

# Behavioural Determinants of Foreign Direct Investment

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## Abstract

The paper presents a behavioural economics approach to foreign direct investment. Starting from behavioural finance theory, it uses content analysis from interviews made to Portuguese managers with investments abroad. The study presents evidence of herding, anchoring, overconfidence, mental accounting and other behaviour rules in firms' location decisions that originate a set of determinants of FDI flows and complement the neoclassical paradigm. Moreover, it confirms the Heiner model (1983, 1985, 1989) by showing that the higher the uncertainty faced by decision makers the more frequent will be the use of behavioural rules. The central role of uncertainty helps explain why FDI flows occur more frequently among developed countries.

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## **1 - Introduction**

FDI theory has been developing on a partial-equilibrium basis and its empirical analysis is often not conclusive indicating that there are many determinants of FDI decisions and their role varies with context (countries, firms and so on – Blonigen, 2005). But theory seldom considers the role of managers within the decision making process. Psychologists recognize that managers, as human beings in general, have several motivational factors that are either intrinsic to their personality or shaped by their environment and may have multiple and changing objectives that are often contradictory (Frey and Eichenberger, 2001). Values are subject to choices and change with the personal experience of individuals. This change in values modifies the objectives that individuals attempt to attain (Akerlof, 1983). Given that managers have checks on their performance (from competition, shareholders, customers and employees) they often do make their choices more carefully than as if they acted as individuals. But managers are not immune to moral, cultural and other social influences usually disregarded by the economic literature.

Moreover, the behavioural finance literature has shown (e.g. Shiller, 2003) that simpler decisions in equity markets or portfolio investment cannot be totally explained by a neoclassical approach. Thus, the role of managers seems suitable to provide a complementary perspective to mainstream economics, and thus an enrichment of FDI theory.

The aim of this paper is to show that the behavioural approach can make a contribution to FDI theory by identifying a new set of determinants, similar to those presented in behavioural finance. These are rules of behaviour repeatedly followed by managers that motivate firms to choose exact locations in external markets.

This approach is better suited than what is usually assumed in economic models to show the complexity of FDI location decisions because it gives a central role to the uncertainty (risk as part of known unknowns plus unknown unknowns) faced by managers. It is the purpose of this paper to display uncertainty in accordance with the reality of FDI location decisions. That is, to enhance the relevance of factors that go beyond the standard assumptions of neoclassical theory and to include behavioural characteristics that affect the perceptions of managers in their decision making process. Hence it is important to understand the different perceptions of managers and to understand how they impact real life FDI location decisions.

The focus on uncertainty is based on the Heiner (1983, 1985, 1989) model of behaviour prediction. The use of a behavioural framework, based on the “behaviouralists” (e.g. Simon) and on economic psychology (e.g. Tversky and Kahneman), allows a better understanding of the key determinants in

FDI location decisions. The central idea of the model is the higher the uncertainty the higher should be the use of behavioural rules. It was theoretically applied to FDI in Hosseini (2005) and an empirical confirmation, using data from Portuguese firms, is made in the paper.

The empirical work is based on interviews and the interpretation of information through content analysis as a complement to the enormous amount of quantitative work found in the FDI literature. This is reinforced by statistical tests in order to assess the results obtained in the qualitative work. The following section briefly reviews FDI theory by pointing to its limits while section 3 details the methodology and section 4 presents empirical evidence of behavioural rules. Section 5 deals with the role of uncertainty by testing the Heiner model and the paper ends with a brief conclusion.

## **2 – Limits to FDI theory**

Consider a firm deciding whether to invest abroad and where to locate its investment. A rational decision-maker attempts to maximize the present value of the difference between revenue and costs when answering these questions. For this end it must collect substantial information and by assuming a discount rate from the expected inflation, the desired rate of return and the presumed associated risk, it can calculate a net present value for the investment.

The decision to invest abroad and where to locate the investment depends on the decision-maker's expectations about the value of these variables for the various available alternatives. If the decision to go abroad is already made, the location of the investment, and its expected revenue and costs, becomes the relevant issue. Thus, one can consider that the two key variables for rational location decisions are revenue and costs.

Economic literature has presented several explanations impacting revenue and costs for FDI to occur. Transnational companies (TNC's), when making FDI location decisions within imperfect markets, seek to improve their revenue stream in several ways. They use specific advantages over local competitors in the host market to compensate the additional costs of investing abroad. Several specific advantages are noted: product differentiation, managerial and marketing skills, innovation and technology, scale and agglomeration economies, better and cheaper access to capital and government induced distortions (Ietto-Gillies, 2005).

Knickerbocker uses risk mitigation concerns and defensive behaviour by "followers" against the aggressive behaviour of "first movers" to explain why firms in the same industry tend to invest in the same countries. The proximity-concentration model (Horstmann and Markusen, 1992, Brainard, 1993) explains multi-plant TNC's and two-way horizontal FDI when it becomes relatively less expensive in comparison with exporting.

The will to minimize transactional costs and thus to be more cost-efficient is also used by the FDI literature to explain location decisions. The transactional costs approach explains the occurrence of FDI (but not its exact location) from a cost comparison between market transactions and the internal

allocation of resources. Penrose (1958) and Williamson (1975, 1981) state that the bigger and more complex is the firm or the better and cheaper the legal framework and existing information channels, the lower the potential advantages of internalization (both domestic and international) and the higher the incentive to operate within the market. Buckley and Casson, Hennart and Caves (1996) further developed this approach by stating that the resulting power of market imperfections (originating in less-tradable goods such as “research and development”, knowledge or intangible assets such as brands) are an incentive for internalization and thus for the formation of TNC’s. Further explanations of location decisions are mainly related with the fragmentation of production processes by single-plant firms into different stages based on different relative factor endowments and thus prices across countries (the factor proportion model, Helpman and Krugman, 1985). In this case, vertical FDI is unidirectional (from richly endowed countries to cheaper labour endowed locations).

The main approach of a behavioural nature, where firms are seen as learning organizations, was developed by the Scandinavian school where the relevant factor for the location decision is psychic distance, that is, “... *the sum of factors preventing the flow of information from and to the market. Examples are differences in language, education, business practices, culture and industrial development*” (Johanson and Vahlne, 1977, p. 24).

All the above reasons are valid explanations for FDI or location decisions. However, they rely on a simple view about managers and decision-making in firms. Neoclassical economics sees firms and managers as rational profit maximizers where uncertainty is often reduced to risk so that rationalization conditions can be developed. In a world of certainty it would be easy for managers to make investment decisions abroad. They just would need to calculate the difference between revenue and costs for all the available options in terms of location and to choose the one that result in higher profitability. However, in the real world of a manager’s life things are not that simple. FDI location decisions require a huge amount of information, comprise different steps where a large number of small sequential decisions are made during several months or years, and the invested capital is relatively immobile and focused on the long term (Aharoni, 1999). In the meantime environmental variables are permanently changing in unpredictable ways and decision makers are themselves affected by rather different events. The process involves a lot of different people that, directly or indirectly, influence the final location. Furthermore, each FDI location decision comprises not only the “economically rational” part but also the “behavioural” part, where perceptions and other cognitive features of managers are included (Katona, 1975).

Therefore, a more complete definition of FDI location decisions, as the one provided by the behavioural approach, must also consider the way the behavioural component influences a FDI location decision by recognizing the relevance of managers’ cognitive characteristics within the decision-making process.

Moreover, a feature of most decision making situations is the existence of uncertainty or “*the absence of ability to decipher all of the complexity of the environment; especially one whose very structure itself evolves over time*” (Heiner, 1983, p, 569). It includes, besides risk, the known unknowns and unknown unknowns. Contrary to risk, the remaining part of uncertainty cannot be mitigated and it is not possible to assign probabilities for each alternative (Knight, 1921). However, the behaviour of all types of agents is thought to be highly influenced by uncertainty and while neoclassical economics usually play down the outcomes to which they are not able to assign a probability the behavioural approach emphasizes it. That is, it differs from expected utility theory where risk and uncertainty are often faced as being the same thing while acting as a constraint to maximization (Hirshleifer and Riley, 1992, p. 10).

The behavioural approach considers how uncertainty and the extrinsic and intrinsic cognitive characteristics of managers influence the decision-making process. It fully considers the FDI decision-making process by giving uncertainty a central role in each step. This is very important for three reasons: First, the emphasis on rules of behaviour in this paper arises from the fact that most situations faced by decision makers are related to “*nonreplicable uncertainty or even ignorance*” (Heijdra, 1988, p. 83); Second because individuals usually deal with each event in a separate way before combining the outcomes and thus uncertainty is increased<sup>2</sup> (Kahneman and Tversky, 1979). This is applicable to each different step in FDI decisions where different persons participate; Third, as Alchian (1950) proposes, because it seems more sensible to develop a model from an initial situation of uncertainty and only then to add elements of foresight, and not to start it on a certain goal such as profit maximization and afterwards abandon it by considering uncertainty and different motives for agents’ behaviour. Therefore, the behavioural approach highlights uncertainty as an evolving phenomenon by focusing on the cognitive characteristics of individuals as key to the decision-making process and, thus, as the basis of the changing expectations considered by the neoclassical theory. That is, the problems faced by decision makers change with uncertainty.

It is within this complexity that behavioural rules arise. Behavioural rules or heuristics are simplifying strategies to reduce complexity that systematically deviate from the predictions of unbounded procedural rationality and are explained by uncertainty (Frey and Eichenberger, 2001). The behavioural perspective considers that managers, like any individual, when facing uncertainty are subject to errors and “anomalous” behaviour in decision making. Both may be corrected. But while errors may be a one time deviation from economic rationality explained by the limited capabilities of human beings, heuristics are sequential deviations, where intuition has a role and its own rationality, and are represented by systematic and predictable biases arising from behavioural rules. In a dynamic perspective, when agents are finally able to correct their anomalous behaviour the environment has changed in a significant way and, because a changing context impacts the perceptions of managers,

agents have to permanently re-start their personal learning process to cope with the new environmental conditions. Therefore, the behavioural approach aims to identify the relevant durable patterns of firms' behaviour.

