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Effect of time and type of measurement on objective performance trends: a longitudinal analysis of new salespeople

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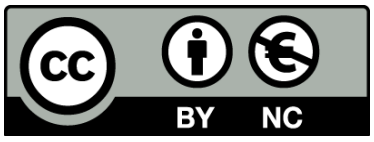

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"Effect of time and type of measurement on objective performance trends: a longitudinal analysis of new salespeople"

A thesis submitted in partial fulfillment
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Doctor of Philosophy - Business Administration

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Dedication

To my family, friends and everyone who believed I would graduate. Special thanks to Carol and Laura for their understanding and support; *¡esta tesis os ha robado tanto tiempo en el que podríamos haber estado juntos…!*

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Abstract

The measurement of sales force performance is an issue of the upmost importance. Research in this area has primarily focused on cross-sectional studies establishing a link between various types of predictors and sales performance at a specific moment in time, despite the well accepted idea that performance is dynamic over time. Moreover, the most frequent way to measure performance has been through subjective measures. Yet, little is actually known empirically about trends (growth trajectories) of objective performance over time and their determinants.

The empirical research study presented in this dissertation is designed to fill this gap. First, we conducted an extensive survey of the literature in order to identify empirical work referred to objective measures of performance at the individual level in the sales domain, yielding 133 published studies and 148 samples. Then, we analyzed in detail, on one side, all studies using two or more objective measures of performance and, on the other, studies conducting a longitudinal research. Building on job stages theory, we argue specifically that measurements of objective performance taken at different times are not related when salespeople are involved in changing contexts. Furthermore, we hypothesize that growth trajectories measured with different indicators of objective performance are not related.

Random coefficient modeling in the form of Hierarchical Linear Modeling is then used to analyze objective performance over time. The individual performance growth trajectories of 230 salespeople that joined a Spanish direct selling firm were modeled using SPSS and R software. To the best of our knowledge, this thesis represents the first longitudinal study to explicitly analyze and compare the trends (growth trajectories) of various measures of objective

performance (sales, units and compensation) of salespeople during their first months at a company.

This analysis yielded three important results at the individual salesperson level. First, time matters when measuring individual objective performance. Our findings confirm that performance is dynamic over time and that there is a rank-order effect when measuring salespeople. Second, different objective measures of performance quantify different things. We found no evidence that the growth trajectories of objective measures of performance taken during the same period are related, thus, building on the idea that objective measures of performance are not interchangeable. Third, these findings help understand the specificities of new salespeople in direct selling, facing a transitional job stage.

This thesis, thus, contributes to the longitudinal analysis of sales performance confirming (a) that future esearch studies have to consider the relationship over time of objective performance with any set of predictors, and (b) that objective indicators of sales performance are not interchangeable and have to be chosen carefully by scholars according to the objectives of each investigation. Additionally, it has important implications for practitioners referred to selection, promotion, retention, evaluation, training and compensation of salesforces.

Key Words: salesperson, objective performance, new salespeople, dynamic performance, longitudinal, growth trajectory, trends, random coefficient modeling (RCM), hierarchical linear modeling (HLM)

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CHAPTER 1 - INTRODUCTION

The motivation for the study came from both the academic and the practitioner perspectives. While performance measurement in the sales domain has been widely researched, little is known about the impact of the dynamic nature of performance, that is, how it evolves over time. Specifically, we will focus on research questions referred to better understand the growth trajectories of performance, and, specially, about the impact that the time and type of measurement have on trends (growth trajectories) of objective performance of new salespeople. We will try to address such issues by applying a sophisticated statistical technique developed by academia in recent years.

This thesis is structured as follows: in Chapter 2, we begin by reviewing the literature on two main areas of the sales domain: the measurement of performance with different indicators and its longitudinal analysis. In Chapter 3, we construct a set of testable hypotheses. Following the literature review and hypotheses development, in Chapter 4 we outline the methodology used to test the relationships hypothesized in the model. Chapter 5 begins with descriptive and exploratory findings, and then presents the results of the hypotheses testing in detail, following the Random Coefficient Modeling (RCM) approach. This dissertation also includes a discussion section, Chapter 6, which delves into some of the most interesting implications of the findings . We wrap up with necessary limitations and directions for future research and anticipated contributions to theory, methods and practice (Chapter 7). Finally, in Appendix A, we detail 133 published studies about objective measurement of sales performance.

CHAPTER 2 - LITERATURE REVIEW

2.1 Introduction and overall approach

In this chapter, we review the literature on the sales field referred to/regarding/on the basis of two primary issues: (a) the implication of using different measures of sales performance, especially objective indicators, and (b) the advantages of studying the dynamic evolution of performance over time, that is, through a longitudinal approach. Furthermore, (c) we will illustrate how it can be specially beneficial to combine these two approaches into the analysis of salespeople facing a change in their job stages: when joining a company as newcomers. All this will be used to build our hypotheses in Chpt. 3.

