors' confidence in the country's political and economic stability. The need to rebuild trust is obvious. The newest development in Argentina's macroeconomic environment, namely the call for IMF assistance loans and the resulting 50%-depreciation of the peso in the second and third quarter of 2018, will jeopardise the government's efforts to increase financial markets' confidence in Argentina's capability to keep sovereign risk low. Meso and micro level risks were discussed by analysing PPP cases from Europe and Latin America, evaluating the new legal environment in Argentina, and interviewing 22 experts. The analysis was mainly based on PPP projects in the transportation sector. Thus, more research is needed in other sectors, in particular in the energy and water supply.

Considering the existing asymmetry in experience between Argentina's public sector and international private investors, and the high degree of uncertainty about Argentina's future political, social, and economic stability, our recommendation is that the country starts with PPP arrangements that are rather small-scale and standardised projects. Argentina should, however, restrain from PPP as a model for innovative, highly complex and rather unknown projects. Moreover, it is highly recommendable to include the expertise of the World Bank and the Inter-American Bank in as many projects as possible.

Acknowledgments

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How Millennials' Personality Traits Influence Their Eco-Fashion Purchase Behavior

By Wei Fu[*] & Bei chen Liang[†]

This study examined how millennials' personality traits (i.e., ecological consciousness and social consciousness) influence their behavior outcomes (i.e., purchase intention and willingness to pay more) in the eco-fashion context by applying attribution theory. This study also tested the moderating effect of need for variety on the relationship between millennials' personality traits and their behavior outcomes. A focus group including 9 participants and an online questionnaire involving 141 participants were used to accomplish the purpose of the study. A confirmatory factor analysis (CFA) was used to test how well the measured variables represented the various constructs, and structural equation modeling (SEM) was used to test the hierarchical relationships among millennials' personality traits and their behavior outcomes. The results indicated that millennials' ecological consciousness and social consciousness positively influenced their purchase intention and willingness to pay more for eco-fashion. Furthermore, the results supported the existence of a moderating effect of millennials' need for variety on the relationship between social consciousness and willingness to pay more. Specifically, when millennials had a higher need for variety, their social consciousness had a stronger positive effect on willingness to pay more for eco-fashion. This study extends previous work involving attribution theory by affirming that millennials' eco-fashion consumption behavior is influenced by their personality traits such as ecological consciousness and social consciousness. In addition, this study has managerial implications for apparel manufacturers, designers, and retailers and offers suggestions for educators in fashion marketing.

Keywords: *Millennials' Personality Traits, Ecological Consciousness, Social Consciousness, Eco-fashion, Attribution Theory, Purchase Intention, Willingness to pay More.*

Introduction

The U.S. fashion and apparel industry is a $12 billion business, and the average American family spends $1,700 on clothes annually (BLS Data 2018). However, the fashion and apparel industry is also the second largest polluter in the world (Conca 2015). The carbon footprint created by the fashion and apparel industry is significantly growing every day, and the fashion industry has recently begun to launch eco-fashion to promote ethical fashion and to achieve sustainable growth in revenue and in market share (Choi et al. 2011). Eco-fashion produced in an ethical and ecological production system is fashion clothing designed for a long lifetime of use, and it causes few or no negative environmental or social impacts (Niinimaki 2010). According to GFK (Germany's largest market research

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organization), more than half (56%) of US consumers are willing to pay extra for eco-friendly products and prefer to see green advertisement used to promote these products (Gibbs and Hungerford 2016). Unfortunately, eco-fashion products are still a niche market because of the perceived high cost and the lack of awareness of the benefits of eco-friendly products (Speier 2016). Therefore, what the proper target market of eco-fashion might be and how to engage those customers in eco-fashion acquisition on a consistent basis are important questions of interest to eco-fashion designers, manufacturers, and retailers.

Millennials are individuals born between 1981 and 1999; with a population of 80 million and with $600 billion in annual spending, they are the largest generation in the US, and they account for 1/3 of all consumer spending (Kestenbaum 2017). They have great purchasing power and are the most powerful consumer group in the marketplace. According to the Boston Consulting Group (BCG), 48% of millennials purchase eco-friendly products in an effort to protect our planet, and they do what they can to live a more sustainable lifestyle (Kibbe 2014). Also, millennials are young whose ages were between 18 and 23, and they are in a developmental stage in which lasting beliefs and mindsets are formed (Brosdahl and Carpenter 2011). Their beliefs about and trust in eco-fashion are relatively easily developed at this stage. In this sense, millennials may be an ideal target market for eco-fashion, and eco-fashion designers, manufacturers, and retailers must think about marketing strategies to engage them in eco-fashion purchasing in ways that are relevant to their particular characteristics.

The purpose of this study is to develop an understanding of millennials' consumption behavior with regard to eco-fashion. Specifically, what personality traits of millennials have significant effects on their purchase intention regarding eco-fashion and willingness to pay more for it? What are primary factors moderating the relationship between millennials' personality traits and their buying behavior? To address this issue, attribution theory (AT) was adopted in this study. AT was originally derived from Heider (1958), who believed that people tend to see cause and effect relationships between different events or things. Jones and Davis (1965) further argued that a person's behavior matches or corresponds with her or his personality traits. Specifically, attribution theory shows how an individual explains events as she does and how the individual's past experience influences her present purchase decision (Hammerl et al. 2016). This study examines how certain of the millennials' personality traits, i.e. ecological consciousness and social consciousness, influence their behavior outcomes, i.e. purchase intention and willingness to pay more, in the eco-fashion context. This study also tests whether the need for variety can be an important moderator increasing millennials' engagement in eco-fashion acquisition. The conceptual model is shown in Figure 1.

Figure 1. *Conceptual Model*
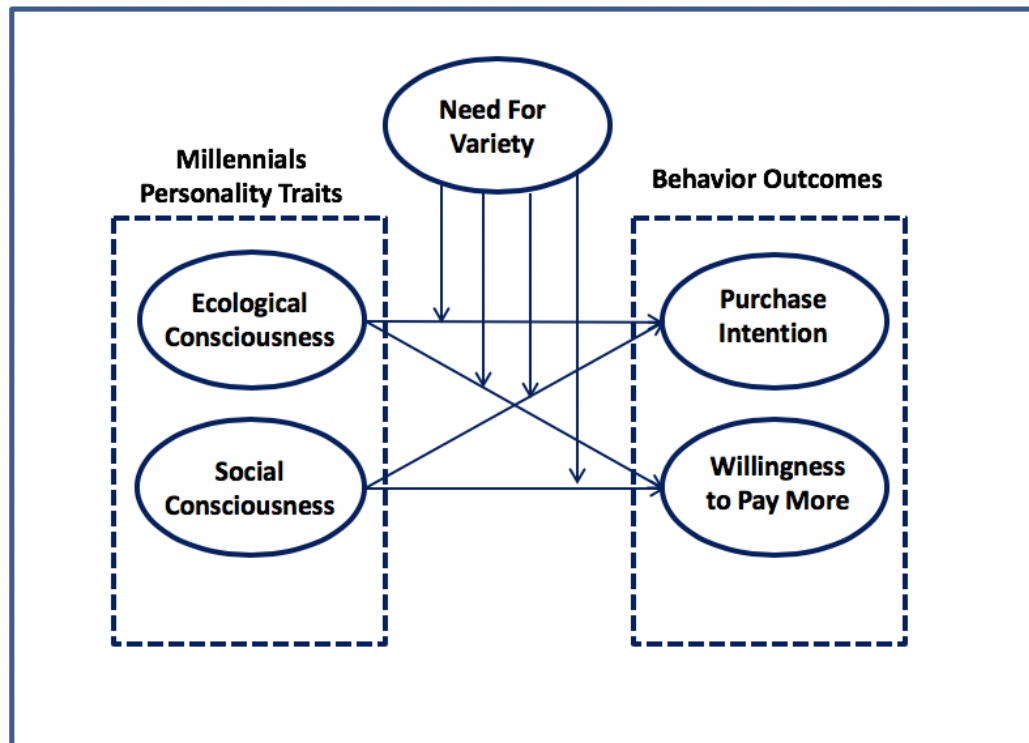
Literature Review

Millennials, born between 1981 and 1999, have been described as the generation that is most aware of a variety of social problems such as child labor, low wages, and problematic working environments, and they are willing to correct those wrongs (Lu et al. 2013). Currently, millennials spend $600 billion annually, and the amount of money millennials are expected to spend annually in the next five years is more than 3 times the amount they are currently spending (Kestenbaum 2017). Products with eco-friendly features are among the top 5 categories in which millennials are willing to pay more (Gibbs and Hungerford 2016). Further, millennials are socially and environmentally conscious; they are world-minded and have greater awareness of sustainability issues (Jankovska et al. 2015). Therefore, it is crucial to target millennials for the purpose of establishing in them long-term positive attitudes and behaviors related to eco-friendly products (Kang et al. 2013).

According to Heider (1958), a person's behavior can be explained in terms of two kinds of attributions: internal attributions, i.e. a person acts in certain way because of her personality traits, motives, or beliefs and external attributions, i.e. a person behaves in certain ways because of the situation in which she finds herself. In this study, both internal and external attributions can be applied to explain millennials' eco-fashion purchase behavior. Millennials' purchase intention and willingness to pay more for eco-fashion are attributed to certain aspects of their personality traits, i.e. ecological consciousness and social consciousness, and their

clothing purchase behavior can also be influenced by the availability of new or different products. Specifically, millennials may have a tendency to seek variation in hedonic products such as music, leisure activities, and fashion products (Ratner et al. 1999). For them, a greater desire for variety may have stronger influence on the relationship between their personality traits and behavior outcomes.

The Influence of Ecological Consciousness on Purchase Intention and Willingness to Pay More

Ecological consciousness is an awareness of the importance of being respectful toward living things in the natural world such as plants, trees, animals, and insects; it thus reflects the harmony that should exist between humans and nature (Alwitt and Berger 1993). Ecologically conscious individuals such as millennials tend to have strong concerns about the environment, the natural world, and social issues; they care about the environment, read eco-labels, and show a strong sense of environmental concern (Alsmadi 2012). Environmental concern is positively related to environmentally conscious consumers' recycling behavior, willingness to pay higher prices for high quality products, and green buying behavior (Sharma and Bansal 2013). Those who have high levels of environmental consciousness respect the living things in the natural world and are willing to purchase products and services that have a positive impact on the environment (Chang 2012). To satisfy their environmental concerns and follow ethical standards, ecologically conscious individuals tend to purchase eco-products and alter their behaviors in accordance with their green beliefs (Cho et al. 2013). Therefore,

> H1a: Millennials' ecological consciousness will positively influence their purchase intention regarding eco-fashion.
> H1b: Millennials' ecological consciousness will positively influence their willingness to pay more for eco-fashion.

The Influence of Social Consciousness on Purchase Intention and Willingness to Pay More

Social consciousness, also known as social awareness, is the consciousness shared within a society concerning social situations (Cooley 1992). Indivi-duals' awareness and sense of responsibility regarding environmental and social issues were found to have a positive impact on their green purchasing behavior, e.g. socially conscious consumers like millennials care about corporate social responsibility and make purchases from organizations that promote fair-trade and socially responsible products (Bina 2017). Socially conscious individuals are willing to engage in conscious processing to think about ways to improve the quality of life in society and enhance others' lives by purchasing and paying more for eco-friendly products (Brooker 1976). Eco-friendly purchase behavior is a type of socially responsible behavior. An individual is socially concerned when she takes into account the public consequences of her private consumption and

attempts to use her purchasing power to create social change (Kozar and Hiller-Connel 2013). Therefore,

> H2a: Millennials' social consciousness will positively influence their purchase intention regarding eco-fashion.
>
> H2b: Millennials' social consciousness will positively influence their willingness to pay more for eco-fashion.

The Moderating Effect of Need for Variety

Need for variety is the personal desire to adopt new styles and to maintain differentiation (Kim et al. 2002). Managers and retailers view a consumer's choosing a different brand or a different product as a process involving a search for variety because consumers see the new product to be different from former ones. High variety seekers are very curious to try something that is different, unfamiliar, and new, and they are more likely to perceive greater variety in their choices; low variety seekers like to stick with products that they usually purchase (Baumgartner and Steenkamp 1996).

Need for variety is related to hedonic shopping for items such as eco-fashion clothing; this notion relates to a person's tendency to switch away from a choice made on a previous occasion (Ratner et al. 1999). Specifically, individuals with a high need for variety will be more likely to interpret their personality-related behavior as high involvement purchasing, while individuals with a low need for variety will have less desire for their belongings to appear different and unique from those of other individuals, and this personal characteristic will subsequently undermine their personality-related willingness to pay more for and intention to purchase eco-fashion products (Baumgartner 2002). Therefore,

> H3a: Millennials' need for variety will moderate the relationship between ecological consciousness and purchase intention. When they have a higher need for variety, millennials' ecological consciousness will have a stronger positive effect on purchase intention.
>
> H3b: Millennials' need for variety will moderate the relationship between ecological consciousness and willingness to pay more. When they have a higher need for variety, millennials' ecological consciousness will have a stronger positive effect on willingness to pay more.
>
> H3c: Millennials' need for variety will moderate the relationship between social consciousness and purchase intention. When they have a higher need for variety, millennials' social consciousness will have a stronger positive effect on purchase intention.
>
> H3d: Millennials' need for variety will moderate the relationship between social consciousness and willingness to pay more. When they have a higher need for variety, millennials' social consciousness will have a stronger positive effect on willingness to pay more.

Methodology

This study used both qualitative and quantitative techniques to accomplish its purpose. Specifically, a focus group interview was conducted to select appropriate eco-fashion clothing images for the online survey, and an online questionnaire using a survey tool website (Qualtrics) was used to collect quantitative data to test the hierarchical relationships among millennials' personality traits and their behavior outcomes. Data analysis was conducted using SPSS 20 for descriptive information and AMOS 20 for testing the measurement model and the structural model. With AMOS 20, a confirmatory factor analysis (CFA) was used to test how well the measured variables represented the various constructs. Structural equation modeling (SEM) was used to examine the causal relationships among all latent variables.

Procedure and Sample

To decide the eco-fashion visual images for the study, eco-fashion images from websites were identified by using key words such as "eco", "green", "ethical", "natural", "organic", and "sustainable". Then, a number of male and female eco-fashion images in a variety of designs and styles including shirts, T-shirts, sweaters, fleece clothing, jackets, and jeans were chosen. A volunteer focus group interview was conducted and the participants were nine undergraduate students majoring in consumer sciences in a southeastern university in the United States. The moderator of the focus group was a professor of Retail, Hospitality, and Tourism Management Department; and the assistant moderator was a PhD student in the Department of Retail, Hospitality, and Tourism Management. At the beginning of the group discussion, the researcher provided the definition of eco-fashion, which is provided in the introduction of this study. The participants discussed their ideas, thoughts, and feelings toward eco-fashion images based on popular style and color, sustainable design (organic cotton, made in USA, low impact dyes, fair trade, and soul flower originals), and the age range in relation to the eco-fashion images. Based on the focus group discussion, a total of sixteen (eight female and eight male) eco-fashion images were selected for the online survey, and the age range of the survey sample was decided as 18-55.