All heuristics that are recurrent and persist during a certain period of time because they are not immediately corrected through learning or incentives due to the limits of the human being may be considered as behavioural rules (Heiner, 1983, 1989; Arrow, 1996). This includes both FDI location decisions not consistent with the strategy and others that are also inconsistent with optimization. In the first case consistent decisions imply FDI operations to be within the broader strategy of the firm. If they are not and are kept throughout the years then a behavioural rule inconsistent with rationality is observed.

Generally speaking, behavioural rules are usual choices typified in accordance with their place in the time span, that is, related with past or present events or concerning expectations about future developments, and by its intrinsic or extrinsic cognitive origin. A better understanding of each firm's decision making process may be obtained by using the Heiner (1983, 1985, 1989) model, where the relative rigidity faced by decision-makers is emphasized and the usual optimization assumptions of the neoclassical literature are disregarded. The behavioural approach will use some inputs from psychology, namely the so called heuristics in decision making in the presence of uncertainty. This improves the understanding of the objectives and motivations of firms and managers when investing abroad.

The role of behavioural rules is not consensual, however. Hirshleifer and Riley (1992, p. 34, 35), for example, consider that experimental evidence on heuristics only translate certain limitations of the human mind and give an incorrect idea of how individuals behave in real situations when making really important decisions. Therefore, the authors say, heuristics do not affect the findings of the neoclassical approach when dealing with uncertainty because they can be avoided through learning and the right incentives. The issue, then, is if there are deviations of rational economic behaviour which are systematically followed by decision-makers even considering both learning and incentives.

The behavioural finance literature has shown these rules of behaviour to exist. Many have been applied to financial markets and, although the actions and the outcomes of these markets are much more easily observable than in the case of foreign investment, some may be extrapolated to FDI decisions and complement the current literature. They are valid to explain information collection, selection of alternatives and for the final FDI location decision based on the information available. Thus, even without forming a unified model, they complement both the neoclassical and the traditional behavioural theories of the firm in the explanation of FDI.

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<sup>2</sup> For example, the collection of information in FDI operations is done without previous knowledge of the location decision.

Table 1 – **Taxonomy of behavioural rules in FDI decisions**

Time	Type	Intrinsic	Extrinsic
Past		Learning, hindsight bias, Sunk costs, Mental accounting, Break-even effect, house money effect	Historical anchoring, Cultural anchoring
Present		Framing, Representativeness	Availability, Feelings, Fairness, Herding, Cascading, Signalling, False consensus bias, reputation-based herding, Inter-expert inconsistency
		Strategic inconsistencies	
Future		Overconfidence, confirmatory bias	

The taxonomy of behavioural rules is presented in table 1. Columns are divided according to its source of motivation, the intrinsic or the extrinsic dimension of cognitive characteristics. The rows are divided according to the time reference that originates them. It is not an exhaustive list of all behavioural rules but of those that could apply to FDI operations. Given the large number of heuristics the paper is focused only on a subset.

Mental accounting explains investments abroad but not their exact location. Economic research has shown that risk taking behaviour is affected differently by prior gains and losses. Expected utility theory only considers incremental outcomes from current wealth when decisions are being made. That is, past experiences of decision makers, be it gains or losses, are not considered and choices must be invariant across problem descriptions. Thaler and Johnson (1990) show that under some circumstances investors find attractive opportunities to break-even after prior losses. People are more cautious when they are investing to earn money and more adventurous when they have the prospect of loosing because they fail to adapt to recoverable losses. Thus, a loss that is recoverable may induce risk behaviour. This indicates that managers are more willing to put additional money in a faltering venture when they have previously committed funds to it if they believe it is possible to recover current losses. Thaler and Johnson (1990) also show that investors with prior gains may be more willing to accept a higher risk (the house money effect) as long as the prior outcome is not totally cancelled, that is, as long as the potential loss is lower than the prior gain. This is a situation where investors have a feeling of control or the ability to limit loss and it is a type of mental accounting that explains how previous good experiences by managers affect current decisions. On the other hand, investors with prior losses (seen as non-recoverable) may be less willing to take risks because they are not able to integrate the subsequent losses with the prior outcome.

Strategic inconsistency arises when firms do not follow long term strategies designed both from the environment and the internal capabilities of firms. Without a clear strategy to guide all the departments and workers of a firm in the allocation of its resources, where consistent decisions are consecutively

made, profit maximization becomes impossible to attain (Simon, 1991). Thus, in FDI locations all the decisions should be consistent with the broader strategy so that the firm can comply with maximization requirements. However, empirical studies show that even firms claiming a maximization objective do follow guidelines to make certain decisions that are inconsistent with optimization (Schwartz, 1998).

Finally, expectations about the future may lead to overconfidence when the disregard of relevant information by managers leads to non-optimal FDI location decisions. Illusion of control or the tendency of managers to overestimate control over outcomes due to perceived better skills and abilities are examples of overconfidence (Hilton, 2003). Other potential explanations include the situation when managers have more information than they can handle and thus tend to be overconfident, and the fact that people tend to think they know observable facts better than is actually the case. A further reason is the existence of mistaken beliefs, illusory correlations, such as “*less developed markets means higher and easier profitability*”. Overconfidence may also be explained by a tendency of individuals to interpret information to confirm their pre-judgements or initial information (confirmatory bias – Rabin, 1998). Malmendier and Tate (2005) present empirical evidence of overconfidence in the context of corporate investment.

Those of extrinsic origin include anchoring, where traditional values and common historical and cultural practices condition present behaviour. Anchoring happens when social states are evaluated from a particular starting point and the choice of this point influences behavioural outcomes (Frey and Eichenberger, 2001, p. 26). Grinblatt and Keloharju (2001, p. 1064) and Beckmann et al (2008) provide examples in investors’ decisions through the identification of a reference point for decision-makers based on a common tongue and cultural background. This cultural influence can also originate from the specific historical practices of each firm that determine the concept of psychic distance (Johanson and Vahlne, 1977). Therefore, cultural variables should not be ignored given that they can influence decisions and play a significant role in determining FDI locations.

Referring to the present, the availability of recent, dramatic or well publicized events is usually overestimated by individuals while the opposite characteristics, such as normality and regularity, leads to an underestimation of the relevance of events. This bias may alter the judgement of managers in FDI location decisions. These are situations in which the frequency of an event is judged by the facility with which its occurrence is remembered (Tversky and Kahneman, 1982). When there is a huge stream of news about the attractiveness of some markets, managers’ attention is immediately transferred from other potential targets. China, for instance, is an example of a recent and well publicized opportunity that may induce a firm to ignore other potential markets. This availability may influence managers to follow the “herd” in FDI operations, through social learning and information externalities, as it happens in more efficient financial markets. Herding refers to any behaviour similarity brought about by social influences on an individual’s thoughts, feelings and actions, and transmitted through words or direct communication, observation of actions or of outcomes (Banerjee,

1992 or Zwiebel, 1995). It means that the behaviour of individuals is based on both private information and the influence of others but that the later prevails over the first leading to similarity of decisions. Economic literature has presented empirical evidence of this type of behaviour in FDI (e.g., Kinoshita and Mody, 2001)

Finally, there are moral constraints, from family, friends, institutions, religion and everything that helps or influences individuals by shaping preferences that affect the behaviour of managers. A studied example is fairness, when managers act in conformity with informal but socially accepted rules or standards (Kahneman et al, 1986).

### **3 – Methodology**

The option for qualitative research is closely related with the attempt to better understand the determinants of FDI from a managerial perspective by considering the contextual variables surrounding a manager within the FDI decision-making process (Marshall and Rossman, 1995). It was implemented using the general interview guide approach, where a set of topics are outlined before being explored with each respondent through an interview. These topics served as a guide for all the themes covered in the interview and as a grid for the content analysis of the information collected (Patton, 1990).

The use of in-depth interviewing with business managers, where respondents, in the course of an informal conversation, freely present, in their own words, all their thoughts, feelings, perceptions and experiences about a set of pre-determined issues, allows for a direct contact with those involved in FDI location decision and thus to have a deep understanding of the motivations and rationale behind those decisions or, in Patton's words (1990, p. 278), to “...enter into the other person's perspective”.

The idea is to acknowledge the participant's perspectives on FDI decisions and to analyze together both their objective and subjective views. Each respondent was also asked to explain the strategy of the firm, supposedly the basis for FDI decisions. In case the firm had a multi-business FDI operation, the interview focused on the core areas (more important in historical and/or volume terms).

The interviews were made to managers in Portuguese firms with FDI operations from different industries: agriculture, manufacturing, energy, construction, financial and services. The common denominator is that all operations represent part of a firm's production capabilities installed abroad. The reason is that the decision to invest abroad has to be very well thought and the uncertainty associated significantly greater than, for example, the opening of a mere representative office (in most cases these are only a support for exports).

The number of operations abroad for this group total 112 and represent 5.6% of the total Portuguese FDI<sup>3 4</sup> (Banco de Portugal, 2005). Each operation corresponds to a country location by a Portuguese investor. The sample is skewed for large firms in Portugal although these are, at best, medium size firms in international terms.

**Table 2 - Universe and sample of Portuguese outward FDI operations - 2004**

Type of Countries	Universe	%	Sample	Sample / Universe
Developed	1054	53	58	5.5 %
Portuguese Speaking	565	28	27	4.8 %
Other countries	380	19	27	7.1 %
Total	1999	100	112	5.6 %

Data collection focused also on documentation directly supplied by interviewees and other available information in firms' internet sites, such as annual reports, or national newspapers. Documentation analysis was used as a complement and as a source of validity for some of the information collected in the interviews.

The collected information was organized by themes through a case description. A cross-case analysis was then performed leading to the results for each theme. Based on the interpretation of these results there was an identification of behavioural rules in each firm's FDI decision making. These rules are the empirical evidence that indicate the existence of behavioural determinants of FDI. The identified behavioural rules together with the remaining collected information allow for the building of a database and to perform statistical tests on the Heiner model.