2.2 The use of different measures of salespeople performance

2.2.1 Definitions of sales performance

In today's highly competitive marketplace, personal selling is a critical element for firms to achieve success based on customer satisfaction, loyalty and profitable sales volume (Albers, Mantrala, and Sridhar 2010; Jaramillo & Grisaffe, 2009; Paparoidamis & Guenzi, 2009). Specifically, salesforce performance represents one of the most critical, important and widely studied constructs in sales research (Bommer et al., 1995; Churchill et al., 1985; Fu, 2009; Jaramillo, Mulki & Marshall, 2005; Plouffe, Hulland & Wachner, 2009; Rich et al., 1999; Verbeke, Dietz & Verwaal, 2010).

Authors have defined sales performance in different ways and it is not estrange to find inconsistencies in its conceptualization (Singh & Koshy, 2010). Some authors have focused on the "outcome" element of this construct., defining sales performance as a salesperson's contribution to achieving the organization's objectives (Cravens et al., 1993), a salesperson ability to achieve and quantify sales objectives (Sujan, Weitz & Kumar, 1994) or the results salespeople achieve through the application of effort and skill (e. g. sales units, revenues, market share, new accounts or profitability) (Anderson and Oliver, 1987).

Other authors include in their definitions the "behaviors" that are required to achieve these results (Anderson and Oliver 1987), defining sales performance as the evaluated behaviors that contribute to the achievement of the goals of the organizations (Churchill et al., 1985; Walker et al. ,1979). In a similar way, behavioral performance is referred to the evaluation of various activities, behaviors and strategies salespeople engage in when meeting their job responsibilities (e.g., sales calls, sales presentations, sales planning, territory management, sales support,…) (Anderson and Oliver, 1987) (Grant et al., 2001) (Piercy et al., 2006).

Several authors have included both "outcome" and "behavioral" elements in their conceptualization of performance(Anderson and Oliver, 1987) (Babakus et al., 1999) (Behrman and Perreault, 1982) (Grant et al., 2001) (Jex and Thomas 2003) (Menguc, Han & Auh, 2007) (Walker et al., 1979). Even though both elements are conceptually distinct (Piercy et al., 2006) or even considered to be following different managerial philosophies (Oliver and Anderson 1994), some authors affirm that they are related; achieving sales

objectives -outcome performance- is determined largely by salespeople's performance on the behavioral dimension (Babakus et al., 1996) (Menguc, Han & Auh (2007) (Piercy, Cravens, Lane & Vorhies, 2006) (Piercy, Cravens, and Morgan 1998).

Authors have focused on analyzing either outcome-based or behavior-based measures of performance; several studies have focused on the former (Plouffe, Sridharan & Barclay, 2010).

2.2.2 Different ways to classify performance measurement criteria

Since performance has been measured in several different ways by academics, it is essential to choose the most relevant measurement criteria, since this will determine the quality and relevance of sales research (Chonko, Loe, Roberts & Tanner, 2000) and the strength of the relationship between determinants and sales performance (Farley et al., 1995; Verbeke, Dietz & Verwaal, 2010). Several studies have analyzed the implications of using specific ways to measure performance or how the use of different measures of performance modify the direction or degree of the relationship with different types of determinants (e.g. Chonko et al., 2000; Churchill et al., 1985; Rich et al., 1999; Verbeke, Dietz & Verwaal, 2010). Additionally, there have been periodic requirements by academia to improve measures of performance (Avila et al., 1988; Chonko, Loe, Roberts & Tanner, 2000; Oliver & Anderson, 1995).

There are multiple ways to measure performance; the more frequent are the following:

- Multi Vs single item: performance can be measured through one or various items. While single-item measurements are used most frequently (Franke & Park, 2006) (Plouffe, Sridharan & Barclay, 2010), some authors have used multi-item (e. g. Homburg et al., 2011; Chonko, Loe, Roberts & Tanner, 2000)

- Hard Vs soft measures: hard measures can be measured in an objective, tangible way and include sales, profits, units sold,…; soft measures include, among other, customer satisfaction or trust (Paparoidamis & Guenzi, 2009).

- Cross-sectional Vs longitudinal measurement: performance can be measured at a single point in time or at different time periods, registering different performance environments and factors that could affect performance. The impact of time on performance has been ignored in general (Chonko, Loe, Roberts & Tanner, 2000)

- Control for externalities or not: performance controls for externalities when includes items like sales as a percentage of quota or sales corrected for the salesperson's route or territory difficulty and does not control for it when considers items such as total sales, number of calls or new accounts gained (Churchill, Ford, Hartley & Walker, 1985). Authors have either controlled for externalities (e. g. Levy & Sharma, 1993; MacKenzie, Podsakoff & Fetter, 1993; Weitz, 1978) or not (e. g. Cron & Slocum, 1986; Liden, Stiwell & Ferris, 1996; Podsakoff & MacKenzie, 1994).