The questionnaire was developed using a survey tool website (Qualtrics), and the online survey link was sent to the online consumer panel, whose members were recruited by a marketing research firm in California. According to Kline (2005), a sample size between 100 and 200 for SEM is medium. Therefore, a total of 141 respondents constituted the sample. The demographic information shows that more than half of the respondents were Caucasians (60.3%), and about one-fourth of millennials were in the age groups of 19–26 (23.9%) and 27–35 (60.9%). As for annual household income, the largest group earned $40,000 to $59,999 (26.2%), followed by less than $20,000 (22.7%) and $20,000 to $39,999 (17.0%).

Measures

All measures were adapted from previous studies and were rated on a 7-point Likert-type scale ranging from "strongly disagree" (1) to "strongly agree" (7). The scale items for need for variety were adapted from Van-Trijp et al. (1996); those for ecological consciousness from Peloza et al. (2013); those for social consciousness from Wagner et al. (2009); those for purchase intention from Rodgers (2003); and those for willingness to pay more from Shen et al. (2012).

Results

The results indicate that millennials' personality traits, i.e. ecological consciousness and social consciousness) positively influence their behavior outcomes, i.e. purchase intention and willingness to pay more for eco-fashion. Also, millennials' need for variety moderates the relationship between social consciousness and willingness to pay more.

Measurement Model

The measurement model was comprised of 4 constructs measured by 14 items. Factor loadings of all items ranged from 0.651 to 0.932, and all paths were significant ($p<0.001$). The composite reliabilities of the constructs ranged from 0.836 to 0.957, meeting the minimum criterion of 0.70 (Nunnally and Bernstein 1994). The factor loadings and composite reliabilities of the measurement model are provided in Table 1. The fit statistics of the measurement model were $\chi^2(71) = 131.384$; $\chi^2/df = 1.85$; CFI = 0.964; TLI = 0.953; and RMSEA = 0.078. Therefore, the model was found to fit the data very well, and all measures were reliable.

Once reliabilities had been established, convergent and discriminant validity were assessed. Convergent validity was supported by the factor loadings ranging from 0.651 to 0.932 ($p<.001$), the composite reliabilities exceeding the recommended level of .70, and average variance extracted (AVE) values greater than the recommended threshold value of .50 (Hair 2011). Discriminant validity was also confirmed by the finding that the AVEs exceeded the squared correlation coefficients, i.e. shared variance, between all possible pairs of constructs (Fornell and Larcker 1981) (Table 2).

Table 1. *The Measures*

Variable	Measurement Items	Factor Loading	Composite Reliability
Ecological Consciousness	When I have a choice between two equal products, I always purchase the one less harmful to other people and the environment.	0.778	0.896
	I try only to buy products that can be recycled.	0.877	
	I tend not to buy household products that harm the environment.	0.780	
	I make every effort to buy paper products made from recycled paper.	0.866	
Social Consciousness	I am a socially responsible person.	0.685	0.836
	I am concerned to improve the well-being of society.	0.891	
	I often find myself thinking about ethical issues.	0.755	
	It is never necessary to sacrifice the welfare of others.	0.651	
Purchase Intention	I would like to make a purchase toward eco-fashion.	0.958	0.957
	I would like to have more information about eco-fashion	0.929	
	I'm interested in buying eco-fashion	0.927	
Willing to Pay More	I am willing to pay a premium for eco-fashion.	0.920	0.915
	I would rather spend my money on eco-fashion clothes more than anything else.	0.798	
	I prefer to purchase eco-fashion clothing even if it is somewhat more expensive.	0.932	

Table 2. *Construct Validity of the Measurement Model (AVE)*

Construct	1	2	3	4
1. Ecological Consciousness	**0.610**			
2. Social Consciousness	0.552	**0.339**		
3. Purchase Intention	0.524	0.436	**0.880**	
4. Willingness to Pay More	0.500	0.399	0.616	**0.784**

Notes: Diagonal entries show the average variance extracted by the construct. Off-diagonal entries represent the squared variance shared (squared correlation) between constructs.

Structural Model

A structural model was used to examine the causal relationships among all latent variables in the conceptual model. The fit indices of the structural model were $\chi^2(71)=131.384$, $\chi^2/df=1.859$, CFI=0.964, TLI=0.953, and RMSEA=0.078. As illustra-ted in Table 3, millennials' ecological consciousness positively influenced their purchase intention (H1a) and willingness to pay more (H1b); millennials' social consciousness positively influenced their purchase intention (H2a) and willingness to pay more (H2b).

Table 3. *Hypotheses Testing Results*

Hypo-thesis	Structural Path	Standardized Regression Weight	S.E.	t-Value	Result
H1a	Ecological Consciousness → Purchase Intention	0.520	0.144	4.483***	Supported
H1b	Ecological Consciousness → Willingness to Pay More	0.529	0.166	4.350***	Supported
H2a	Social Consciousness → Purchase Intention	0.274	0.146	2.436*	Supported
H2b	Social Consciousness → Willingness to Pay More	0.239	0.1689	2.021*	Supported

*$p < .05$, **$p < .01$, ***$p < .001$

The Moderating Role of Need for Variety

Table 4. *Moderating Effects of NFV*

Hypo-thesis	Structural Path	Standardized Regression Weight		χ^2 Difference	Result
		High Group	Low Group	(df=1)	
H3a	Ecological Consciousness → Purchase Intention	0.361	0.589	12.608	Not Supported
H3b	Ecological Consciousness → Willingness to Pay More	0.738	0.341	8.902	Not Supported
H3c	Social Consciousness → Purchase Intention	0.113	0.368	6.597	Not Supported
H3d	Social Consciousness → Willingness to Pay More	-0.077	0.434	0.716	Supported

The moderating effect of need for variety was tested through multi-group analysis: this involved splitting the sample into sub-groups according to whether respondents scored high or low on the measurement items of NFV (need for variety). The mean score for respondents' NFV was 5.07. Thus, respondents who rated higher than 5.07 on NFV (N=69) were categorized into the "high" group, and respondents who rated lower than 5.07 on NFV (N=72) were categorized into the "low" group. The difference in chi-square values between the unconstrained model (in which all paths were constrained to be equal except for the link between ecological consciousness and purchase intention) and the constrained model (in which all paths were constrained to be equal across high-NFV and low-NFV groups) determines whether NFV acted as a moderating variable. In this way, $H3b$ $H3c$, and $H3d$ could be tested as well. As illustrated in Table 4, the chi-square difference test revealed that there was no significant difference between the two groups in the paths from ecological consciousness to purchase intention ($\Delta\chi^2$ = 12.608, p = 0.000), from ecological consciousness to willingness to pay more ($\Delta\chi^2$

= 8.902, p = 0.002), and from social consciousness to purchase intention ($\Delta\chi^2$ = 6.597, p = 0.010). There was a significant difference between the two groups in the path from social consciousness to willingness to pay more ($\Delta\chi^2$ = 0.716, p = 0.397). Thus, only H$_{3d}$ was supported.

Discussion and Implications

Consumers have a positive attitude towards eco-fashion, but the positive attitude does not always translate into action (Carey and Cervellon 2014). In other words, there is an attitude-behavior gap in eco-fashion purchasing. To choose the right marketing strategies for reducing the attitude-behavior gap in millennials eco-fashion purchasing, this study employed attribution theory (AT) to explain how millennials' personality traits, i.e. ecological consciousness and social consciousness, influence their behavior outcomes, i.e. purchase intention and willingness to pay more for eco-fashion. In addition, this study tested the moderating effect of need for variety on the relationship between millennials' personality traits and their behavior outcomes. The results of this study contribute to the literature and have implications for understanding millennials' eco-fashion purchasing behavior. The results of this study also offer recommendations for educating millennials in an ethical consumerism.

This study extends previous work involving attribution theory (Heider 1958, Jones and Davis 1965) by affirming that millennials' eco-fashion consumption behavior matches certain aspects of their personality traits such as ecological consciousness and social consciousness. Furthermore, this study demonstrates that millennials' social consciousness has a more significant impact on their willingness to pay more for eco-fashion when their need for variety is high rather than low. This study also has managerial implications for apparel manufacturers, designers, and retailers. First of all, the findings support the idea that ecological consciousness and social consciousness positively influence purchase intention and willingness to pay more. Therefore, marketers can advertise the ecological attributes and social benefits of eco-fashion in terms of production processes (i.e., the dyeing process) and materials (i.e., the use of eco-fabric) to increase millennials' purchase intention and willingness to pay more for eco-fashion.

Further, ecological consciousness has a stronger impact on cognitive response than social consciousness does, implying that millennials' ecological consciousness is a particularly important predictor of their eco-fashion purchasing behavior. Environmental changes such as those affecting plants, animals, and the weather can more easily generate individuals' awareness than social issues can because even relatively minor changes in the environment can influence the harmony between humans and nature (Alwitt and Berger 1993). Further, social issues are less likely to catch individuals' attention because social issues such as child labor or low wages are related to ethical issues and have no significant influence on many people. Therefore, when applying these findings to management strategies, manufacturers and retailers may wish to promote eco-sign campaigns on social

media platforms to help millennials identify the eco-signs and to encourage their eco-fashion purchasing behavior.

The findings of the study also support the existence of a moderating effect of millennials' need for variety on the relationship between social consciousness and willingness to pay more. Specifically, when there is a higher need for variety, millennials' social consciousness can have a stronger positive effect on their willingness to pay more for eco-fashion. With this knowledge, manufacturers and designers can create and produce a greater variety of styles of eco-fashion products to strengthen millennials' willingness to pay more for eco-fashion, and retailers can emphasize the novel and cool features of eco-fashion products such as the use of natural plant dyes and fabrics to strengthen millennials' willingness to pay more for eco-fashion.

In addition, this study offers suggestions for educators in fashion marketing. Ethical decision making is complex, and consumers' actual pur-chase behavior toward ethical products such as eco-fashion is limited. However, millennials are young consumers born between 1981 and 1999 (Kestenbaum 2017); they have great purchasing power and are the most powerful consumer group in the marketplace; millennials' beliefs and mindsets are in a developmental stage (Brosdahl and Carpenter 2011) and their beliefs about and trust in eco-fashion are relatively easily developed at this stage. Because they are familiar with technology and social media, millennials can influence their family purchase decision directly and indirectly. Therefore, educating millennials to care about ethical components of products and engage in an ethical consumerism are important. Specifically, universities should consider expanding fashion education in millennials to introduce how fast fashion consumption affects the environment and contributes to negative effects and climate changes, and educators should make efforts to help millennials identify the ecological attributes and social benefits of eco-fashion and engage in an ethical consumerism.

Conclusions

This study examined how millennials' personality traits (i.e., ecological consciousness and social consciousness) influence their behavior outcomes (i.e., purchase intention and willingness to pay more) in the eco-fashion context by applying attribution theory. This study also tested the moderating effect of need for variety on the relationship between millennials' personality traits and their behavior outcomes. A focus group including 9 participants and an online questionnaire involving 141 participants were used to accomplish the purpose of the study. A confirmatory factor analysis (CFA) was used to test how well the measured variables represented the various constructs, and structural equation modeling (SEM) was used to test the hierarchical relationships among millennials' personality traits and their behavior outcomes. The results indicated that millennials' ecological consciousness and social consciousness positively influenced their purchase intention and willingness to pay more for eco-fashion. Furthermore, the results supported the existence of a moderating effect of

millennials' need for variety on the relationship between social consciousness and willingness to pay more. Specifically, when millennials had a higher need for variety, their social consciousness had a stronger positive effect on willingness to pay more for eco-fashion.

This study has some limitations that lead to recommendations for future studies. First, the participants were nine female undergraduate students majoring in consumer sciences in a southeastern university in the United States. They are younger millennials and their ages were between 18 and 23. They are more aware of the sustainability issues than other majors' students such as engineering. However, their response may be gender or age biased. Therefore, the researcher asked all nine participants to think from the perspectives of their older brothers or sisters, the age-biased biases may still exist. Future studies can do two focus group studies that include a wide age range of millennials. Specifically, one focus group recruits younger millennials and the other focus group includes older millennials. Second, this study used only 16 (8 male and 8 female) images as visual images. Future studies can identify a wider spectrum of eco-fashion styles to increase the generalizability of the study. Third, the proposed model was tested millennials in the eco-fashion context. Therefore, when generalizing these findings to other types of eco-products such as eco-friendly package food and eco-friendly party supplies or other generations such as generation X, caution must be exercised.

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The Effects of International Financial Reporting Standards on Financial Reporting Quality

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The purpose of this study is to investigate whether the financial reporting under International Financial Reporting Standards (IFRS) has more quality than local GAAP for firms listed on Taiwan stock exchange. Financial Reporting Quality is measured in this study by three attributes of earnings introduced in previous literature, namely: 1) earnings management expressed as managing towards positive earnings and earnings smoothing and, 2) timely loss recognition expressed as the asymmetric incorporation of economic gains and losses and large negative net income, and 3) value relevance. Ordinary Least Square (OLS) Regression analysis, Z-test, and Binary Logistic Regression are employed to investigate the pre-IFRS (2008-2010) and post-IFRS (2012-2014) adoption periods on value relevance, earnings management, and timely loss recognition. The study employs a sample of 426 manufacturing firms from 8 industries listed on Taiwan stock exchange. The study finds that firms adopting IFRS evidence less earnings smoothing. However, there is no significant difference in either the timely loss recognition or the value relevance of accounting information between the pre and post-adoption periods. This study contributes to the literature by using data from an emerging market. It provides an insight to practitioners, international standard setters and regulators into the international debate on the effects of the switch from local GAAP to IFRS on Financial Reporting Quality.

Keywords: Emerging market, earnings management, timely loss recognition, value relevance.

Introduction

Investors around the world became suspicious about the quality of accounting information due to corporate financial scandals resulting from fraudulent financial reporting. They seek to have high quality, transparent and comparable financial information to help in making rational investment decisions. The Financial Reporting Quality (FRQ) is influenced by high-quality accounting standards and its appropriate enforcement (Benyasrisawat 2011, Khanagha 2011). Therefore, moving toward harmonized high-quality accounting standards is becoming an increasingly important issue to enhance the transparency and comparability of financial information produced.

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Since 2001, the International Accounting Standards Board (IASB) an independent, non-profit organization has played an important role by developing high-quality International Financial Reporting Standards (IFRS) for use internationally for financial reporting purposes. Its main objective is to achieve international convergence. The European Union's publicly listed firms are required to prepare their financial reports in accordance with IFRS. Taiwan adopted IFRS in 2012 and many other developing and developed countries have either adopted IFRS or are in the process of the adoption. Approximately 140 countries around the world have now permitted IFRS adoption (Dayanandan et al. 2016).

IASB does not provide a clear definition of FRQ. However, Financial Accounting Standards Board Statement of Financial Accounting Concepts No. 1 (1978) states that "one objective of financial reporting is to help present and potential investors in making rational investment decisions and in assessing the expected firm cash flows". Verdi (2006) defines FRQ as the accuracy with which financial reporting provides information to investors about the firm's activities, particularly its expected cash flows. While Dechow et al. (2010) define as "Higher quality earnings provide more information about the features of a firm's financial performance that are relevant to a specific decision made by a specific decision-maker".