Although qualitative research has its limits, namely its interpretive methodology and the direct involvement of the researcher in data collection, it can be addressed through actions to validate the information. As Marshall and Rossman (1995, p. 80) put it, "*the participant's perspective on the phenomenon of interest should unfold as the participant views it, not as the researcher views it*".

Besides documentation analysis further steps were taken to deal with potential disadvantages of the use of interviews. There was a preparation via the form of four exploratory interviews and collection of information about each firm's activity and FDI operations and, afterwards, a second contact with all the interviewees was made and eight answered further questions or requests for clarification.

#### **4 - Evidence of behavioural rules**

One of the aims of this paper is to find new determinants of FDI location decisions in order to enrich the FDI literature. Content analysis identified 175 situations in 112 FDI operations where

<sup>3</sup> Banco de Portugal estimative. There were 8 divestments that are in the sample but no longer in the universe. However, the universe includes also locations without a productive component (e.g. representative offices) and affiliates of foreign-owned Portuguese firms. Therefore, the representativity is underestimated.

<sup>4</sup> The interviewees were directly responsible for or participated in 76% of the total number of FDI decisions here considered and the actual management of the firms is the same or follows a similar internationalization strategy in 88% of operations.

behavioural rules may partially explain investment decisions abroad. Table 3 divides them as per the taxonomy described above. Given the impossibility of presenting all of them, the paper focus on four cases where the difference between the neoclassical and the behavioural approaches is shown and evidence of several behavioural rules determining FDI is given.

**Table 3 – Identified Rules of Behaviour**

Time	Type	Intrinsic			Extrinsic			Total cases
		Rule of behaviour	Nr. of cases	Nr. of firms	Rule of behaviour	Nr. of cases	Nr. of Firms	
Past	Learning		10	7	Anchoring	43	12	73
	Mental accounting		20	4				
Present					Cascading	4	4	99
					Herding	23	14	
	Strategic inconsistency		13	7	Strategic inconsistency	30	3	
					Inter-expert inconsistency	17	17	
					Fairness	12	4	
Future	Overconfidence		3	3				3
Total cases per type		55			120			175
Total locations		175						

**Case 1:** BES, a bank, and JM, a retailer, decided to invest in the Brazilian market in the second half of the 1990's. The FDI literature provides two main possible explanations for these investments, cost efficiency and revenue. BES was already in Brazil, through an investment bank and other areas of business, when the decision to make a huge investment in a retail bank was implemented. Its manager refers to the exhaustion of the Portuguese market and thus the need for other markets to grow and to look for profitability as motives to invest abroad. He also stated that the group only invests abroad in businesses where it has a very good know-how in the domestic activity, like retail banking services. As reasons for the location in Brazil he refers to cultural variables such as a common tongue and a resident Portuguese community as a potential customer base. Therefore, according to FDI theory the aim was to increase revenue by having access to new clients in a different market with cultural liaisons.

The behavioural approach recognizes the role of expected profitability and business growth as motifs to invest abroad. However, these were not exclusive of Brazil. There were other possible choices where the growth potential could have been larger. Therefore, other reasons may help explain the specific choice of Brazil as a location to invest

First, the presence of the group in the country since 1975, although in different business areas, seems to provide reassuring knowledge about the local market that was not available for other competing locations. This is implicitly confirmed by the interviewed manager: *“We are in Brazil since 1975 (insurance, investment banking and agriculture businesses) and, in 1997, decided to buy a bank with a retail network. But it did not work that well because it is a very peculiar market where foreigners are usually not successful. It is necessary to rely on local management because they know better the market”*.

However, despite the long business activity in Brazil and 20 years of accumulated knowledge of the market, the firm did not hire local managers to run its new business and relied on expatriates. Therefore, the investment of 1997 showed not only an inability to learn by the firm and its managers but also overconfidence on its own management to obtain different and better results than those of other banks, often with more international experience. The interviewed manager recognized that up to 2004 only one foreign bank, ABN Amro, was able to be successful in the Brazilian market.

Second, the simultaneous move of a few hundred Portuguese firms to Brazil motivated by the Portuguese government also explains this decision. In 1996, the Portuguese government decided that Brazil was the main objective for the Portuguese economy (NPI, 1997). The Portuguese prime-minister at the time made several speeches and visits to this country, explicitly exhorting investors to move to that market. IPE (a state owned holding) participated as a shareholder in the investment made by a private firm. Furthermore, the year 2000 marked the 500<sup>th</sup> anniversary of the arrival of Pedro Álvares Cabral to Brazil (following the 500<sup>th</sup> anniversary of Vasco da Gama’s journey to India), with widespread celebrations both in Portugal and in Brazil. Therefore, there was, on that period, a huge stream of news about the attractiveness and the opportunity of investing in Brazil. Portuguese firms were in the beginning of the process of internationalization (in terms of FDI) and cultural ties, common language, a huge market and a “push” from the government (through specific incentives such as interest free loans) explained the sudden interest in Brazil. According to Costa (2003) there were, in 2001, 147 investments in Brazil made by 83 parent Portuguese companies and a large majority of these had invested after 1996. It means that almost one in three Portuguese firms with investments abroad in the end of the 1990’s chose the Brazilian market.

In this process, judgements about FDI decisions were altered and other potential markets were clearly downplayed given the availability of evidence about Brazil. This availability of well publicized events was overestimated by some Portuguese managers when deciding to invest in Brazil in the period between 1997 and 1999 and shows an easily recognizable herding phenomenon. The manager of BES confirms it: *“we went with other firms such as PT, JM and Sonae”*. FDI location decisions were

influenced by an existing “unanimity” in the Portuguese managerial community towards the attractiveness of Brazil. This is true even when the required knowledge to invest seemed to be wrongly perceived. By looking at other firms moving to these markets the idea of a “target market” and “good businesses” is automatically established and discussed among managers. Those that do not “follow the herd” are considered “suspicious” by the market and their reputation may be in danger (Zwiebel, 1995). There is clear evidence about this phenomenon. The manager of another firm, Modelo, stated: *”We had a lot of cash to spend and the government had limited the number of licences to operate in Portugal. So, we decided to invest abroad. On the occasion Brazil and Latin America were the most fashionable locations and this (the investments) has a lot to do with fashions, as you know”*.

But the outcome of these investments was not the expected. From the sample of seven investments in Brazil, four (BES, CGD, JM and Modelo) of them were sold a few years later and, of the remaining, one (PT) is significantly less profitable for the investor than the Portuguese market. Only EDP registered, in 2004, a higher profitability than the consolidated value. Between 1997 and 2001 Portuguese firms together invested 13,000 Million Euros in Brazil but divested half of this amount (Banco de Portugal, 2005). This indicates that a significant part of the investments were not successful and firms had to leave the market. The participation of the Portuguese state in a private enterprise was sold with a huge loss. BES and JM sold their investments with a lower than expected return.

In Portuguese FDI there is also another market, the Spanish, where the herding phenomenon is easily recognizable and ten of the interviewed firms invested after 1990. From these, eight are less profitable (firms BES, Bial, BPI, CGD, EDP, Inapa, Vicaima and Modelo), one (Sogrape) was sold and in another one (Amorim) there is no available information in terms of profitability. The share of divestment over investment is even larger than in Brazil, 67%. This indicates that a significant part of the investments were not successful and firms had to leave the market. Another 170 firms followed the same path in this period, to an estimated total of 250 Portuguese firms in Spain (Pinheiro-Alves, 2001).

JM provides a very similar example. Its aim was also to increase revenue by having access to new clients in a different market. The growth potential was also not exclusive to Brazil, as its present experience in Poland shows, although the country presented an attractive market growth rate at the time. According to the management, the main reason to choose the market was the existing cultural relationship. But the firm also received some pressure from market analysts to invest abroad. The CEO of JM explicitly states it: *“We went abroad because financial analysts did put a pressure on us by ‘threatening’ with a devaluation of our shares. But let me tell you that today I am very cautious with investment banks”*.

However, the behavioural approach provides two extra explanations: availability and herding, as above, and overconfidence from the CEO and main shareholder. He says: *“I was marketing manager of Unilever in Brazil. I knew the market ... if I didn’t I would have not committed so many mistakes”* and then *“It was a nonsense to go to Brazil. It is a very different market, with powerful competitors,*

*both locals and foreigners, very strong and with a lot of money. We have no balance sheet for the market*". But the information about competitors was publicly available and the manager had knowledge of it. Therefore, an illusory perception about the abilities of the firm and of control over future events also explains the investment. The manager recognizes: *"due to a stupid pride I was convinced that we would make it"*.

**Case 2:** A second example is given by PT, a telecommunications firm, and its two location decisions, Mozambique and East Timor. Again, the main explanation of FDI theory is the cultural relationship existing between Portugal and these two countries together with the perception of a superior know-how by the investing firm and the need to serve clients in Mozambique. The behavioural approach provides several other explanations for the location decision that discard the traditional maximization aim. First, both operations are inconsistent with the firm's strategy and thus are an obstacle for maximization. The internationalization strategy of PT is based on mobile communications and focused on Brazil and Africa. However, the firm is not a mobile operator in Mozambique and East Timor is in Asia. Second, the location decision was made after government instructions (the Portuguese state has a golden share in this firm) and with a sense of fairness. Both are Portuguese ex-colonies and very poor countries where the decolonization process was not correctly managed by Portugal. Therefore, there is a common will, in the Portuguese society, to help these countries and mainly the new independent state of East Timor.

The interviewed manager refers that profitability is always the aim of investments abroad and *"...in less developed countries the required return is higher and shorter – 5 years maximum - than in developed economies"*. But both are small investments where the risk of losing money is limited namely in comparison with the huge revenue stream arising from the dominant position of the firm in the Portuguese market. PT enjoyed, for a large number of years, a comfortable position as a monopolist provider of telecommunication services. In 2004 it still had a dominant position in fixed and cable services. Therefore, the risk of losing money is cancelled out by the profits from its domestic activity. The existence of political objectives with a fairness component together with a house money effect arising from the near monopolistic position of PT, provide a more complete explanation of the decision to invest in these countries than the neoclassical approach.