- Absolute Vs Relative measures: absolute measures compare the salesperson to an absolute standard, while relative measures compare the employee to other workers

(Rich et al., 1999). Despite it is common to find a combination of both, several authors have used either the former (e. g. Cotham, 1969; Weitz, 1978) or the latter (e.g. Baehr & Williams, 1968; Rush, 1953)

- Composite Vs Overall ratings: composite ratings consist of various specific items representing "lower-order" performance measures, while overall ratings imply that the rater makes broad conclusions referred to the overall level of performance (Rich et al., 1999). For example, a composite measure of sales performance was created by Barksdale et al. (2003) combining self-reported totals for total commissions and the number of policies sold in the past year; Plouffe, Hulland & Wachner (2009), using factor analysis, created a single overall composite performance measure for a company combining % annual growth in overall sales revenues and % annual growth in existing customer accounts. Various authors have used composite ratings (e. g. Barrick, Mount & Strauss, 1993; Behrman & Perreault, 1982; Steward, Hutt, Walker & Kumar, 2009) and some other overall ones (e.g. Avila, Fern & Mann, 1988; Fu, 2009; Homburg et al., 2011)

2.2.3 Comparison of objective versus subjective measures of performance in the sales domain

2.2.3.1 Objective measures have been less used than subjective measures

Complementarily to other criteria previously mentioned, the "most popular" way to classify measures of performance differentiates them between objective and subjective measures (Bommer et. al., 1995); the latter can be divided into subjective self-reported measures and subjective supervisory-rated measures.

"Objective measures" of sales performance include volume in units or dollars, sales quota, profitability, number of orders, prescriptions, sign-ups, dollar expenditures on personal selling, OR growth in customers or revenues (Albers, Mantrala & Sridhar, 2010; Ko & Dennis, 2004; Panagopoulos & Dimitriadis, 2009; Plouffe, Hulland & Wachner, 2009; Rich et al., 1999). Usually, data is directly available from company records or specific measures are created from this available information. In some occasions, this data is directly asked to salespeople. When compared to non sales jobs, objective measures of salesperson performance are "more readily available" and "more unambiguously attributable to the salesperson's efforts" (Rich et a., 1999).

"Subjective measures" of sales performance are frequently based on (or adapted from) previously defined scales, like Cravens et al. (1993), Babakus et al. (1999) or Behrman and Perreault (1982); for example, the latter has been widely used (Verbeke, Dietz & Verwaal, 2010) and is a self-reported scale refined to five dimensions of sales performance: sales objective, technical knowledge, providing information, controlling expenses and sales presentations. Other elements frequently measured include, for

example, teamwork or planning skills (Jaramillo, Mulki & Marshall, 2005). Subjective measures are based on judgmental evaluations usually obtained from two main sources: self-reports or supervisor (or manager) reports (Jaramillo, Carrillat & Locander, 2004) (Levy & Sharma, 1993).

Objective measures of sales performance have been less used in academic research than subjective measures (Jaramillo, Carrillat & Locander, 2005; Jaramillo, Mulki & Marshall, 2005; Pitt, Ewing and Berthon, 2002), probably because of the difficulties to have access to company records (Jaramillo, Carrillat & Locander, 2005; Jaramillo, Mulki & Marshall, 2005). Plouffe, Hulland & Wachner (2009) affirm that most of the studies have analyzed the impact of Sales Orientation / Customer Orientation (Franke and Park 2006), Adaptive Selling (Giacobbe 1991) or Selling Skills (Rentz et al., 2002; Pettijohn et al., 2008) on self-reported measures from salespeople, but not on objective performance. For example, Jaramillo, Mulki & Marshall (2005) just included 1 out of 51 studies with objective performance in their meta-analysis of the relationship between organizational commitment and salesperson job performance along 25 years. Nonetheless, Churchill, et al. (1985) found in their meta-analysis of determinants of sales performance that 46.7% of the studies used objective indicators. Farrell and Hakstian (2010) found 67 out of 157 situations (42.7%) where objective measures were used -as compared to subjective measures- in their meta-analysis of the effectiveness and utility of personnel selection procedures and training interventions.

Self-evaluations of performance have been extensively used (Jaramillo, Carrillat & Locander, 2005) in the sales literature (e.g., Babakus et al. 1999; Román & Iacobucci,

2010; Sujan et al. 1994; Verbeke and Bagozzi 2000). Some authors support its use affirming that salespeople are in the best position to judge their own performance (Levy and Sharma, 1993), referring to the deficiencies almost always present in objective measures (Borman 1991) or mentioning that sometimes behavioral aspects of sales are within the control of the salesperson (Behrman and Perreault 1982). Churchill et al. (1985) supported its usefulness.