Researchers are investigating the effect of IFRS on FRQ. Some research shows that adopting IFRS enhances FRQ in developed economies (Iatridis 2010, Jeanjean and Stolowy 2008, Zéghal et al. 2011). However, the benefit to emerging markets still unclear (Zhou et al. 2009). Other researchers show mixed results (Morais and Curto 2008, Paglietti 2010). On the other hand, some researchers show that adopting IFRS may not satisfy the information needs of stakeholders and has negative effects on the performance of the stock market and the trading volume (Ball 1995, Barth et al. 1999, Bradshaw and Miller 2002, Yoon 2007). It has been argued that FRQ is highly influenced by the opportunistic behavior of managers and national institutional factors (Jeanjean and Stolowy 2008, Palacios et al. 2014). The principle-based orientation of IFRS could add volatility to financial statements and open the door for possible managerial manipulation (Ahmed et al. 2013).

The empirical evidence about the benefit of implementing IFRS is conflicting and controversial. IFRS has been developed without regard for differences in socio-economic and political environments between different countries. As a result, more empirical evidence on whether the adoption of IFRS in emerging markets has enhanced the FRQ regarding timely loss recognition, value relevance and the level of earnings management is needed. It is important to focus on these three metrics in emerging markets because IFRS is a principle-based approach which is characterized by greater flexibility for manipulation of accounting information. This provides managers the opportunity to manage earnings due to the encouragement of professional judgment and discretion. According to Wong and Jian (2003), the emerging market experience more earnings management because of the relatively weak investor protection and legal system.

The purpose of this study is to empirically investigate whether the adoption of IFRS leads to higher FRQ for manufacturing firms listed on the Taiwan stock exchange. The classification of Taiwan as an emerging market is based on the classification of the World Bank in 2018. It exhibits the characteristics of an emerging economy due to its weak corporate governance, poor legal enforcement and inadequate shareholder protection (Huang and Shiu 2009). According to IFRS 1, Taiwanese listed firms were required to issue their 2012 financial statements under both IFRS and Taiwanese GAAP which provides a unique opportunity to investigate this issue. According to Financial Supervisory Commission (2018), All firms listed on Taiwan stock exchange and financial institutions supervised by the Financial Supervisory Commission were required to apply IFRS starting from 2012 except unlisted public firms, insurance intermediaries, credit card firms and credit cooperatives. They were required to apply IFRS starting from 2015 (permitted from 2013).

Our empirical results show that firms in the post-IFRS period experienced lower level of earnings smoothing compared to firms in the pre-IFRS period. However, there is no evidence found that firms in the post-IFRS period evidenced more timely loss recognition or more value relevance of accounting information than in the pre-IFRS period. In particular, firms in the post-IFRS period have a higher variance of the change in net income and a less negative correlation between accruals and cash flows. This may suggest a significant reduction in earnings smoothing and improvement in FRQ after the transition to IFRS. This study is complements the findings in the existing literature regarding the effects of IFRS on FRQ.

This study contributes to the literature in several ways. First, the effects of IFRS adoption on FRQ in emerging markets have not been widely studied (Kwon et al. 2017) and several emerging markets are in the process of adopting IFRS, such as Saudi Arabian, Egypt, India, Korea, and Malaysia. This study encompasses a sample of listed firms in Taiwan which is considered one of the emerging markets that have a significant influence on the world economy (Bekaert and Harvey 2017). Thus practitioners and international standard setters from other emerging markets can benefit from the results of this study. Second, existing empirical studies have focused on developed countries, such as Germany, Australia, the UK, and France (Peng and Chen 2014, Kaaya 2015, Kwon et al. 2017). This study fills the gap of the related literature by shedding the light on emerging markets. Third, the costs and benefits of switching from local GAAP to IFRS are still unclear. This study provides empirical evidence that compares the FRQ under IFRS with that under local GAAP and this can benefit regulators as they try to make rational decisions regarding the adoption by publicly listed firms in emerging markets. Finally, the findings of this study may help analysts and investors understand IFRS and FRQ issues in emerging markets. This study follows Barth et al. (2008) and Zhou et al. (2009) in focusing on three metrics of FRQ: 1) value relevance, 2) earnings management, and 3) timely loss recognition.

The remainder of this paper is organized as follows. Section 2 presents the related literature and develops the hypotheses. Section 3 deals with the sample

selection, descriptive statistics of variables and the research methodology. Section 4 presents the empirical findings and Section 5 concludes the study.

Literature Review and Hypothesis Development

The quality of financial reporting is determined by the usefulness of information provided to meet the needs of users. One of the factors that affects FRQ is the accounting standards. High accounting standards are characterized by providing relevant, reliable, comparable and consistent accounting information (Khanagha 2011). Firms experience positive returns with increases in FRQ (Armstrong et al. 2010), a reduction in the cost of equity capital in countries with strong legal system (Li 2010), and increases the demand for equities by institutional investors (Florou and Pope 2012). Hence, literature tries to assess the effect of accounting standards on the quality of financial information.

Prior research measures FRQ in different ways. The majority of studies use value relevance, timely loss recognition, and earnings management as three main measures for FRQ as they provide useful financial information to stakeholders especially users in the equity market (Ahmed et al. 2013, Barth et al. 2008, Istrate et al. 2015, Jeanjean and Stolowy 2008, Morais and Curto 2008, Mousa and Desoky 2014, Paglietti 2010). Francis et al. (2004) consider seven measures of accounting quality, namely, earnings management, persistence, predictability, smoothness, value relevance, timeliness, and conservatism. On the other hand, Benyasrisawat (2011) points out three dimensions of FRQ, namely, earnings persistence, value relevance and earnings timeliness. This study uses three attributes of earnings introduced in previous literature (Barth et al. 2008, Kaaya 2015, Lin et al. 2012, Mousa and Desoky 2014, Peng and Chen 2014, Zhou et al. 2009). The attributes are 1) value relevance, 2) timely loss recognition expressed as the asymmetric incorporation of economic gains and losses and large negative net income, and, 3) earnings management expressed as managing towards positive earnings and earnings smoothing.

Paglietti (2010) defines earnings management as the management intention to mislead stakeholders about the financial position of the firm which may affect their compensation. He adds that higher quality of accounting information is characterized by low earnings management. On the other hand, value relevance studies are concerned about the evaluation of the relationship between accounting information and capital market values (Khanagha 2011). It is argued that higher quality of accounting information exhibits a strong relationship between earnings and returns (Mousa and Desoky 2014). Outa (2011) defines timely loss recognition as "the firm's ability to recognize losses as they occur by not engaging in activities that reschedule the losses over other periods of time". Coelho et al. (2017) argue that more timely recognition of the incurred losses in earnings make financial reporting more informative to investors and decision makers.

Several studies have tried to study the impact of adopting IFRS. Studies carried in developed countries regarding the higher quality of IFRS information reveals contradicting results. On the positive side, Irvine and Lucas (2006) find

that IFRS has increased foreign direct investment, improve FRQ and enhance global market integration. Using a sample of 327 firms from 21 countries, Barth et al. (2008) find that firms exhibit less earnings management, higher frequency of large losses, an insignificant frequency of small positive earnings, and more value relevance of FRQ after voluntarily switching to IFRS. Similarly, the findings of Iatridis (2010) suggest that the implementation of IFRS in the UK decrease earnings management, lead to more value relevant accounting measures and more timely loss recognition which help investors in making more rational decisions. These two studies provide consistent results and suggest that adopting IFRS reinforces information reporting quality. Moreover, an empirical study by Armstrong et al. (2010) document that the adoption of IFRS in the European stock market improved the information transparency and earnings quality. Using a longitudinal study that covers pre-IFRS and post-IFRS periods during 1990–2008 for publicly listed Australian industrial firms, Chalmers et al. (2011) find that earnings become more value-relevant and suggest that IFRS adoption affects the associations between accounting information and market value. Several studies have confirmed that adopting IFRS has increased FRQ (Chalmers et al. 2011, Devalle et al. 2010, Meeks and Swann 2009, Chan et al. 2015).

Other studies report contradicting results. A study by Van Tendeloo and Vanstraelen (2005) suggest that there is no significant difference in FRQ for firms adopting IFRS compared to firms adopting German GAAP. Similarly, using a sample of German firms applying IFRS since 2005, Lin et al. (2012) suggest a decline in FRQ under IFRS. They find that financial reports evidence less value relevance, less timely loss recognition, and more earnings management compared to those firms applying U.S. GAAP. These two studies provide consistent results and suggest that adopting IFRS does not enhance information reporting quality. Both Ahmed et al. (2013) and Christensen et al. (2015) find that European Union firms experience more earnings management after IFRS adoption. Ahmed et al. (2013) argue that firms that have voluntary application to IFRS experience less earnings management due to having incentives to increase the transparency of their reporting and attract market capital. On the other hand, firms that have mandatory application to IFRS, lack the motivation to have a transparent financial report which leads to higher earnings management after the adoption of IFRS. However, Capkun et al. (2016) conducted a study in 30 countries and found that firms adopting early, late or mandatory IFRS experience an increase in earnings management. They concluded that the principle-based nature of IFRS allows for greater flexibility in selecting accounting methods and greater discretion in earnings measurement which lead to an increase in earnings management. The conflicting results between the two studies may be due to differences in sample selection where Ahmed et al. (2013) sample include only developed countries (European Union) while Capkun et al. (2016) sample includes both developed and developing countries which have a different legal system, capital market maturity, and development.

The studies presented above are applied in developed countries where we could expect an improvement in FRQ after IFRS adoption due to strong investor protection, strong legal enforcement, and capital market maturity. However, the

results are mixed which makes it difficult to reach a general conclusion that IFRS enhance FRQ in developed countries. This result is supported by Nulla (2014) who observed that each country implemented the same accounting standards in a different way due to flexible standards which can lead to a reduction in FRQ even in strong enforcement countries like Germany and France.

Regarding the developing countries, Aljifri and Khasharmeh (2006) investigated the benefits of IFRS to the United Arab Emirates (UAE). They found that there is a general agreement among different users as investors, auditors and creditors on the importance of applying IFRS in the UAE. Similarly, Liu et al. (2011) examined the effect of IFRS on FRQ for publicly listed firms in China and find significant improvement expressed as an increase in value relevance of accounting information and a reduction in earnings smoothing. In a two emerging counties study, Khanagha (2011) investigated the value relevance of accounting information under IFRS in Bahrain for the period 1996-2008 and the United Arab Emirates for the period 2001-2008 listed firms. A comparison of the results for the pre and post-IFRS adoption, shows more relevant accounting information after the adoption of IFRS in Bahrain stock market, while there was a decline in value relevance for United Arab Emirates stock market. Using a sample of 117 listed firms in Indonesia Stock Exchange, Arum (2013) examined the impact of IFRS on the FRQ which are measured by the proxy of value relevance, timely loss recognition, and earnings management of accounting information. The empirical results indicate lower earnings management and higher value relevance of accounting information while having no effect on the timely loss recognition. This may signal an improvement in the financial reporting quality.

On the other hand, other studies show that adopting IFRS in developing countries does not necessarily lead to an improvement in FRQ. Chen and Yeh (2002), employing a sample of Chinese firms, examined the effect of adopting IFRS on FRQ. Their study revealed that IFRS does not improve accounting practices due to family ownership, informal personal relationship and political influences which contribute to the low reporting quality. Similarly, Rudra and Bhattacharjee (2012) find that publicly listed Indian firms using IFRS experience more earnings management compared to Indians firms using local GAAP which may be considered as a signal to the regulators to think about the effectiveness of IFRS in emerging markets suffering from weak investor protection and legal enforcement. Ames (2013), using data of 3950 listed companies in South Africa between 2000 to 2011 examined the impact of adopting IFRS on FRQ. He finds that FRQ is not improved among the firms adopting IFRS. A study of Taiwanese firms by Peng and Chen (2014) showed that the quality of the financial reports under local GAAP provides more value relevant than IFRS. Other empirical studies find mixed results (Clarkson et al. 2011, Houqe et al. 2012, Outa 2011, Paananen and Lin 2009).Despite, the argument that IFRSs may not fit developing countries due to weak investor protection and legal enforcement (Kaaya, 2015). It is clear that some studies presented show that IFRS improves FRQ. This result is supported by Karampinis and Hevas (2009) who concluded that mandating IFRS may prove beneficial even in an unfavorable context.

Based on the above discussion, this study aims to compare the FRQ under local GAAP with that under IFRS by examining the impacts of implementing IFRS in one of the emerging markets. The study will fill the gap of the related literature by adding more evidence regarding emerging markets. Based on the above discussion that show conflicting evidence on the effect of IFRS on FRQ, the following hypotheses are formulated:

H1: Firms using IFRS experience less earnings management compared to firms using local GAAP.
H2: Firms using IFRS experience more timely recognition of losses compared to firms using local GAAP.
H3: Firms using IFRS experience more value relevant accounting information compared to firms using local GAAP.

Methodology

In this section, three FRQ that has been suggested in prior research as potentially important will be considered: value relevance, timely loss recognition, and earnings management. They are examined separately by comparing accounting information prepared under Taiwanese GAAP from 2008 to 2010 with those prepared under IFRS from 2012 to 2014. Quantifying FRQ is difficult, Hence, this study follows Lang et al. (2006), Barth et al. (2008) and Zhou et al. (2009) in focusing on a range of FRQ measures. According to Lang et al. (2006), accruals are sensitive to the industry in which the firm operates. Accordingly, the effect of industry on the characteristics of accounting data was considered in this study.

Earnings Management

This study analyzes two measures of earnings management. The first relates to the examination of earnings smoothing and the second focuses on managing towards positive earnings.

Earnings smoothing

To test for changes in earnings smoothing, three different measures are used in this study.
1-First, the variability of the changes in the annual net income deflated by end of year total assets. Earnings should fluctuate over time if firms do not use accruals to manage earnings. Accordingly, lower values of the variance of the change in net income are considered a signal to higher earnings smoothing, and vice versa. The change in net income can be affected by factors other than the financial reporting. Hence, controls from prior research have been used as shown in the below model(Barth et al., 2008, Lang et al., 2006):

$$\Delta NI = \beta 0 + \beta 1\ SIZE + \beta 2\ GROWTH + \beta 3\ EISSUE + \beta 4\ LEV + \beta 5\ DISSUE + \beta 6\ TURN + \beta 7\ CF + \beta 8\ AUD + \beta 9\ XLIST + \beta 10\ NUMEX + \beta 11 SECTOR1 + \beta 12 SECTOR2 + \beta 13 SECTOR3 + \beta 14 SECTOR4 + \beta 15 SECTOR5 + \beta 16 SECTOR6 + \beta 17 SECTOR7 + \beta 18 \Delta NI\ (\text{-}1) + \varepsilon \qquad (1)$$

Where ΔNI is the annual change in net income, SIZE is the natural logarithm of the end of year market value of equity, GROWTH is the annual change in sales, EISSUE is the annual change in common stock, LEV is end of year total liabilities divided by equity book value, DISSUE is annual change in total liabilities, TURN is sales divided by end of year total assets, CF is annual net cash flow from operating activities divided by end of year total assets, AUD is an indicator variable that equals one if the firm's auditor is PwC, KPMG, E&Y or D&T and zero otherwise, XLIST is an indicator variable that equals one if the firm is listed outside the EU, NUMEX is the number of Stock Exchanges on which a firm's stock is listed. SECTOR1 is the Commodity Chemicals industry, SECTOR2 Iron & Steel industry, SECTOR3 is the Auto, Truck & Motorcycle Parts industry, SECTOR4 is the Textiles & Leather Goods industry, SECTOR5 is the Food Processing industry, SECTOR6 is the Construction & Engineering industry, SECTOR7 is the Electrical Components & Equipment industry and Machinery & Equipment is the reference category. ΔNI (-1) is a lagged value of observed endogenous response variables for solving serial autocorrelation issue. ε is the error term.