The mental accounting effect seems to be common among Portuguese firms with investments abroad. From the sample of 112 operations, 20 may be partially explained by a firm's previous gains. Two other firms – CGD and EDP - benefited from a monopoly situation in the Portuguese market similar to that of PT. CGD had the monopoly of banking for public servants in Portugal for more than 20 years while EDP has a monopolistic position in the energy market. They were able to absorb sufficient liquidity during the monopoly years that partially motivated and was later used to invest abroad. Table 4 shows obtained profits since 1995 for the three firms. It may be seen that the return on assets of EDP

and PT decreases significantly after 2000 due to the liberalization of both industries. CGD, on the other hand, presented a higher financial margin of 0.5% than the average of the Portuguese banking sector throughout the 1990's.

Table 4 – Consolidated Profits and ROA (values in Million Euros)

Profits	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
CGD	291.17	248.45	528.09	350.75	349.13	544.47	653.78	665.13	667.25	448.48
EDP	n.a.	n.a.	n.a.	522.79	513.94	548.97	450.83	335.22	381.11	440.15
PT	180.83	273.95	349.64	441.1	494.68	540.32	307.39	391.05	240.23	500.12
<b>ROA</b>										
CGD	0.85%	0.68%	1.28%	0.72%	0.63%	0.87%	0.98%	1.00%	0.90%	0.64%
EDP	n.a.	n.a.	n.a.	4.22%	3.75%	3.69%	2.78%	1.85%	2.04%	1.95%
PT	4.31%	6.29%	7.01%	4.75%	5.81%	4.09%	1.74%	2.85%	1.77%	3.86%

Source: Annual reports. ROA = Profits / Total assets

This is implicitly confirmed in the interviews. The manager of EDP stated that *"the market was mature for us and the firm generated excessive cash-flows for our needs in Portugal. Thus, we needed to invest abroad"*. The same happened with CGD and PT. Moreover, the manager of Secil when explaining the internationalization policy of a direct competitor (not included in this study): *"they had a privileged situation during the privatization of the industry (in the 1990's) because the state left them with a lot of money to invest abroad"*. This shows how consecutive Portuguese governments "allowed" state owned firms to earn from their monopoly position and start the internationalization process before being privatized.

The investments made by those three firms, and by Salvador Caetano (see case 4), were generally less profitable than the earnings in the home market. Although one cannot be sure that managers accepted a higher risk when the investments were decided, it is clear that they have been not successful for a long time. CGD invested in Spain in 1991 and it kept on having losses for a decade (Pinheiro-Alves, 2001). EDP invested in Brazil in 1997 and, although is having profits now, the new management hired in 2002 decided to focus on the Spanish market while Brazil is still "running" but in an autonomous and self-financing way. PT invested in Brazil in 1998 and, despite the accumulated losses (table 5), obtained a commercial success and this is a possible explanation to keep the investment. But the motivation for these firms to maintain the investments abroad despite the bad financial results, and besides political considerations (the Portuguese government still has a word in the strategy of these firms), can be understood if it is realized that the three firms have shown systematic consolidated profits in the end of each year. The profits from the activity in Portugal, in a way similar to tax revenue for the state due to their monopolistic component, have been financing losses in the larger and "strategic" FDI investments made by these firms, and managers are, in fact, operating through a mental accounting rule. This is a systematic and recurrent rule because bad financial results abroad are kept and "hidden" year after year by domestic profits.

Table 5 – Net income of the main strategic investments abroad

	Country	1997	1998	1999	2000	2001	2002	2003	2004
CGD	Spain	n.a.	n.a.	n.a.	n.a.	3.16	1.84	0.4	-11.7
EDP	Brazil	n.a.	n.a.	-24.9	7.25	79.9	-20.2	-86.3	48.1
PT	Brazil	-	17.00	9.42	122.1	-519.0	-34.2	-9.88	-59.2

Values in Million euros

**Case 3:** A similar example is given by CGD, a state-owned bank. The investments in China and Spain are justified by growth potential and the aim of obtaining profits. Geographical proximity and willingness to serve clients are location reasons. But the interview reveals other important reasons. In the case of Spain the interviewee refers to several additional reasons: “...to be in a competitive market and Spain is a natural market for us due to geographical proximity. Furthermore, there is a strong presence of Spanish banks in Portugal and our competitiveness also depends on being in Spain”. Although these are valid reasons, and recognized by FDI theory, it should be noted that CGD has a market share of less than 1% in the Spanish market, and is mainly located near the border with Portugal. The biggest Spanish bank, on the other hand, is larger than the entire Portuguese market and has a share of 20% despite informal “warnings” by successive Portuguese governments against an excessive Spanish presence (Pinheiro-Alves, 2001). Therefore, political reasons, namely government instructions, also help to explain the investment in Spain. The fear of an “invasion” of Portugal by Spanish firms was counterbalanced through government instructions and appeals for Portuguese investors to go to Spain (triggering the herding phenomenon described above). In both cases a house money effect can also be observed given the monopoly position enjoyed by CGD for many years and the consequent access to a cheaper funding.

The CGD group also has a branch in Zuhai, near Macao, since 1991. This branch can only operate in foreign currency and thus is “...relatively inactive” in the words of the interviewee. But its banking operations could be booked in other affiliates of the group, including Macao, and thus the branch was unnecessary. Moreover, it was inconsistent with the strategy of the firm up to 2003, when China was firstly considered as a target market. For more than 13 years capital was invested in the branch, without return, and the firm was not able to learn and change the situation. Therefore, FDI is better explained by the political need to maintain a Portuguese presence in the region and to strengthen a position in Macao, which was expected to become a special area of China after 1999 and by cultural reasons, specifically the history of the group, for decades the issuing entity of currency in Macao.

Cultural and historical (of the firm) variables are also very relevant for FDI decisions by Portuguese firms, although neoclassical economics seldom recognizes it. There is cultural influence when investments are attracted by countries that communicate in the investor’s native tongue and have a similar cultural background. Almost one third (35 in 112) of the studied investments are located in Portuguese speaking countries and a further 3 also are explained by cultural or historical reasons. Thus, it seems that this type of anchoring is relevant for decision makers because the decision to invest

abroad was evaluated from a particular starting point, cultural linkages, and the choice of this point influenced behavioural outcomes (investment locations).

The answers obtained in the interviews confirm this statement. Seven firms explicitly stated that cultural variables were determinant for investment location and a further three also referred to their relevance. Moreover, six firms present historical (of the firm) reasons to be present in a market. The manager of Modelo, a retailer, explained the investment in Brazil in this way: *"We were in Brazil since 1989 through a partnership (in an industrial area). So, when we decided to invest there we already knew the market. The cultural aspect and the special affinity of the CEO to the country were decisive in the choice of Brazil"*. The manager of EDP: *"Brazil was a natural market for us due to the opportunity (liberalization of the Brazilian market) and cultural reasons"*.

But in most cases, cultural and historically driven FDI has not good results and show that decisions mainly based on these variables are not rational, in the neoclassical sense, because they are very likely to prevent profit maximization.. The outcome is inferior when compared with consolidated data. This is presented in table 6 for several countries. The information concerns 2004 when the majority of operations were running for some years and thus had sufficient time to become profitable. All together there are 16 locations with lower and 11 with higher return than consolidated accounts.

**Table 6 – Relative performance of FDI in Portuguese speaking countries**

Country Firm	Consolidated ROA (2004)	Angola	Brazil	Cape Verde	Guinea Bissau	Macao	Mozambique	S. Tomé Principe	Timor
BES	0.60%	Higher	Lower	-	-	Lower	-	-	-
BPI	0.80%	Higher	-	-	-	-	Higher	-	-
CGD	0.64%	-	Lower	Lower	-	Lower	Higher	n.a.	Higher
EDP	1.95%	-	Higher	Lower	-	n.a.	-	-	-
JM	4,14%	-	Lower	-	-	-	-	-	-
Mota	1.70%	Higher	-	-	-	-	Higher	-	-
PT	3.86%	n.a.	Lower	n.a.	Lower	n.a.	n.a.	n.a.	n.a.
SC	1.40%	Lower	-	Higher	Lower	-	Lower	-	-
Secil	7.83%	Lower	-	Lower	-	-	-	-	-
Modelo	5,15%	-	Lower	-	-	-	-	-	-
BCP	0.72%	Lower	-	-	-	Higher	Higher	-	-

**Case 4:** A final example is Salvador Caetano, a car producer and assembler, where investments in the United Kingdom and Mozambique are justified by the need to channel domestic production and market size, in the first case, and cultural affinity and superior know-how in the second. However, both investments have peculiar stories. The investment in the UK started in 1984 when a local representative "convinced" the firm to invest in the country but the results were not satisfactory: *"The level of profits was not good and we had several years of losses due to the negative impact of tourism and the difficulties of tour operators. These invested in used buses and destroyed the market for new ones"*. In 1998 the firm made a new investment in the UK to produce coaches with a local partner. But

despite the agreement, the joint venture was broken because the partner decided to joint venture with other firms. Again, market reasons explained the failure: “...we lost a lot of money due to market context, namely the demand for coaches that changed after the new investment was made”. Finally, in 2004 the firm invested again in the production of buses in Portugal to export to the UK and closed the production of coaches by transforming it in a car repairing business. The manager justifies the continuing investment in the UK with the possibility of channelling Portuguese production. But the fact is that the firm has been investing continuously since 1984 without profiting from it and was not able to learn from the different attempts to change the business. This investment has been financed mainly with domestic cash-flows and thus is also justified by the expected possibility to recover previous losses and the ability to limit them. Despite the accumulated loss in the UK, the firm is earning sufficient money in Portugal to cover it. Thus, home gains (the house money effect) affect the decision to invest abroad by limiting the risk.