Churchill et al. (1985) talked about a "dispute" regarding the most appropriate way to measure performance that has continued after years passing (Jaramillo, Carrillat & Locander (2005). It is important to clarify the similarities -or differences- among objective measures, self-reports and managerial ratings. Three meta-analysis have specifically compared objective measures of salesperson performance with managerial ratings and self evaluations in the sales domain (Bommer et al., 1995, partially analyzing salesforces; Jaramillo, Carrillat & Locander, 2005; Rich et al., 1999). They have focused on the comparison and eventual interchangeability of these three types of indicators, trying to identify possible moderators like the control for externalities (yes or no), the rating method (relative, absolute or combined) or the rating format (composite or overall). Additionally, four other meta-analyses (Churchill et al., 1985; Franke & Park, 2006; Verbeke, Dietz & Verwaal, 2010; Vinchur et al., 1998) have tried to identify determinants of salesperson performance, differentiating their results depending on the type of indicator (self-report, managerial report or objective).

Now, we show the most relevant conclusions from different authors when comparing objective, manager-rated and self-rated measures of performance.

2.2.3.2 Objective versus manager-rated measures of performance

Most of the comparisons in academic literature are referred to these two measures of performance. Vinchur & Schippmann (1998) found, in their meta-analysis reviewing predictors of job performance for salespeople, that just a few studies used criteria other than objective sales volume or managerial ratings of salesperson performance.

There has been a long lasting debate in academia referred to the correlation between both types of indicators. Some analysis have identified a high correlation between objective and supervisor-rated performance (Brown & Peterson, 1994; Jaramillo, Carrillat & Locander, 2003, 2004, 2005), stating that there is no bias in the sales manager's rating (Steward, Hutt, Walker & Kuman, 2009); agreeing with this point of view, Pitt, Ewing & Berthon (2002) affirm that subjective assessments by managers of various aspects of performance are as effective as objective measures.

Other studies have found a relatively weak relationship (Levy & Sharma, 1993) (Sharma, Rich & Levy, 2004). For example, Dubinsty et al. (1995) found that the correlation among two supervisory rated measures of performance (job congruence and a composite measure of performance based on ten job dimensions) and two objective ones (% of quota attained and % of prior year's sales achieved) had low correlations ranging from r=0,02 to r=0,16); in addition, they found that sales manager transactional leadership is positively related to salesperson performance rated by a supervisor through the composite measure but not to the other three. Kirchner (1960) compared 21 objective variables (number of demonstrations, number of calls, number of new accounts,…) with 19 appraisal items used by sales managers (stability-maturity, volume of sales, quality of

sales, economy, persuasiveness,…); results showed 61 significant correlation coefficients out of 399 (15%). Weitz (1978) compared four different objective measures of performance (sales and quota) with managers rating and found significant but not strong correlations (ranging from r=0,17 to r=0,43).

Various meta-analyses have concluded that objective and subjective measures are different because they do not capture the same performance aspects of salespeople, and because both types of indicators just share a limited amount of variance (Bommer et al., 1995; Jaramillo, Carrillat & Locander, 2005; Rich et al., 1999):

- Rich et al. (1999) found in a meta-analysis of 21 studies with 4,092 participants that the overall mean corrected correlation between objective and manager-rated measures of salesperson performance was .447, indicating that the two measures shared just around 20% of variance. They added that even under very specific circumstances (e. g. using composite ratings) the correlation never exceeds .50; that would imply sharing a third of their variance or, in other words, that more than two thirds of the variance in subjective ratings by managers are explained by different factors than objective performance.

- Jaramillo, Carrillat & Locander (2005) found an overall corrected mean correlation of 0.44 after analyzing 29 studies with 5,043 salespeople; this implies that objective performance and managerial ratings share just 19.4% of their variance.

- Bommer et al. (1995) got similar results in their meta-analysis of 22 samples with 4,173 salespeople including manager-rated evaluations, with a corrected correlation of 0.41.

- Verbeke, Dietz & Verwaal (2010) found in their meta-analysis of 268 studies that measurement methods moderate the relationship between 18 specific determinants and sales performance and that effect sizes are stronger when objective performance is used when compared to managerial reports.

- Vinchur et al. (1998) found in their meta analysis of predictors of sales performance of 129 samples and 45,944 salespeople different results when they evaluated the validity of different predictors of performance, depending on the measure of performance taken as a dependent variable: they found that potency, achievement and interest are good predictors of performance when it is measured either through objective or manager-rated indicators; on the other hand, different results were achieved for biodata, sales ability and general cognitive ability depending on the measure of performance.

- Franke and Park (2006) found in their meta-analysis of adaptive selling behavior (ASB) and customer orientation (CO) that the largest positive correlation of all the analyzed variables was between objective and manager-rated performance (r=0.35). They showed that ASB increased sales performance, whatever the measure used; they also found that CO had a significant effect on performance only with self reported measures, but it was no significant with objective or managerial ratings.