The residuals of the regression of model 1 are denoted as ΔNI* and their standard deviation $\sigma_{\Delta Ni*}$. Lower standard deviation could be considered as evidence of using accruals to smooth earnings.

2- Second, the variability of annual changes in net income relative to the variability of annual changes in cash flows. The variability of annual changes in cash flows is the variance of the residuals of the regression of annual change in cash flow. Despite the controls used in model 1, the variability in net income may be due to activities that are not correlated with discretionary accruals (Lin et al. 2012). Examining the variability of annual changes in net income relative to the variability of annual changes in cash flows control this concern as firms with more variability in cash flows will have more variability in net income. Controls have been used to mitigate the effect of other factors as shown in the below model:

$$\Delta CF = \beta 0 + \beta 1\ SIZE + \beta 2\ GROWTH + \beta 3\ EISSUE + \beta 4\ LEV + \beta 5\ DISSUE + \beta 6\ TURN + \beta 7\ AUD + \beta 8\ XLIST + \beta 9\ NUMEX + \beta 10 SECTOR1 + \beta 11 SECTOR2 + \beta 12 SECTOR3 + \beta 13 SECTOR4 + \beta 14 SECTOR5 + \beta 15 SECTOR6 + \beta 16 SECTOR7 + \beta 17 \Delta CF(\text{-}1) + \varepsilon$$

$$(2)$$

Where ΔCF is the annual change in net operating cash flow and the residuals of the regression of model 2 are denoted as ΔCF*. The second metric is concerned about the variability of ΔNi* / ΔCF* over the pre-IFRS (2008-2010) and post-IFRS (2012-2014) periods. This variability is denoted as $\sigma_{\Delta Ni* / \Delta CF*}$. If firms use accruals to smooth earnings, the variability of net income will be less than that cash flow.

3- Finally, the correlation between total accruals (ACC) and operating cash flows (CF) helps in detecting the smoothing effect of accruals. If managers use accruals to smooth earnings, there will be a negative correlation between them as managers may tend to increase accruals when suffering from shortage in cash flows(Ball and Shivakumar 2005, Paglietti 2010, Myers et al. 2007). Again, to control for the effect of other factors, the following regression models are used:

$CF = \beta_0 + \beta_1$ SIZE $+ \beta_2$ GROWTH $+ \beta_3$ EISSUE $+ \beta_4$ LEV $+ \beta_5$ DISSUE $+ \beta_6$ TURN $+ \beta_7$ AUD $+ \beta_8$ XLIST $+ \beta_9$ NUMEX $+ \beta_{10}$SECTOR1 $+ \beta_{11}$SECTOR2 $+ \beta_{12}$SECTOR3 $+ \beta_{13}$SECTOR4 $+ \beta_{14}$SECTOR5 $+ \beta_{15}$SECTOR6 $+\beta_{16}$SECTOR7 $+ \beta_{17}$CF (-1) $+\varepsilon$ (3)

$ACC = \beta_0 + \beta_1$ SIZE $+ \beta_2$ GROWTH $+ \beta_3$ EISSUE $+ \beta_4$ LEV $+ \beta_5$ DISSUE $+ \beta_6$ TURN $+ \beta_7$ AUD $+ \beta_8$ XLIST $+ \beta_9$ NUMEX $+ \beta_{10}$SECTOR1 $+ \beta_{11}$SECTOR2 $+ \beta_{12}$SECTOR3 $+ \beta_{13}$SECTOR4 $+ \beta_{14}$SECTOR5 $+ \beta_{15}$SECTOR6 $+\beta_{16}$SECTOR7 $+ \beta_{17}$ACC (-1) $+\varepsilon$ (4)

Where ACC is net income (NI) minus CF. The residuals of the regression in model 3 are denoted as CF* and the residuals of the regression in model 4 are denoted as ACC*. The third metric is concerned about the correlation between CF* and ACC*. The higher negative correlation between them signals the use of accruals to smooth variability in earnings and thus affect FRQ (Myers et al. 2007).

Managing Towards Positive Earnings

The second earnings management measure tests if firms manage earnings towards small positive earnings (denoted as SPOS) rather than a negative earnings. According to Kwon et al. (2017), managers tend to smooth earnings to avoid losses which may results in more frequent positive earnings, if possible, compared to small losses. Hence, a high frequency of small positive earnings signals the greater management's discretion to avoid losses and thus affect FRQ. This measure is evaluated by estimating the coefficient of a dummy variable SPOS in the following logistic regression model(Barth et al. 2008):

$POST(0,1) = \beta_0 + \beta_1$ SPOS $+ \beta_2$ SIZE $+ \beta_3$ GROWTH $+ \beta_4$ EISSUE $+ \beta_5$ LEV $+ \beta_6$ DISSUE $+ \beta_7$ TURN $+ \beta_8$ CF $+ \beta_9$ AUD $+ \beta_{10}$ XLIST $+ \beta_{11}$ NUMEX $+\varepsilon$ (5)

POST(0,1) is a dummy variable that equals one for firms adopting IFRS and zero for firms adopting local GAAP. SPOS equals one if the net income deflated by total assets is between 0 and 0.01 and zero otherwise (Barth et al. 2008). This measure is concerned about the coefficient of SPOS in the regression equation. If the coefficient is negative, this means that firms in the pre-IFRS period are more likely to smooth earnings toward small positive net income compared to firms in the post-IFRS period and vice versa.

Timely Loss Recognition

Timely loss recognition is the second FRQ measure which reflects accounting conservatism. Ball et al. (2000) define timeliness as "the degree to which accounting income incorporates economic income". It can be assessed by two metrics. The first one focuses on the likelihood of reporting a large negative net income (denoted as LNEG). Higher FRQ is characterized by recognizing large losses as they occur rather than being deferred to future periods (Zhou et al. 2009). If managers smooth earnings, large losses should be relatively rare. Hence, high frequency of timely loss recognition signals better FRQ. The following logistic regression is constructed to estimate the likelihood of loss recognition timeliness (LNEG) following IFRS adoption (Lang et al. 2006):

POST(0,1) = $\beta 0$ + β1 LNEG+ β2 SIZE + β3 GROWTH + β4 EISSUE + β5 LEV+ β6 DISSUE + β7 TURN + β8 CF + β9 AUD + β10 XLIST + β11 NUMEX+ε   (6)

LNEG is a dummy variable that equals one if the net income scaled by total assets is lower than -0.20 and zero otherwise (Barth et al. 2008). This measure is concerned about the coefficient of LNEG in the regression equation. If the coefficient is positive, this means that firms in the post-IFRS period are more likely to recognize large losses in a timely manner compared to firms in the pre-IFRS period and vice versa.

The second measure of timely loss recognition is concerned about the asymmetric incorporation of economic gains and losses. Appropriate loss recognition compared to profit recognition has been used in prior research to estimate FRQ (Ahmed et al. 2013). The stock returns are used as a proxy for good and bad news and measured by R^2 of the return-earnings regression model proposed by Basu (1997):

Def(E) = $\beta 0$ + β1$_{(Def(E))}$ *Dr̄ + β2*$_{(Def(E))}$ *r + β3*$_{(Def(E))}$ *(Dr̄ · r) + ε *$_{(Def(E))}$
(7)

Where Def(E) is earnings per share in year t deflated by stock price per share in year t-1. *Dr̄* is a dummy that takes value one in case of bad news(if *r* < 0) and zero otherwise and r is annual stock returns from six months after the firm's fiscal year-end. The interaction between *Dr̄* with *r (β3)* shows the incremental effect of bad news relative to good news on earnings. According to Lang et al. (2006), the information in earnings will find its way into the share price, so the concern is whether the news is captured in earnings in a timely manner. FRQ is associated with share price, therefore a higher R^2 indicates higher reporting quality. In addition, this measure is concerned about the magnitude of the coefficient of the interaction between Dr̄ with r (β3) in the regression equation. The large coefficient is a signal of more timely loss recognition.

Value Relevance

Following previous studies, this study measures value relevance using the price-earnings model (Collins et al. 1999, Van der Meulen et al. 2007). Value relevance considers that high-quality financial reporting should have a high degree of association with the firm's share price which provides more useful information to investors. The model distinguishes between positive and negative earnings as follows (Ohlson 1995):

$$P_{it} = \beta0 + \beta1\ X_{it} + \beta2\ DX + \beta3\ X_{it} * DX + \beta4\ BV_{i,t-1} \tag{8}$$

Where P_{it} is the share price three months after fiscal year end t, X_{it} is earnings per share, DX is a dummy variable equal to one if earnings are negative or zero otherwise and $BV_{i,t-1}$ is the book value per share at the beginning of period t, It should be noted that the coefficient of earnings, $\beta1$, reflects the pricing effect of current earnings. The measure of value relevance is based on the adjusted R^2 of the model which examines the explanatory power of accounting information over years (Wu et al., 2017).

The Sample

Taiwanese publicly listed firms have been required to switch from the Taiwanese GAAP to IFRS in 2012. A sample of 426 firms listed on Taiwan stock exchange is randomly selected in this study. Table 1 presents the sample industry breakdown. The sample comprises a range of industries in the manufacturing sector. Data is obtained from Thomson Reuters DataStream database covering six years, pre-IFRS (2008-2010) and post-IFRS (2012-2014). The same set of 426 firms adopted Taiwanese GAAP in the pre-IFRS (2008-2010) and IFRS in the post-IFRS (2012-2014) period.

Table 1. *Industry Analysis*

Industry	Frequency	Percent	Valid Percent	Cumulative Percent
Auto, Truck & Motorcycle Parts	198	5.2	5.2	5.2
Commodity Chemicals	387	10.1	10.1	15.3
Construction & Engineering	225	5.9	5.9	21.1
Electrical Components & Equipment	1521	39.7	39.7	60.8
Food Processing	225	5.9	5.9	66.7
Industry and Machinery & Equipment	549	14.3	14.3	81
Iron & Steel industry	270	7	7	88
Textiles & Leather Goods	459	12	12	100
Total	3834	100	100	

Empirical Results and Analysis

Descriptive Statistics

Table 2 presents descriptive statistics for the test and control variables used in the research design. Both have been examined separately under both local GAAP and IFRS for the same set of firms. Data is approximately symmetric as skewness ranges from -0.46 to 0.5. The descriptive analysis of the test variables reveals that there is a slight decrease in the mean of the change in annual net cash flow (CF_DELTA) and accruals (ACC) under IFRS compared to Taiwanese GAAP. This may signal a decrease of earnings management practices under IFRS. However, there are no significant differences in the mean and dispersion of the other test variables under both local GAAP and IFRS.

As for control variables, the descriptive statistics show that the adoption of IFRS causes a significant reduction in the mean of the annual change in sales (GROWTH) from 355834 to -495997. Moreover, a significant reduction in the mean of the annual change in common stocks (EISSUE) and the annual change in total liabilities (DISSUE) under IFRS. This may signal that firms in the pre-IFRS period are more likely to issue stocks and debt than firms in the post-IFRS period.

Table 3 reveals that the time series test and control variables are stationary at the 0.01 level. Table 4 shows that according to Schwarz criterion, there is a long-term equilibrium relationship among the time series variables where the p-value of both Tau-statistic and Z-statistic are at the 0.01 level.

Table 2. *Descriptive Statistics*

	Pre-IFRS (2008-2010)					Post-IFRS (2012-2014)				
	Mean	**Median**	**Std. Dev.**	**Skewness**	**Kurtosis**	**Mean**	**Median**	**Std. Dev.**	**Skewness**	**Kurtosis**
Test Variables										
NI_DELTA	-0.003	-0.002	0.012	-0.04	2.23	-0.002	-0.002	0.011	-0.09	2.33
CF_DELTA	569943	440354	2731030	0.15	2.57	552444	485586	2782907	0.14	2.42
ACC	-3516552	-2989165	2797312	-0.55	2.39	-3514471	-3123636	2672059	-0.46	2.43
DEF	0.048	0.050	0.024	-0.09	2.05	0.048	0.048	0.023	-0.02	2.12
R	0.037	0.031	0.152	0.14	1.89	0.045	0.038	0.132	0.20	2.26
P	0.590	0.580	0.166	0.33	2.18	0.575	0.546	0.166	0.50	2.27
BV	0.489	0.482	0.066	0.43	2.52	0.497	0.493	0.070	0.25	2.18
X	0.031	0.030	0.018	0.28	2.25	0.031	0.028	0.019	0.44	2.27
Control Variables										
LNSIZE	18.042	17.998	1.196	0.12	2.58	18.216	18.087	1.131	0.22	2.63
GROWTH	355834	228340	5927955	0.14	2.12	-495997	-648252	5419240	0.22	2.51
EISSUE	1119962	1185916	1007546	-0.20	2.08	539270	585250	1169628	0.19	1.76
LEV	0.879	0.852	0.216	0.40	2.33	0.888	0.880	0.219	0.27	2.25
DISSUE	1620513	1316895	3300458	0.12	2.32	814413	366747	3287520	0.52	2.65
TURN	0.903	0.852	0.403	0.38	2.65	0.831	0.801	0.367	0.37	2.98
CF	0.061	0.061	0.027	-0.003	2.03	0.061	0.062	0.026	-0.01	2.11

Table 3. *Unit Root Test*

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-71.0288	0.0000	16	20413
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-63.7571	0.0000	16	20413
ADF - Fisher Chi-square	2341.98	0.0000	16	20413
PP - Fisher Chi-square	2606.64	0.0000	16	20432

**Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Table 4. *Tau and Z-statistics*

Dependent	tau-statistic	Prob.*	z-statistic	Prob.*
NETINCOME	-18.42707	0.0000	-536.7976	0.0000
NI_DELTA	-16.62892	0.0000	-454.5156	0.0000
LNSIZE	-12.56317	0.0000	-422.3788	0.0000
GROWTH	-12.73522	0.0000	-326.5989	0.0000
EISSUE	-17.43492	0.0000	-487.8751	0.0000
LEV	-14.80203	0.0000	-530.8698	0.0000
DISSUE	-18.41085	0.0000	-535.3919	0.0000
TURN	-14.06258	0.0000	-574.5237	0.0000
CF	-18.34584	0.0000	-532.5232	0.0000
CF_DELTA	-19.47992	0.0000	-585.8725	0.0000
ACC	-18.40662	0.0000	-535.9143	0.0000
DEF	-17.04257	0.0000	-473.4941	0.0000
R	-14.28235	0.0000	-352.1540	0.0000
P	-22.03178	0.0000	-704.3500	0.0001
BV	-20.40924	0.0000	-628.7475	0.0000
X	-21.83900	0.0000	-695.1914	0.0001

Earnings Management

Table 5 presents the results for earnings management measures: managing towards positive earnings and earnings smoothing for firms adopting local GAAP from 2008 to 2010(pre-IFRS) and adopting IFRS from 2012 to 2014(post-IFRS). The first result, the test of the variability of ΔNI* suggests that earnings are less volatile for firms in the pre-IFRS period, 0.00834, than for firms in the post-IFRS period, .00941, after controlling for other factors. This difference is statistically significant at the 0.01 level which suggests a significant reduction in earnings smoothing and improvement in FRQ after the transition to IFRS. On the contrary, the second result, the ratio of the variance of change in net income, ΔNI* to the variance of change in cash flow, ΔCF* is lower for firms in the post-IFRS period, 0000001902, than for firms in the pre-IFRS period, 0.0000004745. Although this may suggest that the variability in net income for firms in the post-IFRS period is not due to the variability in cash flow but driven by the effect of accruals, it is not statistically significant.