In Mozambique there was an agreement with the local government where, informally, access to the market was “exchanged” for the superior know-how of Salvador Caetano in assembling buses. But, according to the interviewee, the local government broke its promises and, despite the previous experience in the UK, there was no formal guarantee in favour of the firm as a way of prevention. The trust is explained by an attitude of fairness towards a very poor country. “We wanted to help the development of Mozambique and agreed, with the state as a partner, to install a factory to produce components and assemble buses. But the government, instead of giving some type of protection to the industry, decided to raise tariffs for the import of components and to eliminate tariffs for the import of buses. Thus, the factory is now inactive because there are no necessary conditions to develop any type of business. And we are very disappointed. It seems that they do not want our help”.

This manager reflects a common feeling in Portugal about the need to invest in the ex-colonies and help them to develop, and confirms that moral influences also have a specific role in economic decisions (Etzioni, 1988). This may explain why the firm invested in good faith, without any formal guarantee, believing that the Mozambican government, as a shareholder, would support the operation. There are a total of 12 examples in the firms surveyed, namely those closely related with the Portuguese policy of helping former colonies. This policy has been partly implemented through state-owned firms or public firms where the government still has influence.

The above presented cases, where FDI location decisions are explained by behavioural rules, have as a consequence no aim or ability to maximize. The aim for profitability is always there but maximization is never an issue and it is impossible to reach due to the use of behavioural rules. Therefore, behavioural rules help in explaining FDI location decisions in a complementary way to mainstream economics. Annex 1 compares the neoclassical and behavioural approaches and underlines the more complete picture provided by the latter one. In all cases the determinants of the location decision presented in bold are not usually recognized by the neoclassical approach although they are now common in behavioural finance.

## 5 – The role of uncertainty

The Competence-Difficulty (C-D) model, proposed by Heiner (1983, 1985, 1989), confronts the “competence” of an agent with the “difficulty” in selecting most preferred alternatives in a decision-making process. An existing gap between competence and difficulty means that agents face uncertainty about how to use information in selecting an option from several potential alternatives. Therefore, uncertainty exposes the limits of any agent in any selection process. This is a different approach from neoclassical economics where it is assumed “...for the purpose of theoretical explanation that there is no gap between an agent’s competence and the difficulty of the decision problem to be solved ...” (Heiner, 1983, p. 562).

The Heiner model presents two types of variables, environmental and perceptual. The first represents environmental (complexity-stability) influences from the past, present and future, in economic, legal, political or cultural terms, surrounding the decisions made by firms while the second refers to how managers perceive the connection between their behaviour and the environment, that is, how they react to information. The second variable includes both the intrinsic and extrinsic characteristics of individuals. The two together determine the gap between capacity and difficulty, that is, the degree of uncertainty (U). The more complex is the environment or the less reliable are the perceptions of managers the greater is the C-D gap and the uncertainty in the decision making process.

$$D - C = U, \text{ with } C \leq D \tag{1}$$

It is the existence of uncertainty that explains constrained behaviour or behavioural regularities. Greater uncertainty reduces the reliability of the decisions-making process and leads managers to rely on behavioural rules when, e.g., opting for collecting further information about a potential location to invest. If there was no uncertainty, the managers would know if the new information was necessary or if the investment operation was profitable. However, when facing uncertainty managers complement the rational part of the decision-making process (collecting information about potential markets) with a behavioural component to reach a final decision about the location of the investment. The higher the uncertainty the more the manager simplifies the decision-making process by relying on behavioural rules. In this way uncertainty becomes the source of the regularities observed in agents’ behaviour while in neoclassical economics predictable behaviour arises from the will to maximize.

Behavioural rules are not explained by some occasional failures but represent a gap in the C-D Model where the degree of uncertainty is significant. They are no mere bounding constraints but behavioural regularities where decision making may be far away from what is deemed to be rational in a neoclassical sense.

A behavioural approach considers FDI decisions as a process of different steps starting with the decision to invest abroad and ending in the chosen location. This may take several months or years where different participants take part in assessing the firm's internal capacity in terms of financing, human resources or inputs, and make many small and big decisions related to information collection, so that several alternatives may be established, and a risk and financial analysis provided to understand the possible impact of an FDI operation on the value of the firm.

Each FDI related decision is supposed to be in accordance with the strategy of the firm and deals with potential sources of information on costs, revenue and risk. But the access to these sources has a component of uncertainty. Due to uncertainty investors do not know if the selection of new information improves their performance. The response to potential information depends both on the environment and on managers' perceptions. Perceptions on information may be of the intrinsic (to the decision maker) or extrinsic (from the environment) type and may lead to bounded rationality (Simon, 1955), where costs, management time and abilities are constraints, or to the use of simplifying strategies in recurrent situations (rules of behaviour). A simple development of the Heiner model explicitly emphasizes the intrinsic and extrinsic components of managerial perception and complements the relevance given by the model to environmental variables. Heiner refers to it (1983, p. 575) but not in a testable way. But others such as Frey and Eichenberger (2001) see it as essential to explain behaviour. From equation (1):

$$\begin{array}{l} \text{If } D > C \quad \Rightarrow \quad U > 0 \\ \text{If } D = C \quad \Rightarrow \quad U = 0 \end{array}$$

When there is no uncertainty each new decision related with the FDI operation is on the right path towards maximization and agents behave as predicted by the neoclassical model (Heiner, 1983, p. 565). This is the usual assumption of neoclassical models where agents use information perfectly by selecting actions that maximize the expected utility based on available information. However, a decision to invest abroad is always uncertain and in many situations there is also uncertainty about how to use information. An extemporaneous decision to collect further information about risk characteristics of a country, for example, may be useless and may have a negative influence on a future location decision.

Considering that uncertainty provokes bounded behaviour (B) and the use of behavioural rules (A), and that both affect competence

$$U = B + Ae + Ai \tag{2}$$

where A is divided into the extrinsic (Ae) and intrinsic (Ai) components of behavioural rules. As long as

$$C < D \quad \Rightarrow \quad U = B + Ae + Ai > 0 \quad (3)$$

Therefore, if there is bounded rationality or “anomalous” behaviour in FDI location decisions maximization cannot be achieved. The farther from zero they are the larger is the gap between the competence in a FDI location decision and the difficulty to implement it. This is valid for each decision or response to potential information within the FDI process. Thus, the model also applies to all the internal decisions related with a FDI operation made by the employees of the firm. The central hypothesis of the Heiner model results from equation (3): Assuming a fixed B, the higher the uncertainty the higher is the reliance of investors (or any other agents) on behavioural rules of intrinsic (Ai) and extrinsic (Ae) nature.

A predicted consequence of the model is that firms invest more where there is less uncertainty. If it is confirmed it indicates the relevance of uncertainty in decision-making and the need of a behavioural approach to complement neoclassical theory. The prediction of the model seems to be valid in the case of Portuguese FDI because its operations are concentrated in developed (55%) and in Portuguese speaking countries (24%). In both cases uncertainty may be considered as inferior to most of the alternative locations (table 7).

**Table 7 – Portuguese FDI abroad (1996-2004)**

	Number of operations (2004)		FDI flows Net value	
	Number	% of total	Value (Million euros)	% of total
OECD countries	1054	53	21.268	55.8
Portuguese-speaking	565	28	9.219	24.1
Other countries	380	19	7.704	20.1

Banco de Portugal (2005)

But in order to test the Heiner model it is necessary first to define a measure for behavioural rules and uncertainty<sup>5</sup>. The expected result of the test is a confirmation of a positive and significant relationship between uncertainty and the use of behavioural rules. The collected information in the interviews and documentation analysis allows the building of a database with a total of 112 observations representing 4.6% of Portuguese firms with FDI and 11.8% of FDI operations abroad (Banco de Portugal, 2005). Only 68 FDI operations register the existence of rules of behaviour. It should be noted that, to test the model, behavioural rules need to be directly related to the chosen location. Therefore, tests only include 160 of the 175 rules because the remaining 15 are related with the decision making process and cannot be allocated to a specific FDI operation.

<sup>5</sup> Annex 2 describes the variables.

A first variable is called “Numbehav” and is formed from the number of rules of behaviour detected for each firm and for each FDI operation. In what concerns uncertainty, the most obvious way to measure it is sovereign risk ratings (proxy 1: “Countryrating”) as presented by the country historical ratings of Standard&Poor’s for long term debt in local currency (where A means lower, B intermediate and C higher risk). Since these are not available for all cases, and given that the level of development is usually (by rating firms) recognized to be negatively correlated with risk, they are replaced, when absent, by the measure of development used by the World Bank. This is not a perfect proxy because ratings strictly represent the ability of the country to pay its sovereign debt in local currency by considering political, economic and financial risks while the Heiner model refers to uncertainty as a whole and not only the risk component. However, the inclusion of these different risks indicates that the “known unknowns” of uncertainty that are not represented by a probability are somehow considered. Only the “unknown unknowns” are missing.

**Table 8 – Frequencies of Behavioural rules per type of country**

Groups of countryrating	Rules of behaviour	Nr. of FDI operations
Rating A (low uncertainty)	38	25
Rating B (medium uncertainty)	45	17
Rating C (high uncertainty)	77	26
Not allocated	15	-
Total	175	68

A second proxy is to define uncertainty by underlining the cultural connections of Portugal. Thus a second variable called “Typeofcountry” is also considered where Portuguese speaking countries are regarded as having more uncertainty than OECD countries, to which Portugal is more integrated in economic and political terms, and less uncertainty than the remaining countries with no special connections with Portugal.

Different proxies to uncertainty may arise from the level of internationalization of each firm. The longer a firm is exposed to foreign markets the higher should be the experience and thus the lower the uncertainty when choosing a new market to invest. Therefore, it can be considered that a longer presence abroad allows for an improvement in the knowledge of how to operate in unfamiliar environments and thus a decrease in uncertainty when the next location decision is made. In this sense, uncertainty is expected to decrease with the number of external markets where the firm is active (proxy 3: “Numbmarkets”) and with the number of years abroad every time a decision to make a FDI is made (proxy 4: “Numbyears”). The lower is the number of markets and the number of years abroad the lower is the experience accumulated by the firm and the higher should be the uncertainty faced by managers.