2.2.3.3 Objective versus self-reported measures of performance

A review of the literature shows that some authors have identified a high correlation between objective and self-report measures of performance (Levy & Sharma, 1993; Sharma, Rich & Levy, 2004), whether others have found weak or non significant correlations (Brown & Peterson, 1994; Chonko et al., 2000; Jaramillo, Carrillat & Locander, 2003, 2004). For example, Chonko et al. (2000) found that the correlation of two self-rated measures of performance (a single and a composite item of total performance) with eight objective measures (all of them related to commissions) ranged between r=0.02 and R=0.31, with 5 out of 16 correlations (31%) with significant but weak relationships; additionally, they said that the relationship between role conflict and role ambiguity are quite different depending on the performance measure used, ranging between .19 and .55 for these ten indicators. Sojka & Deeter-Schmelz (2008) compared an objective and a self-rated measure of performance, finding a significant correlation of r=0,17 that they considered "reasonable" given that these two variables consider differentiated aspects of performance. Franke and Park's (2006) meta-analysis showed that Adaptive Selling Behavior had a significant and direct effect on sales performance, whatever the measure used; they also found that Customer Orientation had a significant effect on performance only with self reported measures, but it was no significant with objective ones.

Jaramillo, Carrillat & Locander (2005) found in their meta-analysis an overall corrected mean correlation of 0,34 between self rated and objective performance, after

analyzing 14 studies with 2.420 salespeople, with a shared variance of just 11.6%, showing a very low predictive validity of self reports on objective performance.

2.2.3.4 Manager-rated versus self-reported measures of performance

Again, authors have different positions when comparing both ways of measuring performance. Some authors argue that managerial evaluations of performance are less biased than self ratings, that is, managerial evaluations are much better than self-reports in measuring "true" performance (Brown & Peterson, 1994; Chonko et al., 2000; De Coninck, 2011; Jaramillo, Carrillat & Locander, 2003, 2004) while others affirm that self-report measures of salesperson performance are more accurate than managerial evaluations (Sharma, Rich & Levy, 2004); Churchill et al. (1985) found that self ratings are correlated with sales managers ratings of salesforce performance.

Verbeke, Dietz & Verwaal (2010) found in their meta-analysis of 268 studies that measurement methods moderate the relationship between 18 specific determinants and sales performance and that effect sizes are stronger when self rated performance is used when compared to manager rated. This confirms previous conclusions from Podsakoff et al. (2003), which they attributed to common method bias- people appraise themselves better than others do.

Franke and Park's (2006) meta-analysis showed that Adaptive Selling Behavior had a significant and direct effect on sales performance, whatever the measure used; they also found that Customer Orientation had a significant effect on performance only with self reported measures, but it was not significant with managerial ratings.

Jaramillo, Carrillat & Locander (2005) found in their meta-analysis an overall corrected mean correlation of 0,19 after analyzing 13 studies with 1,551 salespeople, with a shared variance of just 3.6%, showing that both types of indicators are quite different. The authors showed that differences between both kinds of indicators were attributable to the "performance effect" (i.e., low performers overestimate while high-performers underestimate their actual performance), following Jaramillo et al. (2003) and Plouffe, Hulland & Wachner (2009).

2.2.3.5 Objective versus subjective measures of performance

Finally, some studies have considered objective and subjective measures as a whole. As an example of a specific comparison, Lamont & Lundstrom (1977) used 5 objective measures, 5 managers ratings and 2 self ratings of performance and compared them to 5 personality variables and 6 personal characteristics to try to identify a profile of a "successful industrial salesman". Just 10 out of 110 possible correlations (9%) were statistically significant, with no apparent concentration with any specific measure of performance. The authors affirmed that the characteristics of successful salespeople depended "somewhat" on the criteria used to measure performance.

Churchill et al. (1985) concluded in their meta-analysis of 116 studies and 1,653 observations that no relevant differences were found on the effect of 6 different sets of predictors on performance, whatever the measurement method.

As we have already mentioned, Franke and Park's (2006) meta-analysis showed that Adaptive Selling Behavior had a significant and direct effect on sales performance, whatever the measure used; they also found that Customer Orientation had a significant effect on performance only with self reported measures, but it was not significant with objective or managerial ratings.

Jaramillo, Carrillat & Locander (2005) found in their meta-analysis an overall corrected mean correlation of 0.41 after analyzing 43 studies with 7,463 salespeople.

2.2.4 Different measures of sales performance are not interchangeable

Conclusions show that each indicator is different and low amounts of variance are shared among the three main ways to measure performance (objective, self-rated and supervisory-rated), even though the correlation between objective performance and managerial ratings is higher than than with self-rated performance (Jaramillo, Carrillat & Locander, 2005; Rich et al., 1999). Since these measures of salesperson performance are not interchangeable and do not measure the same things, specific performance indicators have to be chosen depending on the issue that needs to be measured and managed (Babakus, Cravens, Johnston & Moncrief, 1999; Bommer et al., 1995; Chonko et al, 2000; Farrell & Hakstian, 2010; Jaramillo, Carrillat & Locander, 2005; Lamont & Lundstrom, 1977; Plouffe, Hulland & Wachner, 2009; Rich et al., 1999; Verbeke, Dietz & Verwaal, 2010; Vinchur & Schippmann, 1998). Some authors consider that it is better

to use multiple different indicators to measure performance (Babakus, Cravens, Johnston & Moncrief, 1999; Churchille et al, 1985; Franke & Park, 2006).