The third result indicates the correlation between cash flows and accruals. The correlation between CF* and ACC*, for the pre-IFRS period, -0.54, is significantly more negative than the post-IFRS period, -0.038. There is a significant negative correlation between cash flow and accruals at the 0.05 level in the pre-IFRS period. This may suggest that management may use accruals to smooth earnings when cash flow is low. The negative correlation between accruals and cash flow decreased when moving from local GAAP to IFRS. This may indicate that firms adopting IFRS are less likely to use accruals to smooth earnings. This result is consistent with the first one which supports the increase in the quality of financial reports after the IFRS adoption. Finally, the regression coefficient of SPOS is negative which may indicate that firms in the post-IFRS period are less likely oriented towards reporting small positive earnings compared to pre-IFRS. However, the coefficient is insignificant. This indicates that there is no statistically significant difference between firms in the post and pre-IFRS period in managing earnings toward a target.

Table 5. *Comparison of the Pre-IFRS and Post-IFRS Earnings Management*

Earnings Smoothing	PRE-IFRS (N=1278)	POST-IFRS (N=913)
Variability of ΔNI*	0.00834	.00941***
Variability of ΔNI* over ΔCF*	0.0000004745	.0000001902
The correlation of CF* and ACC*.	-0.54**	-0.038
Managing Towards Positive Earnings		
Small Positive NI(SPOS)	Beta = -0.61 Exp(B) = 0.941	

The symbols **, *** indicate a significant difference between pre-IFRS and post-IFRS at the 0.05 and the 0.01 level respectively.

In summary, the above-mentioned results show that firms in the post-IFRS period and less likely to use accruals to smooth earnings compared to the pre-IFRS period. In addition, there are no statistically significant differences between firms in the pre and post-IFRS in the ratio of the variance of change in net income, ΔNI*, to the variance of change in cash flow, ΔCF*, and managing earnings toward a target. This result supports the first hypothesis which states that "Firms adopting IFRS are less likely to manage earnings compared to firms adopting local GAAP".

Timely Loss Recognition

Table 6 presents the results for timely loss recognition: asymmetric incorporation of economic gains and losses and large negative net income. The negative coefficient indicates that firms in the post-IFRS period are less likely to report large losses. However, the coefficient of LNEG is insignificant. In another word, there is no significant difference between pre and post-IFRS in reporting large negative losses. Table 6 shows the R^2 of the regression equation of accounting earnings on stock returns for both good news and bad news. Earnings are regressed on annual stock returns, an indicator that represents bad news and the

interaction of these two predictors. The R^2 in the pre-IFRS is 0.5933 which is larger than that in the post-IFRS which is 0.4493. This indicates that earnings under local GAAP proportionally shows greater timeliness in presenting losses relative to gains. The magnitude of the coefficient of the interaction variable (*B3)* is significant under both local and IFRS GAAP although its magnitude is smaller in the pre-IFRS, -1.719491, compared to the post-IFRS, -1.425209 which is inconsistent with the R^2 result. However, there is no significant difference between the two coefficients. This indicates that there is no significant difference between pre and post-IFRS in the timeliness of earnings which is consistent with the previous result.

Table 6. Comparison of the Pre-IFRS and Post-IFRS Timely Loss Recognition

Timely Loss Recognition	PRE-IFRS (N=1278)	POST-IFRS (N=913)
Large Negative Net Income(LNEG)	Beta = -0.105 Exp(B) = 0.901	
Asymmetric Incorporation Of Economic Gains And Losses	$\beta1 = 0.354147\#$ B2= 1.621350# B3= -1.719491# $R^2 = 0.593385$	$\beta1= 0.332621\#$ B2= 1.617809# B3= -1.425209# $R^2 = 0.449316$

The symbols *, *** indicate a significant difference between pre-IFRS and post-IFRS at the 0.1 and 0.01 level respectively. The symbol # indicates significantly different from 0 at the 0.01 level.

In summary, the above-mentioned results show that there is no significant increase in the timely loss recognition after the adoption of IFRS. This may signal no change in the FRQ. This result does not support the second hypothesis which states that "Firms adopting IFRS are more likely to recognize losses in a timely manner compared to firms adopting local GAAP".

Value relevance

Table 7 presents the degree of association between financial measures and stock prices. The adjusted R^2 for firms in the post-IFRS, 0.30866, is larger than that of pre-IFRS, 0.232839. This indicates that the financial reporting data is more value relevant in the post-IFRS compared to the pre-IFRS period which increases FRQ under IFRS. Focusing on the regression coefficients, it is clear that all variables increase their influence on the share price in the post-IFRS period. In the pre-IFRS period, the regression coefficient of earnings per share (*β1)* and the interaction variable (*B3)* are significant at 0.01 level. In the post-IFRS period, all regression coefficients increased in magnitude and are significant. This indicates that all variables increase their influence on stock prices in the post-IFRS period. However, the chow F-statistic shows no significant difference between the regression coefficients in the post and pre-IFRS period. This indicates that there is no significant difference in value relevance after adopting IFRS which is consistent with the previous result. This result does not support the third hypothesis which states that "Firms adopting

IFRS are more likely to have value relevant accounting information compared to firms adopting local GAAP".

Table 7. *Comparison of the pre-IFRS and post-IFRS Value relevance*

Value Relevance	Pre-IFRS (N=1278)	Post-IFRS (N=913)
The degree of association between financial measures and stock prices.	$\beta 1 = 0.815968\#$ $B2 = 0.002505$ $B3 = -1.660291\#$ $B4 = 0.048866$ Adjusted $R^2 = 0.232839$	$\beta 1 = 1.336180\#$ $B2 = 0.041822\#\#$ $B3 = -2.231037\#$ $B4 = -0.119618\#\#\#$ Adjusted $R^2 = 0.308661$

The symbols #, ##, ### indicate significantly different from 0 at the 0.01, 0.05 and 0.1 level respectively.

The above results support the argument that IFRS reduces earning management. In addition, they do not support the argument that firms adopting IFRS are more likely to recognize losses in a timely manner nor more likely to have value relevant accounting information than firms adopting local GAAP. In other words, the results suggest some improvement in FRQ under IFRS. This study result is consistent with the findings of the study of Zhou et al. (2009) who find that firms adopting IFRS are less likely to smooth earnings than firms adopting Chinese GAAP. In addition, they didn't find adopting firms engaging in a more timely loss recognition which is consistent with Kwon et al. (2017), who documents lower earnings management in Korea after IFRS adoption, and Wu et al. (2017), who find that adopting IFRS in Taiwan does not lead to further increases in value relevance of financial reporting. The results support the findings of many other studies such as Eccher and Healy (2000), Van der Meulen et al. (2007) and Lin et al. (2012).

At the same time, this study result is inconsistent with the findings of Ching-Chieh et al. (2012), who finds that firms adopting IFRS in Taiwan are more value relevant, Mousa and Desoky (2014) who find some improvement in the value relevance after the adoption of IFRS and Capkun et al. (2016), who find an increase in earning management after mandatory IFRS adoption. The results are also inconsistent with the findings of many other studies such as Liu et al. (2011), Khanagha (2011) and Adibah Wan Ismail et al. (2013). One possible reason for the above results is that the stakeholders are affected not only by standards applied but also by other factors. Another possible reason is the characteristics of the emerging markets which might hinder the benefits from IFRS adoption as the weak corporate governance, inadequate shareholder protection and the lack of effective controls and infrastructure to oversight reporting under the IFRS. In addition, convergence in a country that has high-quality accounting standards may not significantly improve all the measures of the financial reporting quality.

Conclusions

The current study extends the literature on the effect of IFRS on financial reporting quality and examines three attributes namely: value relevance, timely loss recognition, and earnings management. It sheds the light on the role of IFRS

in emerging markets to provide more evidence of the impact on the quality of financial information. The results show that firms in the post-IFRS period (2012-2014) are less likely to use accruals to smooth earnings compared to the pre-IFRS period (2008-2010). However, there is no significant difference in the timely loss recognition or the value relevance of accounting information under IFRS. The results suggest some improvement in FRQ under IFRS. This indicates that adopting high-quality accounting standards is not enough to guarantee improvement in FRQ.

This study is subject to several limitations. First, the study sample is limited to the industrial sector. It could be expanded by examining other sectors. Second, only three measures of FRQ are investigated. Further studies can be conducted using other measures as earnings persistence, loss avoidance, and investor responsiveness. The results imply the importance of IFRS and thus have direct implications for practitioners, international standard setters, and regulators. In addition, the results are of interest to analysts and investors who need to understand IFRS and FRQ issues in emerging markets.

Acknowledgments

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Intellectual Capital:
Its Impact on Financial Performance and Financial Stability of Ghanaian Banks

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This paper is an attempt to investigate the effect of intellectual capital (henceforth IC, which is defined using Value Added Intellectual Coefficient (VAIC™) as discussed in Pulic (2008, 2004, 2001, 1998) on financial performance and financial stability of 32 banks in Ghana from 2000 to 2015. The dataset is an unbalanced panel of 354 observations. The methodology of the paper is to test eight hypotheses related to IC and its components (Human Capital Efficiency or HCE, Structural Capital Efficiency or SCE and Capital Employed Efficiency or CEE) and their relationship with financial performance and financial stability. The paper finds support in favour of the claim that VAIC™ has a positive and significant impact on financial performance and financial stability. On the other hand, among the components of VAIC™, it is only HCE that behaves in a manner similar to VAIC™. Among the other components, SCE has a negative impact on financial performance and financial stability. CEE has a positive impact on financial performance but a negative impact on financial stability. This implies that SCE reduces both financial performance and financial stability, while CEE increases financial performance but reduces financial stability. Effects of controls, such as leverage, bank size, concentration and ownership structure are discussed in some detail.

Introduction

The history of intellectual capital (IC) can be traced to the 1960s and 1970s when the initial concern about human asset/resource accounting was raised (Roslender and Fincham 2001). The first exposure draft leading to the development of an accounting standard on intangible assets dates back to 1997, the consequent product which is IAS 38: *Intangible Assets*, the accounting treatment prescribed for intangible assets. Unlike the old economy which was physical capital-based, the current economy is information/knowledge-based. An innovative company doing noteworthy business may be operating in a kiosk with 3 computers, a printer and other electronic appliances and 3 staff, with its resulting operations/outputs hitting country and international headlines. Predominantly in both developed and developing economies, the economic fundamentals have changed resulting in a growing interest in IC which is now a critical element of organisational value. Firm's investment in IC has increased over the years above physical capital investment and is recognized as pivotal lever of wealth creation (Firer and Williams 2003). This has driven the interest in IC measurement, reporting and

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disclosures. In general terms, IC is the knowledge-base and creativity of the human mind. This goes beyond investment in copyrights, patents and goodwill, which appear on balance sheets; it includes know-how of staff and even the firm's relation with its key stakeholders. It is an essential measure of the wealth and value of organisations' human ingenuity; often leading to sustainable competitive advantage and sustainable corporate performance. As a result, corporate bodies now have a function for IC management called Chief Knowledge Officer (CKO), and research in this area continues to increase (Inkinen 2015).

Globally, research in IC continues to increase across industries and continents; the industries including banking, insurance, audit, hotel and small and medium-sized enterprises (SMEs). The key focuses of IC studies are on recognition, measurement, disclosure as well as investigation of the impact of IC on various institutional variables including performance, market value or the impact of certain variables including corporate governance (Al-Musalli and Ismail 2012) on IC. Earlier IC studies have been conducted across continents such as Europe (Mention and Bontis 2013, El-Bannany 2008), Asia (Mondal and Ghosh 2012, Lu et al. 2014), Australia (Clarke et al. 2011, Joshi et al. 2010), among others. In Africa, fewer studies have been done in this area. For banks, IC is very essential; first because banks provide myriads of services which are not accounted for by traditional accounting information. For instance, the financial statements fail to show the values of human capital, organisational capital as well as customer capital which are essential building blocks of every firm (Seetharaman et al. 2002). Again, the universal banking license allows for the provision of varied financial services by banks which, although are argued to help diversify risk, require expertise for effective management.

In Ghana, the aftermath of the structural adjustment programme supported by the IMF and World Bank saw the liberalisation of the banking industry. This and technological changes, globalisation and the adoption of the Universal Banking status have together increased competition and performance in the industry. The same factors have made the banking operations complex, justifying the case for prudent risk management. A search through literature however reveals that there is less knowledge about the impact of IC on financial performance and financial stability of banks in Ghana. Earlier IC studies in Ghana were on IC disclosure (Asare et al. 2013, Asare et al. 2014); the only banking study was by Alhassan and Asare (2016) which studied productivity. No Ghanaian banking study investigated the impact of IC and its components on a conventional financial performance measure or on risk over a long study period.

The current study seeks to address two research objectives: 1) to examine the impact of IC and its components on financial performance of Ghanaian banks and 2) to examine the impact of IC and its components on financial stability of Ghanaian banks. The study therefore seeks to answer two research questions: 1) Does IC and its components have significant impact on financial performance of Ghanaian banks? 2) Does IC and its components have significant impact on financial stability of Ghanaian Banks? First, this study estimated the IC of banks

using the VAIC™ model (Pulic 2001, 1998, 2008, 2004)[1]. The financial stability scores of banks were estimated using the traditional z-score (Hannan and Hanweck 1988, Boyd et al. 1993) and financial performance was measured using return on asset (ROA). The study employed the panel corrected standard error (PCSE) regression technique to investigate the impact of IC on financial performance and financial stability while controlling for leverage, size, competition, government ownership and foreign ownership. The study found evidence to the assertion that IC drives both financial performance and financial stability of banks in Ghana. The result also suggests that Human Capital Efficiency (HCE) is the lifeblood of IC and also a driver of financial performance and financial stability. Capital Employed Efficiency (CEE) is identified to be the next most vital component of IC and triggers increase in financial performance but a decline in financial stability. Structural Capital Efficiency (SCE) was evidenced to be the least important in the industry; it negatively affects financial performance and financial stability. Again, the empirical result indicates that the collusive power of the industry drives the financial performance of the industry but competition is a driver of financial stability.

The remaining parts of the paper are organized as follows: Section two provides a general overview of the evolution of the banking sector in Ghana and a review of empirical literature within the scope of the study. Section three focuses on the methods and data used. The next section presents the empirical results of the study. The penultimate section presented the conclusion of the study. Finally, the implications and recommendations of the study are covered in section six.