The four proxies allow us to consider different perspectives in terms of measurement of variables in the Heiner model. But they do not represent the perceptions of individual managers in terms of uncertainty and this would be the ideal measure in theoretical terms. From the above proxy 2 may be the one that is nearer the perceptions of respondents that mention the advantage of better knowing

Portuguese-speaking countries. For example, the manager of Secil says when justifying the presence in Angola and Cape Verde: “*Our Irish partners do not understand the advantage of having a close cultural relationship with these countries*”.

After addressing the independence of observations and the randomness of the sample selection, several statistical tests are performed in the SPSS software, version 12 (Norusis, 2003). These tests are expected to reveal how strong is and the direction of the relationship between the two variables (uncertainty and behavioural rules). Their use is explained by the characteristics of the available information. The variables are mostly nominal or ranks, the size of the sample is not very large and the assumption of a normal distribution in the population is prevented by the one sample Kolgomorov-Smirnov and other normality tests.

To test the Heiner model it is implicitly assumed that the available information for each case with detected rules of behaviour was collected. The following null and alternative hypotheses apply:

H0: There is no association between uncertainty and rules of behaviour

H1: There is an association

A first issue is that of the linearity in the relationship between uncertainty and behavioural rules. Scatter plots show a very weak linear relationship between them and thus linear tests are not appropriate for the data. But the null hypothesis that uncertainty and rules of behaviour are independent can be checked by using the chi-square statistic. All tests based on the chi-square calculate the difference between the observed and expected values and require each cell to have an expected value greater than 1 and more than 80% of the cells to have a value greater than 5 (Norusis, 2003, p. 167). This means that data has to be aggregated for the number of behavioural rules. “Numbehav” is thus grouped by 0, 1 and 2 or more behavioural rules. Table 9 shows that the null hypothesis can be rejected at a significance level of 1% meaning that in fewer than 1 sample in 100 the two variables would be independent<sup>6</sup>.

Several measures of association and direction are also tested in order to understand how strongly the two variables are related. Table 10 presents the results for “countryrating” and “Typeofcountry” as proxies to uncertainty. Given the weak linearity existing between variables and their characteristics (nominal and scale) tests are made both for nominal and ordinal data. The latter are usually considered more reliable than tests based simply on nominal variables. These tests generally require feeble assumptions and only in some cases outliers or ties in the data need to be considered.

Symmetric measures indicate a significant and fairly strong relationship between both proxies of uncertainty and “Numbehav”. The results are stronger for ordinal measures where the positive or negative sign of the association is also considered.

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<sup>6</sup> The outcome is robust and it does not change qualitatively if the grouping is 0, 1 and 2, and 3 or more rules.

Given that symmetric measures do not consider dependent and independent variables (nominal and ordinal) asymmetric measures are also performed. Their results show a stronger relationship for ordinal measures than for nominal ones and in all cases the values are significant at a 1% level.

Table 9 – Independence tests

Countryrating and Numbehav				
Independence Tests	Value	DFr	N	Significance
Pearson chi-square	30.2	4	112	0.000 ***
Likelihood Ratio	34.9	4	112	0.000 ***
Typeofcountry and Numbehav				
Independence Tests	Value	DFr	N	Significance
Pearson chi-square	55.0	4	112	0.000 ***
Likelihood Ratio	64.4	4	112	0.000 ***

\*\*\* Significant at a 1% level

Measures based in proportional reduction in error (Lambda and Goodman measure the reduction in the error to predict the dependent variable through the independent one) present very low values but this is explained by the use of more disaggregated data in comparison with the remaining nominal measures which are based on the chi-square distribution (and thus require aggregation)<sup>7</sup>.

The two other proxies for uncertainty, “numbyears” and “numbmarkets”, were tested without meaningful results (Annex 3, table 1). It should be noted that these proxies were based on the assumption that higher experience would reduce the use of rules of behaviour. But, as the behavioural approach states, it might be that these rules change with experience but are not necessarily reduced after a determined point.

The results for “Countryrating” and “Typeofcountry” confirm the existence of a relationship between uncertainty and the number of behavioural rules as predicted by the Heiner model. Most of the values are fairly strong and all measures indicate positive direction. The Eta coefficient, for example, shows that “countryrating” explains 54%, and “Typeofcountry” 68%, of the variability in “Numbehav”.

However, there is no guarantee that behavioural rules are caused by higher uncertainty. Other reasons may explain this positive relationship and thus it is useful to analyse if it is spurious, that is, if it is explained by a third or a group of other variables connecting both uncertainty and rules of behaviour. Statistical tests allow us to include control variables. Table 2 in Annex 3 shows the outcome when four control variables (described in Annex 2) are considered: “Decision”, “Respondents”, “Objective” and “Previlevel”. For all the four control variables the association between uncertainty (“Countryrating”)

<sup>7</sup> If the variable “Numbehav” is aggregated for these two tests, values would be 0,265 and 0,143 with a better level of significance for Lambda.

and behavioural rules is still valid except for proportional reduction in error measures due to the level of disaggregation and the small number of observations.

**Table 10 – Association Tests: Uncertainty and behavioural rules (“Numbehav”)**

Situation 1	Value	N	Signific.	Value	N	Signific.
Uncertainty proxy:	Countryrating			Typeofcountry		
Symmetric						
Cramer' V (1)	0.367	112	0.000 ***	0.496	112	0.000 ***
Contingency coef. (1)	0.461	112	0.000 ***	0.574	112	0.000 ***
Kendall's tau-b	0.467	112	0.000 ***	0.273	112	0.000 ***
Gamma	0.640	112	0.000 ***	0.344	112	0.000 ***
Directional						
Lambda	0.118	112	0.009 ***	0.221	112	0.009 ***
Goodman Kruskal Tau	0.089	112	0.000 ***	0.169	112	0.000 ***
Somers' d	0.515	112	0.000 ***	0.280	112	0.000 ***
Eta square	0.544	112	-	0.685	112	-

\*\*\* Significant at a 1% level

(1) Requires aggregated data in “Numbehav” because they are based on the chi-square

A further issue is to assess the individual relevance of each type of behavioural rule. There is enough information for extrinsic and intrinsic behavioural rules (114 and 46, respectively) and for those related with the past (73) and the present (84) in the time span. The testing of the model is made by considering both “Countryrating” (Table 11) and “TypeofCountry” (annex 3, table 3) as the proxy for uncertainty. Statistical tests show all types not to contradict the Heiner model, except rules of intrinsic nature in the second proxy where the results are very weak. In the first proxy, rules originated in the past – anchoring, learning and mental accounting - are the ones presenting a stronger relationship with uncertainty.

## 6 – Conclusions

Behavioural rules are new determinants of FDI location decisions that complement the two main motives presented by economic literature, revenue increase and cost efficiency considerations. These are manager and firm-level determinants of a special kind because they do not arise from the reason behind the decision to re-locate production, such as market, asset or efficiency-seeking, but from the decision making process itself.

The above presented evidence supplies a diversified set of new explanations for FDI location decisions and shows that Portuguese managers follow simplifying strategies when making them. There were several situations where managers repeated the same behaviour in a consecutive way or kept unchanged non-maximizing decisions for a long period. The behavioural approach was able to help explain 55% of FDI location decisions made by the Portuguese firms included in the study.

Table 11 – Type of behavioural rules in the Heiner model

Countryrating and Numbehav (Sit. 1) Tests	Rules of Extrinsic Origin				Rules of Intrinsic Origin			
	Value	Deg. Freed	N	Significance	Value	Deg. Freed	N	Significance
<b>Independence</b>								
Pearson Chi-sqaure	23.5	4	112	0.000 ***	22.4	4	112	0.000 ***
Likelihood ration	26.4	4	112	0.000 ***	21.6	4	112	0.000 ***
<b>Symmetric</b>								
Cramer' V	0.324	-	112	0.000 ***	0.317	-	112	0.000 ***
Contingency coef.	0.417	-	112	0.000 ***	0.409	-	112	0.000 ***
Kendall's tau-b	0.396	-	112	0.000 ***	0.353	-	112	0.000 ***
Gamma	0.568	-	112	0.000 ***	0.560	-	112	0.000 ***
		-				-		
<b>Directional</b>								
Lambda	0.150	-	112	0.017 **	0.083	-	112	0.548
Goodman Kruskal Tau	0.094	-	112	0.000 ***	0.141	-	112	0.000 ***
Somers' d	0.418	-	112	0.000 ***	0.313	-	112	0.000 ***
Eta square	0.466	-	112		0.389	-	112	

\*\*\* Significant at a 1% level; \*\* Significant at a 5% level; \* Significant at a 10% level

Countryrating and Numbehav (Sit. 1) Tests	Rules Originated in the Present				Rules Originated in the Past			
	Value	Deg. Freed	N	Significance	Value	Deg. Freed	N	Significance
<b>Independence</b>								
Pearson Chi-sqaure	11.8	4	112	0.018 **	40.2	4	112	0.000 ***
Likelihood ration	11.4	4	112	0.022 **	43.8	4	112	0.000 ***
<b>Symmetric</b>								
Cramer' V	0.284	-	112	0.006 ***	0.446	-	112	0.000 ***
Contingency coef.	0.373	-	112	0.006 ***	0.533	-	112	0.000 ***
Kendall's tau-b	0.276	-	112	0.001 ***	0.503	-	112	0.000 ***
Gamma	0.421	-	112	0.001 ***	0.711	-	112	0.000 ***
		-				-		
<b>Directional</b>								
Lambda	-	-	112	(1)	0.200	-	112	0.017 **
Goodman Kruskal Tau	0.041	-	112	0.032 **	0.206	-	112	0.000 ***
Somers' d	0.282	-	112	0.001 ***	0.491	-	112	0.000 ***
Eta square	0.304	-	112		0.586	-	112	

\*\*\* Significant at a 1% level; \*\* Significant at a 5% level; \* Significant at a 10% level

(1) Cannot be computed because the asymptotic standard error equals zero

Based on the available observations and performed tests, and given the association existing between the level of uncertainty and the number of behavioural rules detected in Portuguese firms, the Heiner model can be regarded as suitable to study Portuguese FDI operations. The model predicts that managers rely on actions which are adaptable to relatively recurrent situations while ignoring actions which are appropriate in unusual circumstances. Given this learning “failure”, heuristics are needed for a better prediction of behaviour in FDI decisions. Economic theory should not only understand why firms invest abroad but also how are these decisions made. Both perspectives are needed and, contrary to neoclassical theory, the model is able to include them. Therefore, the model seems a good tool to predict managers' behaviour in FDI location decisions.