For example, Rich et al. (1999) say, after their meta-analysis, that objective and subjective measures of salesperson performance have relatively low correlations and, hence, are not interchangeable. The explanations for these low correlations could be that sales managers define performance in a broader way than objective results (that is, that they include other elements in their evaluations) and/or that measurement error could contaminate both types of measures. The authors conclude that, given that different indicators may be measuring different things, executives should only make decisions based on specific indicators that measure particular issues; when choosing these indicators they have to balance the selection of the specific indicator and the minimization of the measurement error.

Chonko et al. (2000) found also a low correlation either when comparing different types of performance (2 measures of self-rated and 8 of objective performance with a clear preponderance of low correlations among them) or when comparing how these measures change over time. The implication is that the classification of salespeople according to their performance changes "dramatically" depending on the measure of performance employed. Before choosing a specific measure, they suggest clarifying the objectives that want to be reached when evaluating a salesperson.

Even authors who have found high correlations between objective and supervisor-rated measures of performance consider that it does not imply that both types of measures are interchangeable (Jaramillo, Carrillat & Locander, 2004).

Nevertheless, despite a general agreement that objective and subjective measures are not interchangeable, researchers generally use just one type of measure (Plouffe, Hulland & Wachner, 2009).

In line with the previous ideas, there is no clear conclusion regarding which is the "best" indicator of a salesperson's performance. Chonko et al. (2000) analyzed ten different objective and subjective measures in a specific study and concluded that they "cannot comment on which, if any, of the criterion measures used in this study is the best"; they argued that each one of them could be useful for different purposes and mentioned that it would be useful to know which is the "correct" variable to measure, but that researchers still need to continue working on this issue. Similarly, Rich et al., (1999) state that the researcher has to make a decision when choosing one or another measure of performance, balancing the pros and cons of different measures and that the definitive decision needs to be determined by future research.

2.2.5 Analysis of studies using objective measures of performance in the sales domain

2.2.5.1 The use in academic research of objective measures of sales performance

We are going to focus our analysis on objective measures of performance. As we explained above in detail, objective measures of sales performance have been less used in academic research than subjective measures (Jaramillo, Carrillat & Locander, 2005; Jaramillo, Mulki & Marshall, 2005; Pitt, Ewing and Berthon, 2002), probably because of the difficulties to have access to company records (Jaramillo, Carrillat & Locander, 2005; Jaramillo, Mulki & Marshall, 2005).

Various meta-analyses have specifically (a) compared objective measures of salesperson performance with managerial ratings and self-evaluations, or (b) identified if the use of a specific indicator affects various determinants on performance (Bommer et al., 1995, partially analyzing salesforces; Churchill et al., 1985; Franke & Park, 2006; Jaramillo, Carrillat & Locander, 2005; Rich et al., 1999; Verbeke, Dietz & Verwaal, 2010; Vinchur et al., 1998). None of these studies -or others, to the best of our knowledge- have analyzed the specific characteristics of the objective measuresemployed or other related conclusions that could arise when comparing the use of different objective indicators of sales performance. We intend to go further in this analysis.

2.2.5.2 Identification and analysis of studies including objective measures of sales performance

We conducted an extensive survey of the literature in order to identify empirical work using objective measures of performance at the individual level in the sales domain. We searched for published articles which fit the following criteria: (1) involved the measurement of sales managers and/or salespeople, at the individual level; we excluded research at the team, store, territory, business unit or firm levels; (2) included at least one measure of objective performance; we included articles which also involved subjective measures; (3) objective performance had to be quantifiable; mostly, the source of information were company records, but in some cases, salespeople were asked to quantify it through a questionnaire; (4) objective performance could be either a dependent or independent variable; (5) studies could be cross-sectional or longitudinal; (6) objective performance was measured with outcome measures, not with behaviors. Specifically, we looked at the following prominent journals, including the ones that have published more articles in the sales field during the last 30 years (Asare, Yang & Beashear Alejandro, 2012): Academy of Management Journal, European Journal of Marketing, Human Relations, Human Resource Management, Industrial Marketing Management, International Journal of Research in Marketing, Journal of Applied Psychology, (JCM), and Journal of Business Ethics, Journal of Business & Industrial Marketing, Journal of Business Research, Journal of Consumer Marketing, Journal of Personal Selling & Sales Management, Journal of Management, Journal of Marketing, Journal of Marketing Research, Journal of Marketing Theory and Practice (JMTP), Journal of the Academy of

Marketing Science, Marketing Letters. Marketing Science, Organizational Behavior and Human Decision Processes, Organizational Research Methods, Personnel Psychology, and Psychology & Marketing. Additionally, an electronic search was conducted of various databases (ABI/INFORM, Business Source Premier, PsycArticles and Emerald) which contain articles for business and psychological research. To conduct this search, we queried to identify all-time articles containing some combination of topical keywords (e.g. sales, selling, sales management, salesperson, salespeople, performance, objective performance,…). Moreover, we identified published articles included in meta-analyses and specific reviews of the literature involving objective measures of sales performance (e. g., Jaramillo, Carrillat & Locander, 2005; Johnson, J., 2014; Sturman, Cheramie & Cashen, 2005).