Overview of the Banking Industry of Ghana

There is an over-a-century history of banking activity in Ghana. From the establishment of the first government savings bank (i.e. the British Bank of West Africa now Standard Chartered Bank) in 1896 and the Colonial Bank (now Barclays Bank) in 1917, the banking industry has been liberalised leading to competition. It is worth noting that prior to the establishment of British Bank of West Africa, the Post Office Savings Bank was established in 1887 and was mainly serving the indigenous population (Appiah-Adu and Bawumia 2016). The financial system was clogged with massive state ownership, huge debts to state-owned enterprises, large non-performing loans, a fixed exchange rate system, and a weak central bank by the end of the 1970s (Isshaq and Bokpin 2012). In the 1980s, the Economic Recovery Programme (ERP), the subsequent Financial Sector Adjustment Programme (FINSAP) and Financial Sector Strategy Plan (FINSSP) were launched when the government sought assistance from the World Bank and the International Monetary Fund (IMF). The programme witnessed the introduction of a market with privatized banks and the central government's diversification of interest in most public corporations, deregulation, revitalization

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[1]VAIC™ is a registered trademark of Pulic A. (2001) Value Creation Efficiency Analysis of Croatian Banks, 1996-2000. (accessed July 2, 2014).. The VAIC™ model was first applied on the banking industry of Australia.

and restructuring of the industry. To provide a legal backing of the programme, the Banking Law 1989 (PNDL 225) was enacted to govern the banking industry of Ghana. As a result, there were new entrants into the banking industry.

**Figure 1.** *Timeline of Developments in the Banking Industry up to 2000*
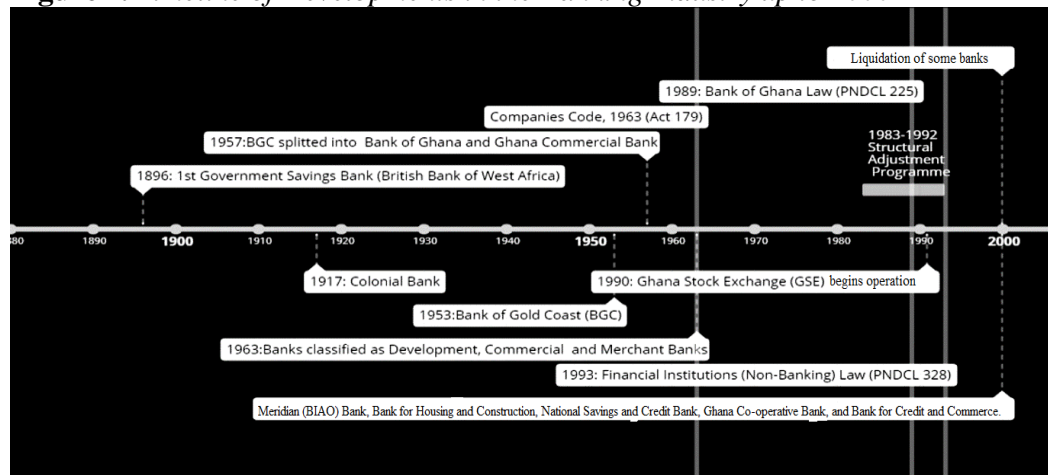
Source: Authors.

In spite of efforts to use legislative and regulatory reforms to enhance the banking industry, in attribution to the real estate losses (Sheng 1996, Sheng and Tannor 1996), Ghana experienced a number of bank liquidations in early 2000 involving banks such as Meridian (BIAO) Bank, Bank for Housing and Construction, National Savings and Credit Bank, Ghana Co-operative Bank, and Bank for Credit and Commerce. The Figure 1 provides a timeline of events up to the year 2000.

There have been various regulatory frameworks aimed at straightening the industry over the last 18 years. An example is the introduction of the Universal Banking License in 2003 which allows banks to carry out comprehensive activities involving investment banking, commercial banking, development banking and insurance among others. Another development is the enactment of the Ghana Deposit Protection Act 2016 (Act 931), which aims at protecting depositors against events of unexpected circumstances, which may result in loss of funds. This Act has been recently amended by the Ghana Deposit Protection (Amendment) Act 2018. The Banks and Specialised Deposit-taking Institutions Act 2016 (Act 930) consolidate all deposit taking laws and regulate deposit-taking institutions. The Bank of Ghana (Amendment) Act 2016 (Act 918) seeks to strengthen the functional autonomy, governance and the Central Bank's ability to respond to banking sector crises. The Act fills the loopholes of the Bank of Ghana Act 2002 (Act 612) and is based on examination of current international trends. The Bank of Ghana in its attempt of executing the Basel II regulatory provisions has given the banks a directive to adopt and apply a risk-based capital adequacy requirement starting from July 2018. As of August 2018, there were 30 licenced banks operating in Ghana. This would have been higher but for the collapse of

some banks and the merger of others[1]. Figure 2 gives a chronicle of regulatory and policy formulations that have evolved which has subsequently shaped the banking industry in the past 17 years.

Figure 2. *Developments in the Banking Industry from 2000-2017*
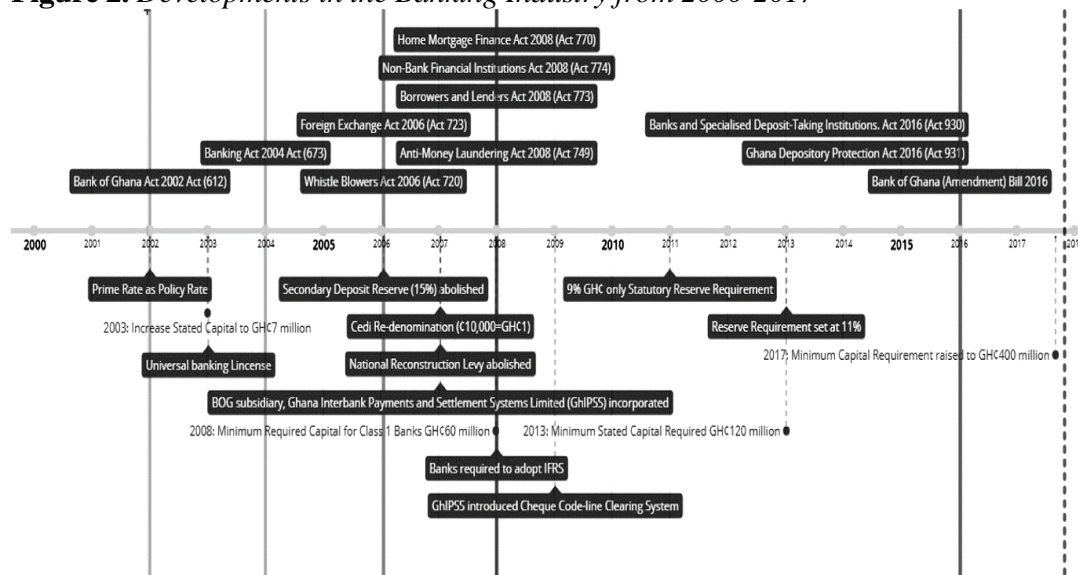
Source: Authors.

Literature Review

The resource-based view of the firm (Penrose 1959) argues that competitive advantage and greater performance are gained when firms acquire, hold and subsequently use strategic assets. IC indisputably is a key resource of firms in the current knowledge-economy and essentially in knowledge-intensive firms. In spite of the debate on classification, there is consensus that IC is a multidimensional concept, which consists of the firm's human, structural and relational resources (Bontis 1998, Mention and Bontis 2013). Human capital is the skills, knowledge and experience base of employees, which is enhanced through training and development. Structural capital is inseparable knowledge base of the organisation and includes structures, processes, systems, procedures, hardware, patents and even the strategy of the organisation. Relational capital is the relation of the organisation with various stakeholders. Other developments in literature include innovation capital, social capital, technological capital and information capital (Inkinen 2015). In spite of the discussions that grew in this area in both research and practice, there have been little impact on the studies as there was no quantitative measure for the various capitals. Earlier on, there was the employment of the traditional Tobin's Q method, the balanced scorecard approach (Kaplan and Norton 1996) and the intangible asset score card sheet (Sveiby 1989, 1997). Pulic

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[1]In 2017, two indigenous banks, UT Bank and Capital Bank were liquidated. In 2018, five other banks were merged into a newly licenced bank, the Consolidated Bank Ghana.

(2001), based on the stakeholder perspective, developed the VAIC™ method which provides a quantitative measure of IC for stakeholder's use. The method permits firms to estimate their efficacy and value creation efficiency and has been adopted in various studies across varied industries (Inkinen 2015).

In spite of its common usage in literature, the VAIC™ model has been criticized. One of them is Ståhle et al. (2011), which argued that the model merely indicates efficiency of the labour and capital investments of firms and is not a valid measure of IC. Nevertheless, other studies alluded to the significance of the VAIC™ model. For instance, Joshi et al. (2010) argued that at present, the model is the only essential quantitative model for measuring IC. Again, for the fact that it used data sourced from audited financial statements which are available public data, it suggests that there is much simplicity, verifiability and reliability (Clarke et al. 2011, Zeghal and Maaloul 2010). Essentially, the model also provides information that has scope and is comparable among firms (Nazari and Herremans 2007, Maditinos et al. 2011).

IC studies have been conducted across various continents. In the European literature, Cabrita and Vaz (2005) used a questionnaire on 53 banks to study the IC performance in Portuguese banks and found IC to be prominently associated to organisational performance. The study concluded that structural capital and relational capital positively moderate the human capital and organisational performance link. Similar result was found in Mention and Bontis (2013), which used 200 survey instruments in Luxembourg and Belgium to study IC and performance connection. The results indicated that human capital has direct and indirect impact on business performance. Also, the impacts of structural capital and relational capital were found to be positive but insignificant on IC while relational capital negatively moderates structural capital's contribution on performance. The VAIC™ model is employed by a number of studies. El-Bannany (2008) investigated the determinants of IC performance in UK from 1999 to 2005 and found that bank profitability and risk are important determinants. The study also found that bank efficiency, investments in IT systems, barriers to entry and efficiency of investments in IC variables have statistically significant impact on IC performance. In a study on 21 banks listed on the Milan Stock Exchange, and using data from 2005 to 2007, Puntillo (2009) found no statistical evidence of an association between business performance measured by return on investment (ROI), return on asset (ROA), market-book-value (MBV) and IC. The only association was evidenced between CEE and the performance measures.

In Asia, the VAIC™ method has been employed in most studies. Mavridis (2004), in a study in Japan for the period 1st April 2000 to 31st March 2001, confirmed significant performance differences among a range of banks. The study also found the same evidence between Japanese and some European banks (data from Greek and Austrian banks). Using data from 2001 to 2003 in Malaysia, Goh (2005) found that the HCE of banks was relatively higher than CEE and SCE. Also, foreign banks were found to be more efficient than domestic banks. Kamath (2007) used data from 2000 to 2004 to study the Indian banking industry and also found that foreign banks outperformed the domestic ones. Again, while there was overall performance improvement over the study period, the study confirmed that

performance differed with respect to segments. Using data from 65 banks from 1999 to 2008, Mondal and Ghosh (2012) used ROA and ROE to measure profitability and ATO to measure productivity and confirmed varied associations between IC and these performance indicators. Again, the study concludes that banks' IC is vital for their competitive advantage. Saengchan (2008) found a strong nexus between IC and financial performance of banks in Thailand over the period 2000-2007. The study used cost-total asset (CTA) ratio to proxy efficiency and ROA for profitability. IC was found to be strongly linked to CTA, suggesting that high IC banks are also cost efficient. In the study, HCE was a major factor of cost efficiency and highly negatively correlated. In a study on listed banks in Turkey from 1995 to 2004, Yalama and Coskun (2007) used the VAIC™ and Data Envelopment Analysis (DEA) and found that the effect of IC on profitability was averagely at 61.3%. The study developed 3 portfolios and found that the portfolio with IC as input yields the highest return. Ghosh and Maji (2014) examined the impact of IC and its components on bank risk in India using data from 1998 to 2012. The study found IC to be inversely associated with credit risk. In the case of insolvency risk, the study found that z-score is positively but insignificantly affected by IC efficiency; suggesting that IC efficiency is negatively related to insolvency risk. The study also found that HCE is positively related to z-score (i.e. negatively related to insolvency risk) but the relationship was insignificant. SCE has a significant positive impact on z-score (i.e. negatively related to insolvency risk).

In Australia, Pulic (2004) revealed that IC and corporate success strongly interact, showing that the banks with high investment in IC perform better financially. In the same industry, Joshi et al. (2010) studied the IC performance of Australian owned banks for the period 2005 to 2007 and found HCE to be higher than CEE and SCE in all banks. In the study, VAIC™ related significantly with human cost and value addition. However, it was found that size, total number of employees and total equity had little or no effect on IC.

In Africa, some studies examined the IC study across sectors and not precisely banks (Firer and Williams 2003). In Ghana, earlier IC studies were on IC disclosure (Asare et al. 2014, Asare et al. 2013). Asare et al. (2013) conducted a content analysis on the annual reports of 25 listed companies (bank and non-bank) over the period 2006-2010 and found that disclosure of IC was quite high and reported descriptively. It found that the improvement in IC disclosure was at a marginal rate. In addition, Asare et al. (2014) used the same data and found that the firms in the finance and insurance sector disclose more IC in their annual reports. Using data from 18 banks over the period 2003-2011, Alhassan and Asare (2016) employed the VAIC™ and DEA to investigate the impact of IC on bank productivity. Employing the Malmquist Productivity Index (MPI) as a measure of productivity, the study found that VAIC™ has a positive impact on productivity. Also, HCE and CEE are the main component drivers. The earlier study used fewer number of banks over a shorter study period. Also, earlier African studies did not examine the impact of IC on financial stability. Specifically in the Ghanaian context, earlier studies did not use the traditional financial performance ratios.

The current study is original in drawing an empirical link between IC and financial stability in an emerging economy. Also, the study used data of more banks over a longer period as compared to earlier studies, thus the analysis may provide comparatively more precise results.

Data and Methodology

There are four parts to this section. The first part describes the model for estimating IC as well as its components in line with the VAIC™ model of Pulic (2001). The next part discusses the proxies used to measure financial performance and financial stability. The penultimate part outlined the empirical model employed to test the various hypotheses of the study which are developed in the last part. The main data (income statement and statement of financial position) are sourced from the Banking Supervision Department of the Bank of Ghana and cross-validated from the annual reports of banks. Data of 32 banks with 354 observations spanning a 16-year period (2000-2015) was used[1].

Measuring IC and its Components: The VAIC™ Model

To measure IC and its components, the current study applied the VAIC™ model of Pulic (2008, 2004, 2001, 1998). The VAIC™ model is a tripartite model with the components: HCE, SCE and CEE. The model is meant to enable managers and stakeholders effectively monitor how the total resources as well as each resource component at their disposal help to generate value addition. HCE defines the knowledge and skills of the employees which can be augmented by training and development. Examples of these include the technical competence, creativity, personal attributes, leadership skills, business skills, and the people skills of employees which at the micro (individual) level enhance financial performance and financial stability. At the macro (organisational) level, healthy work environment and team work, occupational health and safety, commitment to employee growth and development are some human capital factors. SCE comprises of the systems, databases, structures, processes, procedures, policies, routines, hardware, strategies and the intellectual property of the bank. They are created by the organisation and cannot be separated from the organisation. They have the potential of enhancing the capability of employees but are not linked to employees at the individual level. CEE measures the ability of equity holder's fund to contribute to value creation. Pulic (1998) asserted that IC does not create value in a vacuum but does so when combined by financial (physical) capital. This measure seeks to ascertain the efficiency that has not been measured by both HCE and SCE. IC is ascertained by adding these three components which are HCE, SCE and CEE. The mathematical model for VAIC™ has been presented in Appendix 1.