Among the identified types of regularities those originated in the past and of extrinsic nature seem to have a more significant role in the behaviour of Portuguese firms when making FDI decisions. But those of intrinsic nature and originated in the present are also valid. Although heuristics indicate that agents are not able to learn from past experiences in all situations and thus cannot improve indefinitely their behaviour towards optimality, the knowledge about behaviour rules might help managers improving their performance by considering and reviewing their use.

Finally, the findings and consequences presented above rely on some features that may be improved in future work. The enlargement of the database, by the inclusion of other countries and large TNC, would allow the strengthening of these results. Moreover, the behavioural approach needs to be deepened through a better understanding of the role of contextual issues such as the influence of each firm's culture and history and the individual cognitive characteristics of managers, including cultural and moral variables. This suggests the existence of further determinants for country locations in FDI operations.

### Annex 1 – Neoclassical and behavioural approaches in FDI location decisions

<b>Firm</b>	<b>FDI theory</b>	<b>Behavioural approach</b>
BES: Brazil	<ul style="list-style-type: none"> <li>- Growth potential</li> <li>- Cultural affinity</li> </ul>	<ul style="list-style-type: none"> <li>- Growth potential</li> <li>- <b>Cultural anchoring</b></li> <li>- <b>History of the firm</b></li> <li>- <b>Availability and herding</b></li> <li>- <b>Overconfidence</b></li> <li>- <b>Learning inability</b></li> </ul>
CGD: China	<ul style="list-style-type: none"> <li>- Geographical proximity</li> <li>- To serve clients</li> </ul>	<ul style="list-style-type: none"> <li>- Geographical proximity</li> <li>- To serve clients</li> <li>- <b>Strategic inconsistency</b></li> <li>- <b>Mental accounting</b></li> <li>- <b>Cultural anchoring</b></li> <li>- <b>Learning inability</b></li> </ul>
CGD: Spain	<ul style="list-style-type: none"> <li>- Geographical proximity</li> <li>- To serve clients</li> <li>- To compete with Spanish banks</li> </ul>	<ul style="list-style-type: none"> <li>- Geographical proximity</li> <li>- To serve clients</li> <li>- To compete with Spanish banks</li> <li>- <b>Availability and herding</b></li> <li>- <b>Strategic inconsistency</b></li> <li>- <b>Mental accounting</b></li> </ul>
JM: Brazil	<ul style="list-style-type: none"> <li>- Cultural affinity</li> <li>- Market growth rate</li> </ul>	<ul style="list-style-type: none"> <li>- Market growth rate</li> <li>- <b>Availability and herding</b></li> <li>- <b>Cultural anchoring</b></li> <li>- <b>Overconfidence</b></li> </ul>
PT: East Timor	<ul style="list-style-type: none"> <li>- Cultural affinity</li> <li>- Superior know-how</li> </ul>	<ul style="list-style-type: none"> <li>- Superior know-how</li> <li>- <b>Cultural anchoring</b></li> <li>- <b>Strategic inconsistency</b></li> <li>- <b>Mental accounting</b></li> <li>- <b>Fairness</b></li> </ul>
PT: Mozambique	<ul style="list-style-type: none"> <li>- Cultural affinity</li> <li>- Superior know-how</li> <li>- To serve clients</li> </ul>	<ul style="list-style-type: none"> <li>- Superior know-how</li> <li>- To serve clients</li> <li>- <b>Cultural anchoring</b></li> <li>- <b>Strategic inconsistency</b></li> <li>- <b>Mental accounting</b></li> <li>- <b>Fairness</b></li> </ul>
SC: Mozambique	<ul style="list-style-type: none"> <li>- Cultural affinity</li> <li>- Superior know-how</li> </ul>	<ul style="list-style-type: none"> <li>- Superior know-how</li> <li>- <b>Cultural anchoring</b></li> <li>- <b>Fairness</b></li> </ul>
SC: United Kingdom	<ul style="list-style-type: none"> <li>- To channel domestic production</li> <li>- Market size</li> </ul>	<ul style="list-style-type: none"> <li>- To channel domestic production</li> <li>- Market size</li> <li>- <b>Mental accounting</b></li> <li>- <b>Learning inability</b></li> </ul>

## Annex 2 – Description of variables for statistical tests

### Rules of behaviour

**Numbehav** – Number of behavioural rules. When aggregated information is required tests are made for two different groupings so that their robustness can be checked. The first considers three sets of country locations with zero rules, 1 rule or 2 rules or more. The second considers zero rules, 1 or 2 rules, and 3 rules or more.

### Uncertainty

At the level of the FDI operation:

Proxy 1: **Countryrating** – Rating of the country where FDI is located. It varies from rating A, lower uncertainty (risk), to C, higher uncertainty (risk).

Proxy 2: **Typeofcountry** – Divided by: Countries with a similar law and political and economic institutions (OECD and EU) where there is less uncertainty; countries with a common tongue and past with Portugal; remaining countries, with more uncertainty.

Proxy 3: **Numbmarkets** – Number of external markets where the firm is present when the next FDI location decision is made. A higher number corresponds to lower uncertainty.

Proxy 4: **Numbyears** – Number of years abroad when the next FDI location decision is made. A higher number corresponds to lower uncertainty

### Control variables

**Decision** – Influence of shareholders in decision-making. The shareholder structure did not significantly change in the past for the considered firms. This is divided in 4 categories: Individual decisions with more than 5% and less than 50% or more than 50%. And group decisions when the firm is public or when the Portuguese government has a role.

**Respondents** – Influence of respondents divided in 3 categories: CEO's, Other members of the board and Middle managers.

**Objective** – Stated goals of the firm divided in 5 categories: Maximization, Minimum profitability, Other quantitative objective, Qualitative objectives and at least two of the last three.

**Previlevel** - Previous level of internationalization based on 2 indicators for each firm: Number of years abroad and number of markets where a firm is present when each FDI decision is made. This variable is classified in 3 different categories:

a) Lower level (of internationalization): when the firm only has investments abroad less than 5 years old

b) Medium level: when the firm has FDI for 5 or more years but it is present in less than 5 countries

c) Higher level: when the firm has FDI for 5 or more years and it is present in more than 5 countries

The number 5 is arbitrary in this classification although is confirmed in some verbal statements by interviewees. For example, the manager of firm 8 refers that “*a firm needs at least 5 years to become profitable*”.

### Annex 3

**Table 1 - Measures of association and direction  
Numbyears/Numbmarkets and Numbehav**

Statistical Tests	Value	N	Signific.	Value	N	Signific.
Uncertainty proxy:	<b>Numbyears</b>			<b>Numbmarkets</b>		
<b>Symmetric</b>						
Kendall's tau-b	0.031	107	0.690	-0.057	107	0.466
Gamma	0.036	107	0.690	-0.069	107	0.466
<b>Directional</b>						
Lambda	<b>0.239</b>	<b>107</b>	<b>0.007 ***</b>	<b>0.179</b>	<b>107</b>	<b>0.025 **</b>
Goodman Kruskal Tau	0.239	107	0.293	0.095	107	0.861
Somers' d	0.027	107	0.690	-0.052	107	0.466
Eta square	<b>0.447</b>	<b>107</b>	-	<b>0.303</b>	<b>107</b>	-

\*\*\* Significant at a 1% level; \*\* significant at a 5% level;

Cramer's v and contingency coefficient are not feasible because they are based on the chi-square distribution and the number of observations is insufficient

**Table 2 – “Countryrating” and Behavioural Rules - Tests for Control Variables**

**Table 2a: Decision**

Control variable: Decision Situation 1	1 - Individual more than 50%			2 - Individual more than 5%			3 - Group in public firm			4 - Group with State role		
	Value	N	Significance	Value	N	Significance	Value	N	Significance	Value	N	Significance
<b>NTotal =112</b>												
<b>Symmetric</b>												
Kendall's tau-b	<b>0.320</b>	<b>37</b>	<b>0.013 **</b>	<b>0.583</b>	<b>13</b>	<b>0.004 ***</b>	<b>0.432</b>	<b>25</b>	<b>0.037 **</b>	<b>0.541</b>	<b>37</b>	<b>0.000 ***</b>
Gamma	<b>0.459</b>	<b>37</b>	<b>0.013 **</b>	<b>0.857</b>	<b>13</b>	<b>0.004 ***</b>	<b>0.818</b>	<b>25</b>	<b>0.037 **</b>	<b>0.682</b>	<b>37</b>	<b>0.000 ***</b>
<b>Asymmetric</b>												
Lambda	0.174	37	0.278	0.286	13	0.124	<b>0.400</b>	<b>25</b>	<b>0.029 **</b>	<b>0.179</b>	<b>37</b>	<b>0.016 **</b>
Goodman and Kruskal Tau	0.071	37	0.246	0.289	13	0.129	<b>0.300</b>	<b>25</b>	<b>0.027 **</b>	<b>0.127</b>	<b>37</b>	<b>0.004 ***</b>
Somers' d	<b>0.329</b>	<b>37</b>	<b>0.013 **</b>	<b>0.750</b>	<b>13</b>	<b>0.004 ***</b>	<b>0.519</b>	<b>25</b>	<b>0.037 **</b>	<b>0.608</b>	<b>37</b>	<b>0.000 ***</b>
Eta	<b>0.342</b>	<b>37</b>		<b>0.911</b>	<b>13</b>		<b>0.548</b>	<b>25</b>		<b>0.620</b>	<b>37</b>	