The research yielded 133 published studies, for a total of 148 samples -including studies with more than one setting. In **Appendix A** we show these studies, detailing the authors, industry, sample size, time frame of the analysis, specific measures of objective performance and other items analyzed in the study (determinants, covariates,…). Studies range from 1960 to 2015 and cover a wide variety of industries. Now, we explain the main conclusions that we have found after analyzing this information, regarding to two issues:

- specific objective indicators used to measure performance
- comparison of results when using multiple indicators of performance

2.2.5.3 Brief description of the studies using objective measures of sales performance

Vinchur et al. (1998) affirmed in their meta-analytic review of predictors of job performance that one of the limitations of their analysis was that most of the objective measures that they found used "sales" as an indicator. In our analysis, we wanted to confirm this conclusion and identify other typically used measures. we have identified eight main typologies of indicators:

- **sales volume**. Used in 49 % of the studies. A given study may use more than one indicator; in this situation –e.g., two different measures of sales volume-, we have just counted it once. Sales is the most frequently used measure of job outcomes. Usually it refers to actual performance measured in dollars (or other currencies), but in some cases it was forecasted or adjusted.

- **sales quota** (32 %). It controls for externalities such as territory differences, market potential or economic conditions, what makes it an especially adequate indicator of objective performance (Ahearne, Srinivasan & Weinstein 2004; Jaramillo et al., 2007; MacKenzie, Podsakoff & Ahearne 1998).

- **number of units sold** (20 %). Depending on the specific industry, included loans, policies, cards, cars, specific industrial products,…

- **commissions / salary / earnings** (16 %). In some cases, authors mention specifically that it is considered an indirect measure of job outcomes.

- **profitability** (6 %). Just in one case authors explained in detail how it was computed; they use to take typical profit-related indicators from the company.

- **number of customers** (6 %). In some occasions they specified that it was related to "new" customers for the company.

- **market share** (4 %). Also controls for externalities.

- **other** (5%). Including price per order, sales calls or wastes.

Results are consistent with Vinchur et al. (1998). As a final conclusion, despite a significant concentration on "sales", there is a wide variety of indicators used by researchers, depending on the specific setting, objectives and issues that they want to analyze, and the availability of information.

The measurement period ranged from four weeks to ten years, with 47 % of the cases considering a 12 months period and 41% less than 12 months. Sharma et al. (2004) affirmed that one-year sales data are representative of the salespeople's true performance; as shown by the wide range of periods displayed, the time frame has to be carefully chosen and adapted to the objectives of the research.

16% of the studies included a longitudinal analysis - 3 or more observation points over time (Ployhart & Ward, 2011). 8 % of the studies were referred to new salespeople. 34 % of the studies considered various measures of performance or used composite measures of objective performance. In the following section we are going to analyze the latter.

2.2.5.4 Studies using more than one indicator of performance

As we have shown, 34 % of the studies considered various measures of performance or used composite measures of objective performance. This is consistent with Franke & Park (2006), who, in their meta-analysis of salesperson adaptive selling behavior and customer orientation, said that objective performance is "often" measured with a single indicator. We have addressed previously the comparison of results obtained in studies using objective and subjective measures –either managerial ratings or self evaluations. Now, we will compare and analyze the results obtained in studies using various indicators of objective performance or composite measures. We have not found other studies where such a comparison has been done. Depending on the available data, we analyzed results in two different ways: (a) comparing direct correlations among the objective measures of performance, or (b) comparing whether the correlation of each determinant was similar or not for the different measures of performance used. We found different combinations -some of them repeated- when comparing the aforementioned indicators: quota Vs number of customers, number of units Vs number of units, sales Vs profitability and salary Vs salary…

First, we analyze various studies using composite measures of performance created through the combination of various single measures obtained from company records. In two cases, the composite measure was calculated including a subjective measure. The main advantage of this kind of indicators is that they increase the strength of the construct because it considers different aspects of sales (Plouffe, Hulland & Wachner, 2009). Jaramillo, Carrillat & Locander (2005) found in their meta-analysis that

managerial ratings based on composite measures had a grater correlation with objective performance (r=0.52) than when using overall indicators (r=0.37), suggesting to use composite ratings when managerial ratings were used. Next, we describe some relevant issues regarding the specific indicators and the methodology used to calculate the composite indicators.

Crant (1995) created, in his study of 131 real estate agents, a composite performance rating based on three different indicators of objective performance: number of houses sold, number of listings generated for the firm and commission income. Given that all three dimensions were highly correlated (correlation coefficients: sales-listings 0.79; sales-commissions 0.77; listings-commissions 0.70) he computed z scores for each of the three indicators and summed them up. z scores accounted for the measurement differences among the dimensions given that two indicators were based on "number" of houses sold or listed and the other one in "dollars".