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[1]There were 30 banks in operation as of 2015, 27 of which are used in this study. Also, 5 other banks that existed over the study period but later exited have been included.

The current study adopts the VAIC™ model since it still offers us an insight into the IC of banks. Also, this is because the arguments in contrast to the method are not mainly because of the insufficiency of the model in itself but because of the difficulty in quantitatively measuring IC.

Measuring Financial Performance and Financial Stability

Various bank studies employed ROA as dependent variable in their studies to measure financial performance (Tan et al. 2017, Firer and Williams 2003). In this current study, the ratio of Profit Before Tax (PBT) to total asset is used to estimate ROA. The ratio expresses the effectiveness of the bank to take earnings advantage of the asset base at its disposal. High values of this ratio are desirable while lower values are undesirable. Higher values suggest that the management of the bank has been effective in taking advantage of economic resources to increase returns.

The z-score, a measure of insolvency risk, is employed as a measure of financial stability in this study. It was first proposed by Hannan and Hanweck (1988) and used by Boyd et al. (1993). Since then, it has been employed by various studies to investigate the financial stability of banks (Iannotta et al. 2007, Tan and Floros 2013, Tan et al. 2017, Ghosh and Maji 2014). The score considers the return, volatility of return and the capital base of the banks. High z-score suggests financial stability and the ability to absorb losses[1]. The model is given as:

$$ZS = \frac{ROA + E/A}{\sigma ROA} \tag{1}$$

where ROA is return on asset, E/A is equity-asset ratio and σROA is the standard deviation of ROA.

Empirical Model

The authors employed the Prais-Winsten panel corrected standard error (PCSE) regression technique of Beck and Katz (1995) to ascertain the impact of IC and its components on financial performance and financial stability of banks in Ghana. The following models are used to ascertain the link.

$$\varphi_{i,t} = \alpha_1 + \delta_2 VAIC^{TM}_{i,t} + \delta_3 LEV_{i,t} + \delta_4 HHIL_{i,t} + \delta_5 SIZE_{i,t} + \delta_6 GOWN_{i,t} + \delta_7 FOWN_{i,t} + \varepsilon_{i,t} \tag{2}$$

$$\varphi_{i,t} = \omega_1 + \gamma_2 HCE_{i,t} + \gamma_3 SCE_{i,t} + \gamma_4 CEE_{i,t} + \gamma_5 LEV_{i,t} + \gamma_6 HHIL_{i,t} + \gamma_7 SIZE_{i,t} + \delta_8 GOWN_{i,t} + \delta_9 FOWN_{i,t} + \tau_{i,t}$$
$$\tag{3}$$

where φ is the financial performance or financial stability indicator of a bank; *i* and *t* are the specific bank and year respectively. VAIC™ is value added intellectual coefficient, HCE is the human capital efficiency, SCE is the structural capital

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[1]The z-score measures financial stability of the banks. High z-score suggests low insolvency risk (high solvency risk and high financial stability) and low z-score suggests high insolvency risk (low solvency risk and low financial stability)

efficiency, CEE is the capital employed efficiency, LEV is the leverage of the bank, SIZE is the size of the bank, HHIL is the concentration measure of the bank, GOWN is government ownership and FOWN is foreign ownership. For ε and τ they are the error terms which are serially correlated along time. Also, α and ω represent the constant terms while δ and γ are the regression coefficients.

Equation (2) examines the aggregate effect of VAIC™ (i.e. additive measure of components HCE, SCE and CEE) on financial performance and financial stability. On the other hand, Equation (3) examines the effect of the individual components of VAIC™ separately on financial performance and financial stability. Although the aggregate effect of VAIC™ might be positive or negative, the individual component drivers of VAIC (i.e. HCE, SCE and CEE) might behave differently. Thus, the regression equations look at the problem in two ways.

Hypotheses Development

The evolved theoretical links between the dependent variables and the explanatory variables are explored in this section with their resulting hypotheses. A tabular presentation of the relationships between the dependent variables and the explanatory variables has been presented in Appendix 2.

IC (VAIC™) and Financial Performance

The knowledge-based view (KBV) of the firm points out that IC is an essential organisational value and performance driver. Greater advantage is obtained from IC investment than in physical capital in organisations especially in the service sector. IC investment has become a strategic way to enhance competitive advantage and firm value. Empirical studies by Mondal and Ghosh (2012), Saengchan (2008) and Cabrita and Vaz (2005) attributed the positive impact of IC measured by VAIC™ on performance, save for Puntillo (2009). Our expectation based on theory and empirical results is a positive association between IC, its components (HCE, SCE and CEE) and financial performance. The following hypotheses are therefore tested:

> *H1. IC is a driver of high financial performance in banks.*
> *H2. HCE is a driver of high financial performance in banks.*
> *H3. SCE is a driver of high financial performance in banks.*
> *H4. CEE is a driver of high financial performance in banks.*

IC (VAIC™) and Financial Stability

Risk and IC in banking studies are not many. Ghosh and Maji (2014) was the first to consider the nexus, using credit risk and insolvency risk. The role of human capital in risk management in current financial markets that require consistent adjustments to market issues cannot be overemphasized. The human and non-human knowledge-base of the organisation is expected to increase efficiency in

giving out loans and thus reduce the probability of loan loss or insolvency. In line with this argument, we expect a negative link between IC with its components and risk such that high IC leads to lower risk. Thus, high IC is expected to lead to financial stability (high z-score). The following hypotheses are therefore tested:

H5. IC is a driver of high financial stability in banks.
H6. HCE is a driver of high financial stability in banks.
H7. SCE is a driver of high financial stability in banks.
H8. CEE is a driver of high financial stability in banks.

To reduce the effect of other exogenous variables that may explain the observed nexus that IC has on financial performance and financial stability, five control variables (size, concentration, leverage, foreign ownership and government ownership) have been included in the regression model.

Leverage

Earlier studies employed leverage in IC studies (Zeghal and Maaloul 2010, Firer and Williams 2003). The ratio of total liabilities to total assets is used as proxy for leverage in this study. High leverage can result in banks mainly focusing on meeting the demands of their debtholders. This deviates from the stakeholder view assumed by VAIC™. Again, banks that employ high debt will consequently have higher obligations to pay interest to debt holders, which could make them less attractive for investors and also highly exposed to the risk of insolvency.

Size

A benefit that banks derive from large scale operation is economies of scale. Economies of scale results in decreased cost which can lead to higher firm performance. Again, it can also affect the risk-bearing ability of banks. Large banks are more able to spread their portfolio risks by way of diversification as compared to the smaller banks. The natural logarithm of total assets is used as a proxy for size in this study. This has been employed in other banking studies (Firer and Williams 2003, Alhassan and Asare 2016). Biekpe (2011) provided an empirical evidence of the existence of economies of scale in the banking industry of Ghana.

Market Structure

The Quiet Life Hypothesis (QLH) of Hicks (1935) argues that firms in concentrated markets benefit from a "quiet life" devoid of competition. This in effect negatively impacts performance since banks become inefficient. The inefficiency of managers can also be evidenced in their inability to manage risks. Earlier studies employed the concentration ratio to measure market structure (Alhassan and Asare 2016). The Herfindahl Hirschman Index (HHI) is a better market structure power compared to the concentration ratio. From the product

market concentration standpoint, this study measures HHI as the sum of squares of market shares of loans of the banks apiece[1].

Ownership Structure

Ownership structure can be expressed in various ways. This can be based on foreign and domestic ownership or on government and private ownership. Goh (2005) and Ghosh and Maji (2014) respectively conducted their IC analysis using the ownership structures. For the first measure, a dummy of 1 is used to represent foreign banks and 0 for local banks while for the second measure, a dummy of 1 is used to represent government ownership and 0 for private ownership. Based on the global advantage theory, it is expected that foreign banks will have access to better technologies and expertise. This is expected to have a positive effect on their financial performance and financial stability. Also, management of the banks that are owned by government may be exposed to bureaucracy and external pressures from politicians who may have a negative effect on their financial performance and financial stability.

Empirical Results

This section discusses the results of the descriptive statistics, the correlation analysis and the regression results to address the research objectives and test the various hypotheses developed for the study.

Descriptive Statistics

The results of the descriptive statistics presented in Appendix 3 shows that overall, the mean of ROA is 0.031 (SD=0.04) suggesting that banks make a return of 3.1% on total asset, which varies across banks and across years. Also, the result indicates that ZS has an average of 5.435 and varies across bank and years. The result on VAIC™ and its components show that on average, the VAIC™ of the banks is at 4.311. HCE contributes an average of 3.022 to VAIC™. On average, SCE contributes 0.588 to VAIC™ while CEE contributes 0.681 to VAIC™. This result differs from that of Alhassan and Asare (2016) which found that on average VAIC™ was 2.09 (SD=1.94), HCE was 1.54 (SD=1.45), SCE was 0.50 (SD=0.40) and CEE was 0.05 (SD=0.03). As a result of the superiority of the data used by the current study, the relevance of the components of VAIC™ has to be re-established that the second most vital component is CEE and the third being SCE. The result on LEV indicates that on average, 82.8% of the asset of the banks is financed by debt. In terms of the size of banks, on average, the total assets of the banks is at GH¢ 762 million and varies across banks and years. Again, the result indicates that

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[1]The HHI of loans can be computed as $HHI = 1000 * \sum_{i=1}^{N} MS_i^2$ where MS is the market share of total loans of a bank for a specific year.

only few (13.4%) banks are government owned, with 48.7% of the banks being foreign owned.

Correlation Analysis

The pairwise correlation matrix is computed for the explanatory variables to test whether there is the existence of multicollinearity which can lead to wrong inferences. This has been presented in Appendix 4. The results indicated that HCE is highly correlated with VAIC™ with a coefficient of 98.1. However, this is not a problem since both VAIC™ and HCE will not be included in the same regression models but different models. Apart from that, all the other correlation coefficients are below 0.7. Thus, using the rule of thumb of 0.7 as argued in Kennedy (2008), the regression models will not be perverted by multicollinearity. Moreover, a variance inflation factor (VIF) test has been conducted as presented in Appendix 5. The results are below three which is far below the rule of thumb of ten, suggesting that multicollinearity does not exist. Wooldridge (2016) argues that a VIF below ten suggests that there is no multicollinearity.

Intellectual Capital (IC), Financial Performance and Financial Stability

The results of the nexus between IC and financial performance, as well as financial stability are presented in Table 1. VAIC™ and also its components were separately regressed on financial performance and financial stability. The panel corrected standard errors (PCSE) regression model was used for the estimations. The model diagnostics as indicated by the Wald Chi-square shows that the variables included in the models affect financial performance and financial stability significantly. Also, the results indicated that R-squared hovers around 37% and 39%. The model estimation has been discussed in Appendix 6.

The results indicated that VAIC™ positively and significantly affects financial performance at 1%. This supports our H1 that IC drives financial performance of banks. The result is consistent with the finding of Mondal and Ghosh (2012) and Alhassan and Asare (2016). This indicates that IC triggers financial performance of banks. This emphasises the importance of IC in increasing innovative capabilities of the banks for augmenting financial performance. The result also indicates that HCE has a positive and significant impact on financial performance at 1%. This is also consistent with our H2 and with the findings of Alhassan and Asare (2016). This suggests that banks can use their investment in human capital to drive financial performance. In the case of SCE, there is a negative and insignificant impact on financial performance. This is contrary to our H3 and suggests that SCE is not important for driving financial performance. The result is consistent to some extent with the finding of Mondal and Ghosh (2012) but the difference can be explained by the fact that their study did a year-on-year analysis instead of a pooled analysis. Also, it is contrary to the findings of Alhassan and Asare (2016) which found a positive insignificant nexus but this can be explained by the fact that a productivity measure has been used. Thus, based on these two studies and our results, it is suggested that SCE is not

important to financial performance measured by profitability as compared to that measured by productivity. CEE has a positive effect on financial performance. However, the nexus is statistically insignificant. This suggests that capital investment positively affect financial performance but slightly.

Table 1. *IC, Financial Performance and Financial Stability*

	ROA	ZS	ROA	ZS
VAIC™	0.007***	0.431***		
	(0.001)	(0.119)		
HCE			0.007***	0.548***
			(0.001)	(0.145)
SCE			-0.006	-0.090
			(0.006)	(0.600)
CEE			0.007	-1.340***
			(0.005)	(0.391)
LEV	0.021***	-2.616***	0.020**	-1.469*
	(0.008)	(0.907)	(0.008)	(0.880)
SIZE	0.013***	-0.823***	0.013***	-0.569***
	(0.002)	(0.206)	(0.002)	(0.207)
HHIL	0.446***	-55.671***	0.473***	-40.841***
	(0.082)	(8.652)	(0.082)	(8.405)
GOWN	0.001	2.000***	0.000	1.912***
	(0.007)	(0.557)	(0.007)	(0.547)
FOWN	0.006	2.020***	0.007	1.795***
	(0.005)	(0.419)	(0.005)	(0.424)
CONSTANT	-0.312***	25.605***	-0.310***	19.629***
	(0.049)	(4.690)	(0.048)	(4.734)
Banks	32	32	32	32
Observations	354	354	354	354
R-squared	0.366	0.309	0.389	0.338
Wald χ^2	134.21***	72.72***	137.79***	68.61***
AR(1)	27.508***	48.746***	32.591***	58.837***
B-P/C-W χ^2	33.10***	28.76***	58.83***	102.12***

Notes: ROA, return on asset; ZS, z-score; VAIC™, value added intellectual coefficient; HCE, human capital efficiency; SCE, structural capital efficiency; CEE, capital employed efficiency; LEV, leverage; SIZE, size of bank (logarithm of total assets); HHIL, Herfindahl Hirschman Index of loans; GOWN, government ownership and FOWN is foreign ownership, CONSTANT is the constant variable, AR (1) is first order serial correlation and B-P/C-W is Breusch-Pagan/Cook-Weisberg test for heteroscedasticity[1]. Standard errors are in parenthesis and are robust to both heteroscedasticity and serial correlation *** $p<0.01$, ** $p<0.05$, * $p<0.1$
Source: Authors' Estimation in STATA14[2].

For the result of the control variables, leverage was found to have a positive and significant effect on financial performance. This suggests that banks that employ high debt are high financial performers. Size has a positive and significant

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[1] The heteroscedasticity test is based on the studies of Breusch and Pagan (1979) and Cook and Weisberg (1983).
[2] The authors have applied the *asdoc* STATA program written by Shah A. (2018) "Asdoc: Create High-Quality Tables in MS Word from Stata Output". to create the tables.

effect on financial performance, which suggests that the banks enjoy the benefit of economies of scale which enhances their financial performance. Concentration of banks has a positive and significant effect on financial performance. Thus, high competition reduces the financial returns of the banks, suggesting that bank profitability is driven by the collusive power of banks in the industry rather than on efficiency. Government ownership of banks has a positive impact in financial performance, suggesting that government owned banks are relatively high financial performers. This can be as a result of the benefits that government owned banks enjoy because of their association to government. For instance, many government payments (e.g. government workers' salary payments) are carried out through government banks and thus will serve as an advantage for the banks as compared to the private banks. Foreign ownership has a positive and insignificant effect on financial performance. This suggests that foreign ownership slightly triggers high financial performance and is consistent with the finding of Goh (2005) and Kamath (2007). There have been many innovative initiatives that have been brought into the banking industry over the past years by foreign banks, which can explain their high financial performance as compared to their local counterparts.