\*\*\* Significant at a 1% level; \*\* Significant at a 5% level; \* Significant at a 10% level

**Table 2b: Respondents**

Control variable: Respondent Situation 1	1 - CEO			2 - Member of the Board			3 - Middle Manager		
	Value	N	Significance	Value	N	Significance	Value	N	Significance
<b>NTotal =112</b>									
<b>Symmetric</b>									
Kendall's tau-b	<b>0.617</b>	<b>5</b>	<b>0.025 **</b>	<b>0.517</b>	<b>47</b>	<b>0.000 ***</b>	<b>0.465</b>	<b>60</b>	<b>0.000 ***</b>
Gamma	<b>1.000</b>	<b>5</b>	<b>0.025 **</b>	<b>0.742</b>	<b>47</b>	<b>0.000 ***</b>	<b>0.619</b>	<b>60</b>	<b>0.000 ***</b>
<b>Asymmetric</b>									
Lambda	0	-	(1)	<b>0.321</b>	<b>47</b>	<b>0.003 ***</b>	<b>0.111</b>	<b>60</b>	<b>0.095 *</b>
Goodman and Kruskal Tau	0.167	5	0.513	<b>0.165</b>	<b>47</b>	<b>0.000 ***</b>	<b>0.103</b>	<b>60</b>	<b>0.000 ***</b>
Somers' d	<b>0.667</b>	<b>5</b>	<b>0.025 **</b>	<b>0.568</b>	<b>47</b>	<b>0.000 ***</b>	<b>0.510</b>	<b>60</b>	<b>0.000 ***</b>
Eta	<b>0.662</b>	<b>5</b>		<b>0.569</b>	<b>47</b>		<b>0.579</b>	<b>60</b>	

\*\*\* Significant at a 1% level; \*\* Significant at a 5% level; \* Significant at a 10% level

(1) - Cannot be computed because the asymptotic standard error equals zero

Chi-square based tests are not feasible due to lack of sufficient observations.

**Table 2c: Objective**

Control variable: Objective Situation 1	1 - Minimum profitability			2 - Other quantitative objective			3 - Qualitative objectives			4 - 1, 2 and 3 together		
	Value	N	Significance	Value	N	Significance	Value	N	Significance	Value	N	Significance
<b>NTotal =112</b>												
<b>Symmetric</b>							<b>Only 1 case</b>					
Kendall's tau-b	<b>0.483</b>	<b>20</b>	<b>0.001 ***</b>	<b>0.567</b>	<b>47</b>	<b>0.000 ***</b>				<b>0.399</b>	<b>44</b>	<b>0.001 ***</b>
Gamma	<b>0.687</b>	<b>20</b>	<b>0.001 ***</b>	<b>0.752</b>	<b>47</b>	<b>0.000 ***</b>				<b>0.568</b>	<b>44</b>	<b>0.001 ***</b>
<b>Asymmetric</b>												
Lambda	<b>0.273</b>	<b>20</b>	<b>0.060 *</b>	0.161	47	0.122				0.040	44	0.562
Goodman and Kruskal Tau	<b>0.225</b>	<b>20</b>	<b>0.074 *</b>	<b>0.123</b>	<b>47</b>	<b>0.002 ***</b>				0.066	44	0.137
Somers' d	<b>0.528</b>	<b>20</b>	<b>0.001 ***</b>	<b>0.610</b>	<b>47</b>	<b>0.000 ***</b>				<b>0.444</b>	<b>44</b>	<b>0.001 ***</b>
Eta	<b>0.528</b>	<b>20</b>		<b>0.625</b>	<b>47</b>					<b>0.523</b>	<b>44</b>	

\*\*\* Significant at a 1% level; \*\* Significant at a 5% level; \* Significant at a 10% level

**Table 2d: Prevelevel**

Control variable: Level Internationalization Situation 1	1 - Lower level			2 - Medium level			3 - Higher level		
	Value	N	Significance	Value	N	Significance	Value	N	Significance
<b>NTotal =107</b>									
<b>Symmetric</b>									
Kendall's tau-b	<b>0.308</b>	<b>41</b>	<b>0.003 ***</b>	<b>0.529</b>	<b>27</b>	<b>0.000 ***</b>	<b>0.563</b>	<b>39</b>	<b>0.000 ***</b>
Gamma	<b>0.446</b>	<b>41</b>	<b>0.003 ***</b>	<b>0.698</b>	<b>27</b>	<b>0.000 ***</b>	<b>0.747</b>	<b>39</b>	<b>0.000 ***</b>
<b>Asymmetric</b>									
Lambda	<b>0.192</b>	<b>41</b>	<b>0.017 **</b>	0.167	27	0.245	0.087	39	0.311
Goodman and Kruskal Tau	<b>0.101</b>	<b>41</b>	<b>0.027 **</b>	<b>0.143</b>	<b>27</b>	<b>0.034 **</b>	<b>0.142</b>	<b>39</b>	<b>0.001 ***</b>
Somers' d	<b>0.353</b>	<b>41</b>	<b>0.003 ***</b>	<b>0.573</b>	<b>27</b>	<b>0.000 ***</b>	<b>0.616</b>	<b>39</b>	<b>0.000 ***</b>
Eta	<b>0.370</b>	<b>41</b>		<b>0.544</b>	<b>27</b>		<b>0.648</b>	<b>39</b>	

\* Significant at a 1% level; \*\* Significant at a 5% level; \*\*\* Significant at a 10% level

Chi-square based tests are not feasible due to lack of sufficient observations.

**Table 3 - “Typeofcountry” and different types of behavioural rules**

TypeofCountry and Numbehav (Sit. 1) Tests	Rules of Extrinsic Origin				Rules of Intrinsic Origin			
	Value	Deg. Freed	N	Significance	Value	Deg. Freed	N	Significance
<b>Independence</b>								
Pearson Chi-square	<b>60.2</b>	<b>4</b>	<b>112</b>	<b>0.000 ***</b>	<b>18.0</b>	<b>4</b>	<b>112</b>	<b>0.001 ***</b>
Likelihood ration	<b>73.4</b>	<b>4</b>	<b>112</b>	<b>0.000 ***</b>	<b>18.7</b>	<b>4</b>	<b>112</b>	<b>0.001 ***</b>
<b>Symmetric</b>								
Cramer' V	<b>0.519</b>	-	<b>112</b>	<b>0.000 ***</b>	<b>0.284</b>	-	<b>112</b>	<b>0.001 ***</b>
Contingency coef.	<b>0.591</b>	-	<b>112</b>	<b>0.000 ***</b>	<b>0.372</b>	-	<b>112</b>	<b>0.001 ***</b>
Kendall's tau-b	<b>0.212</b>	-	<b>112</b>	<b>0.008 ***</b>	0.129	-	112	0.120
Gamma	<b>0.283</b>	-	<b>112</b>	<b>0.008 ***</b>	0.214	-	112	0.120
<b>Directional</b>								
Lambda	<b>0.233</b>	-	<b>112</b>	<b>0.000 ***</b>	0.028	-	112	0.857
Goodman Kruskal Tau	<b>0.214</b>	-	<b>112</b>	<b>0.000 ***</b>	<b>0.118</b>	-	<b>112</b>	<b>0.000 ***</b>
Somers' d	<b>0.216</b>	-	<b>112</b>	<b>0.008 ***</b>	0.110	-	112	0.120
Eta square	<b>0.725</b>	-	<b>112</b>		<b>0.352</b>	-	<b>112</b>	

\*\*\* Significant at a 1% level; \*\* Significant at a 5% level; \* Significant at a 10% level

TypeofCountry and Numbehav (Sit. 1) Tests	Rules Originated in the Present				Rules Originated in the Past			
	Value	Deg. Freed	N	Significance	Value	Deg. Freed	N	Significance
<b>Independence</b>								
Pearson Chi-square	<b>34.3</b>	<b>4</b>	<b>112</b>	<b>0.000 ***</b>	<b>77.1</b>	<b>4</b>	<b>112</b>	<b>0.000 ***</b>
Likelihood ration	<b>31.7</b>	<b>4</b>	<b>112</b>	<b>0.000 ***</b>	<b>93.2</b>	<b>4</b>	<b>112</b>	<b>0.000 ***</b>
<b>Symmetric</b>								
Cramer' V	<b>0.409</b>	-	<b>112</b>	<b>0.000 ***</b>	<b>0.370</b>	-	<b>112</b>	<b>0.097 *</b>
Contingency coef.	<b>0.501</b>	-	<b>112</b>	<b>0.000 ***</b>	<b>0.464</b>	-	<b>112</b>	<b>0.097 *</b>
Kendall's tau-b	<b>0.212</b>	-	<b>112</b>	<b>0.002 ***</b>	0.137	-	112	0.121
Gamma	<b>0.307</b>	-	<b>112</b>	<b>0.002 ***</b>	0.184	-	112	0.121
<b>Directional</b>								
Lambda	0.056	-	112	0.563	-	-	-	(1)
Goodman Kruskal Tau	<b>0.117</b>	-	<b>112</b>	<b>0.000 ***</b>	<b>0.073</b>	-	<b>112</b>	<b>0.003 ***</b>
Somers' d	<b>0.209</b>	-	<b>112</b>	<b>0.002 ***</b>	0.129	-	112	0.121
Eta square	<b>0.423</b>	-	<b>112</b>		<b>0.819</b>	-	<b>112</b>	

\*\*\* Significant at a 1% level; \*\* Significant at a 5% level; \* Significant at a 10% level

(1) Cannot be computed because the asymptotic standard error equals zero

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