The results of this current study provide additional insight into the IC and financial stability nexus as studied by Ghosh and Maji (2014). The results of this current study indicated that VAIC™ has a positive significant impact on financial stability (i.e. negative effect on insolvency risk) at 1 percent. This is consistent with our H5. Although Ghosh and Maji (2014) also established a positive relationship, the relationship was insignificant. Also, their study used a different measure of IC (i.e. HCE+SCE). Our result indicates that IC performance triggers financial stability. As regards the impact of HCE on financial stability, there is a positive significant relationship at 1 percent which is in support of our H6. This is also similar to the positive relationship evidenced in Ghosh and Maji (2014) except for the insignificant relationship they found. This suggests that banks that have employees with technical skills, business skills, leadership skills, people skills and have an organisational environment that encourages learning and development are likely to be financially stable. This is very essential especially in the Ghanaian context where non-performing loans have been a major drawback to the financial stability of the industry. The argument here is that high human capital investment will result in better risk management, loan management, capital structure decision, working capital decisions which could have consequences on financial stability. SCE has a negative and insignificant effect on financial stability. This is contrary to our H7 and the finding of Ghosh and Maji (2014). The finding suggests that structural capital is not a positive driver of financial stability. Thus, the organisational culture, systems, policies, procedures and structures in the banking industry are not positive drivers of financial stability. CEE has a negative and significant effect on financial stability. This does not support our H8 and suggesting that financial capital does not drive financial stability. Thus, the ability of shareholders' fund to create value does not trigger financial stability. An attempt of managers to meet the needs of shareholders without considering the needs of other stakeholders will undermine the financial stability of the industry.

In terms of the control variables, leverage has a negative and significant effect on financial stability. This suggests that high debt in the capital structure of banks will trigger financial instability. This supports the regulatory decision of Bank of Ghana to adopt the Basel II framework and the increase of the minimum capital requirements of the banks to GH¢120 million in 2013 and GH¢400 million in 2017. Size has a negative and significant effect on financial stability. This suggests that banks are not able to attain risk-bearing economies of scale. Concentration has a negative and significant effect on financial stability. This suggests that competition induces financial stability. Government ownership has a positive and significant effect on financial stability. This suggests that government ownership enhances financial stability. Foreign ownership has a positive and significant effect on financial stability. This also suggests that foreign ownership enhances financial stability of banks.

Conclusion

In the current knowledge-based economy, the focus of businesses is not only on their financial capital. Their focus is on all the various capitals that have the potential of enabling them earn competitive advantage, increased financial performance and financial stability. In banking, the issuance of the Basel Accords emphasis the need for capital efficiency, risk management and revenue growth. Banks employ various intellectual assets such as human capital, structural capital and relational capital to improve their financial performance, financial stability and innovative capacity.

This study investigates the impact of IC and its components on financial performance and financial stability of banks using an unbalanced panel data of 32 banks with 354 observations over the study period 2000-2015. The Panel Corrected Standard Errors (PCSE) regression model was used to study the impact while controlling for leverage, size, concentration, foreign ownership and government ownership. The study is unique in that it employed data of 27 (90%) of the banks in operation in 2015 and 5 other banks that have exited the industry over the study period. The study period is 16 years as compared to Alhassan and Asare (2016) which used a study period of 9 years and 18 banks. As we increased the sample size, the precision of our results also increases. Again, the current study is original in examining the relationship between IC and financial stability in Africa. The study has controlled for concentration for both financial performance and financial stability using the Herfindahl Hirschman Index which is superior to the concentration ratio. Finally, the ownership structures of banks have been considered in this study. Some earlier studies either did not include them or conducted their analysis based on the ownership structures without including ownership as a control variable.

On the results of VAIC™, the study found that the IC performance of banks results mostly from HCE. This suggests that the abilities, knowledge and skills of employees of the banks are the driving force of financial performance. Thus, in support for the resource-based theory, the ability of banks to have efficient human

capital will earn them sustained competitive advantage and consequently increased financial performance. The second most important component is CEE which measures the value creating ability of financial capital of shareholders. The least contributing constituent is the SCE. This is contrary to the finding of Alhassan and Asare (2016) which used fewer data and found that SCE is the second most important constituent and CEE is the least. The study also found that overall, the average financial stability (z-score) of the industry over the study period is somewhere around 5.4.

The empirical result of the impact of IC on financial performance reveals that IC drives financial performance. This supports the resource-based view which argues that IC is essential in increasing sustainable competitive advantage which eventually results in increased financial performance. HCE was evidenced to be the most contributing factor in driving financial performance. Thus, banks that are unable to harness the potentials of their employees in creating value will perform abysmally in terms of financial performance. CEE has a positive effect on financial performance. Although this relationship was insignificant, the positive relationship suggests banks that are able to create more value from shareholder's capital have increased financial performance.

In the case of the impact of IC on financial stability, the empirical evidence reveals that IC is the lifeblood of financial stability. HCE is evidenced to be the most important IC factor that drives the financial stability of banks. This reveals the importance of experience, skills and abilities of employees in effective risk management. SCE negatively affects financial stability. Although the effect is not significant, the result suggests that corporate culture, systems, processes and procedures do not drive the financial stability of banks. This result may suggest that the structural capital of banks in Ghana do not provide a conducive environment for effective risk management. Thus, there is the need for the banks to ensure the development of a corporate culture and internal control systems that ensure effective risk management. This can be effectively done by employing best practice corporate governance principles. This finding may provide barking to the reason for the collapse of some banks in recent banks, by asserting that it is because of poor corporate culture and poor corporate governance. CEE was found to have a significant negative impact on financial stability. This suggests that the ability of financial capital to create value inhibits financial stability. Thus, over-focusing on shareholder value creation at the expense of the other stakeholders may result in undermining financial stability.

For the result of the control variables, the study suggests that banks that employ high debt are high financial performers. However, high debt in the capital structure of banks may trigger financial instability. This backs the adoption and implementation of the Basel II framework by the Bank of Ghana which took off from 2018. It also supports the increase of the minimum capital requirements of the banks to GH¢120 million in 2013 and GH¢400 million in 2017. Banks were found to be enjoying the benefit of economies of scale which enhances their financial performance. However, the banks may be unable to attain risk-bearing economies of scale. High competition reduces the financial returns of the banks. This suggests that bank profitability is driven by the collusive power of banks in

the industry rather and not efficiency. Yet, competition in the industry induces financial stability. Government owned banks are relatively high financial performers but are more financially stable. Foreign ownership slightly triggers high financial performance but it highly results in financial stability supporting the global advantage theory.

Implication of Findings and Recommendations

The study has implications for policy and practice. It suggests that investment in IC is a force to reckon with and is a driver of financial performance and financial stability. Generally speaking, investment in training and development of employees pays off. Thus, bank managers should take steps to involve in better human capital investment that will end up increasing the financial performance and financial stability of the banks. Management should exploit the benefits of SCE as well as CEE to enhance their financial performance and financial stability. SCE can be enhanced by putting in place various internal controls processes through the application of corporate governance best practices. The banks should consider the stakeholder view so as to reap the benefits of IC. Thus, the needs of not only the shareholders but also the employees, customers, investors, debtholders should be considered and by so doing increased financial performance and financial stability will be attained. The banks should attempt to report on IC so as to monitor their IC performance and also derive the benefits from the competitive advantages that IC yields. This is very essential because the next phase of corporate reporting is about how value is created by businesses. In so doing, the International Integrated Reporting Council's (IIRC) framework of capitals and how they help create value can be adopted. The regulator should also monitor the IC performance of the banks to ensure that banks have the prerequisite knowledge-base and internal processes and systems to be able to conduct effective and efficient bank management and most especially monitor risk since the regulator is poised towards enhancing effective risk management in order to foster financial stability and create a resilient financial industry. Competition in the industry should be fostered by the regulator since it serves as a recipe to financial stability.

In spite of the relevant results provided by the study, it is not without limitations. First, the employment of the VAIC™ model has been criticised by some researchers because of its inability to measure relational capital and for the fact that where negative value added is obtained by banks, the VAIC™ results become difficult to interpret. Also, the study employed the profitability ratio to ascertain financial performance, other measures such as efficiency scores (technical efficiency, cost efficiency, revenue efficiency, profit efficiency) can be estimated using parametric or non-parametric approaches to measure financial performance of banks. There have been efforts by some scholars to produce an extended VAIC model (Nazari and Herremans 2007), other studies can use such models to exploit the impact of IC on dependent variables. Also, the relationship between IC and competition, corporate governance, research and development can

be examined by subsequent studies. Another area for further study is the investigation of the determinants of IC. This current study was conducted using data on the banking industry of Ghana, other studies can cover the firms listed on the Ghana Stock Exchange, multinational companies or small and medium-sized enterprises (SMEs) can also be considered. Other banking studies can conduct a content analysis of the annual statement of the banks to examine their IC reportage over the years. More so, cross-country studies will also provide more insight by including various economic, regulatory or regional differences. Thus, further studies can explore the various industries in Sub-Saharan Africa (SSA), or other economic or regional blocs.

Acknowledgements

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Appendices

Appendix 1. *Measuring IC and its Components: The VAIC™ Model*

Value added (VA) reflects the contribution of management and employees to value creation. When total bank revenue, including interest income, and fees and commission, is represented by OUTPUT and the operating cost, including interest expenses, finance and administration expenses excluding personnel expenses (it is rather treated as an investment), is represented by INPUT, VA can be expressed mathematically as:

$$VA \ = \ OUTPUT - INPUT \tag{4}$$

With this, we can break down each component of VAIC™ in a ratio form as:

$$HCE = VA/HC \tag{5}$$

Where HC is human capital, personnel expenses herein treated as investment.

$$SCE = SC/VA \tag{6}$$

Where SC is structural capital, VA less HC

$$CEE = VA/CE \tag{7}$$

Where capital employed is the book value of the firm's total net assets.
The variables are expressed as follows:

1. HCE - indicating the value added (VA) efficiency of human capital
2. SCE - indicating the VA efficiency of structural capital
3. CEE - indicating the VA efficiency of capital employed.

The VAIC™ model is then formalized as:
$$VAIC™_i = HCE_i + SCE_i + CEE_i \tag{8}$$

Where:

$VAIC™_i$ is the value added intellectual coefficient of bank *i*.
HCE_i is the human capital coefficient of bank *i*.
SCE_i is the structural capital coefficient of bank *i*.
CEE_i is the capital employed coefficient of bank *i*.
It is also worth noting that HCE + SCE yield the intellectual capital efficiency (ICE) coefficient (Pulic, 2008).

Appendix 2. *Relationships between Dependent Variables and Explanatory Variables*

	Expected Signs		Actual Signs	
	ROA	ZS	ROA	ZS
VAIC™	+	+	+	+
HCE	+	+	+	+
SCE	+	+	-	-
CEE	+	+	+	-
LEV	-	-	+	-
SIZE	+	+	+	-
HHIL	-	-	+	-
GOWN	-	-	+	+
FOWN	+	+	+	+

Source: Authors.

Appendix 3. *Summary Statistics of Model Variables*

Variable	Obs	Mean	Std.Dev.	Min	Max
ROA	359	0.031	0.040	-0.171	0.181
ZS	359	5.435	3.880	-5.107	30.965
VAIC™	354	4.311	3.133	-2.827	33.263
HCE	356	3.022	2.959	-1.628	32.075
SCE	354	0.588	0.380	-3.119	2.435
CEE	356	0.681	0.471	-0.538	4.537
LEV	359	0.828	0.174	0.090	1.937
SIZE (GH¢)	359	7.62e+08	1.00e+09	884000	6.59e+09
HHIL	359	0.090	0.035	0.056	0.183
GOWN	359	0.134	0.341	0.000	1.000
FOWN	359	0.487	0.501	0.000	1.000

Notes: ROA, return on asset; ZS, z-score; VAIC™, value added intellectual coefficient; HCE, human capital efficiency; SCE, structural capital efficiency; CEE, capital employed efficiency; LEV, leverage; SIZE, size of bank; HHIL, Herfindahl Hirschman Index of loans; GOWN, government ownership and FOWN is foreign ownership.
Source: Authors' Estimation in STATA14.

Appendix 4. *Correlation Matrix for Explanatory Variables*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) VAIC™	1.000								
(2) HCE	0.981***	1.000							
(3) SCE	0.341***	0.225***	1.000						
(4) CEE	0.214***	0.070	0.046	1.000					
(5) LEV	-0.138***	-0.178***	-0.084	0.303***	1.000				
(6) SIZE	0.041	0.034	-0.019	0.102*	0.068	1.000			
(7) HHIL	0.039	-0.017	0.128**	0.266***	0.060	-0.691***	1.000		
(8) GOWN	-0.053	-0.066	-0.058	0.126**	-0.033	0.186***	0.069	1.000	
(9) FOWN	0.170***	0.176***	0.157***	-0.153***	-0.111**	0.036	-0.094*	-0.383***	1.000

Notes: VAIC™, value added intellectual coefficient; HCE, human capital efficiency; SCE, structural capital efficiency; CEE, capital employed efficiency; LEV, leverage; SIZE, size of bank (logarithm of total assets); HHIL, Herfindahl Hirschman Index of loans ; GOWN, government ownership and FOWN is foreign ownership.
Source: Authors' Estimation in STATA14.

Appendix 5. *Variance Inflation Factor*

	VIF	1/VIF
ROA and ZS		
SIZE	2.263	0.442
HHIL	2.167	0.461
GOWN	1.353	0.739
FOWN	1.238	0.808
LEV	1.081	0.925
VAIC™	1.068	0.936
Mean VIF	1.528	0.936
ROA and ZS		
HHIL	2.708	0.369
SIZE	2.621	0.382
CEE	1.427	0.701
GOWN	1.357	0.737
FOWN	1.275	0.784
LEV	1.179	0.848
HCE	1.130	0.885
SCE	1.111	0.900
Mean VIF	1.601	0.900

Source: Authors' Estimation in STATA14.

Appendix 6. *Model Estimation*

We applied the panel corrected standard errors (PCSE) regression technique of Beck and Katz (1995). This technique assumes that disturbances are by default contemptuously correlated across panels and heteroskedastic in computing the variance-covariance estimates and standard errors. The diagnostic tests conducted for autocorrelation and heteroscedasticity using the serial correlation discussed by Wooldridge (2002) and Breusch-Pagan/Cook-Weisberg Lagrange multiplier test respectively reveals that there is the existence of first-order autocorrelation and heteroscedasticity. Thus, our model has specified both autocorrelation and heteroscedasticity and thus computes the Prais-Winsten PCSE estimates instead of the ordinary least squares PCSE estimates. The study thus favours this technique over the fixed effort and random effect models. Although the Hausman specification test we conducted supported the use of fixed effect in this case, the fixed effect provides results by excluding the ownership structure variables which are relevant for our study as being serially correlated.