Liden, Stilwell & Ferris (1996) developed a composite objective measure of performance combining coverage (avg. number of sales calls to retail outlets made per day) and distribution (total amount of product distributed; distribution of new products). It is important to note that they obtained the primary information from company records but then asked managers to "simply transform" the annual quantities of these variables to a qualitative scale, so that it would be easier to compare the results with a subjective measure (their own rating of their subordinates).

MacKenzie, Podsakoff & Ahearne (1998) developed a composite performance rating standardizing and weighting equally three measures: total commissions, number

of policies sold and % of sales quota attained. They mention that they found similar results after creating factor scores from the standardized items given that the factor loadings for each of the three items were similar.

MacKenzie, Podsakoff & Rich (2001) used three multiple indicators (commissions, number of policies sold and percentage of sales quota attained) of the latent in-role sales performance construct.

Plouffe, Hulland & Wachner (2009) created, through factor analysis, a single composite measure for salespeople of cleaning and laundry services, based on plan percentage (dollar sales versus an annual plan target) and average weekly rental value in dollars.

Weitz (1978) developed a composite measure of performance combining four different objective indicators of sales performance (sales and quota for both the overall company and for a specific Division) and the subjective managers rating through factor analysis. The correlations of the composite measure with the five components were significant and strong (ranging from r=0.69 to r=0.81 for the objective indicators and being r=0.56 for the subjective indicator).

Now, we analyze various studies with various objective measures of performance.

Adkins & Russell (1997) used store sales and profits as objective measures of store performance and found a statistically significant relationship of r=0,61 between them.

Ávila & Fern (1986) used three objective indicators of performance in their analysis of a computer manufacturer: % of quota achieved, number of new accounts generated and number of accounts lost. Even though they do not provide detailed results, they mentioned that no one of the three objective measures was correlated with each other. For the analysis, they finally just kept sales quota.

Baehr & Williams (1968) used mean sales volume rank (average of all ranks assigned to a salesp. over the last 10 years) and maximum sales volume rank (the highest ranking the salesp. received over the last 10 years) to analyze a specialty food manufacturer. They found that both measures were highly correlated ($r = .75$, $p < .001$) "because of their common source data". Additionally, they regressed 15 personal-history factors of salespeople on both variables, and found that: the multiple R values of the 15 independent variables were .50 for mean sales volume rank and .36 for maximum sales volume rank; considering the two variables with higher weights, "financial responsibility" had a "simple r" of .43 and .31 and "stability" " had a "simple r" of .39 and .27, respectively, for both criterions.

Bartling & Weber (1996) analyzed the effects of transformational leadership training on the financial performance for 20 branches -not salespeople- in Canada using two independent -but similar in nature- objective measures of performance: number of personal loan sales and number of credit card sales, both weighted by the number of full-time staff employed in each branch to control for branch size. Results showed similar -but not the same- conclusions for both variables, stating that training effects were

significant for the number of personal loan sales and marginally significant for the number of credit card sales.

Behrens & Halverson (1991) used initially actual sales and projected sales. Given that the correlation was very high (r=0.96), they finally used just actual sales in their analyses.

Bernhardt, Donthu & Kennett (2000) analyzed the correlation between employee satisfaction, customer satisfaction and performance at 382 restaurants from a nationwide fast food chain. They measured objective performance through three different indicators: sales, customer counts and profitability. They got similar results for all three indicators, concluding that the relationship between composite customer satisfaction or employee satisfaction was "very weak" for all three measures of performance.

Chonko, Loe, Roberts &Tanner (2000) analyzed salespeople from an industrial products company using 8 objective measures of performance -and 2 subjective ones-, concluding that the preponderance of low correlations among them suggests that different measures may be measuring different phenomena: very low correlation (r= 0.08 to 0.16) among the 4 readily available indicators (current percent salary increase, percent salary increase six months prior, percent salary increase twelve months prior and current dollar salary increase). They created 4 performance measures (different ways to measure increases or differences between the 4 readily available ones): four correlations were very low (r=0.01 to 0.12) and two higher (r= 0.57 and 0.79). 68% (11 out of 16) of the correlations among all 8 indicators are below 0.30 and three of them are above 0.70.

Cotham (1968) analyzed a retail appliances chain, comparing four different indicators of objective performance (sales volume, sales volume adjusted for store differences, commission earnings and commission earnings adjusted to store differences) with 30 measures of job satisfaction. From a possible 120, just 12 correlations (10%) were found statistically significant, showing clear differences depending on the objective measure considered: the correlation between actual and adjusted earnings was not statistically significant, no significant relationships were found between adjusted earnings and job satisfaction variables, four correlations were found with actual earnings. both actual and adjusted sales volumes were correlated with the same four measures of job satisfaction, with similar values. Three of these four measures of job satisfaction were the same ones correlated with actual earnings. Hence, they found similar results for actual earnings and sales -either actual or adjusted- but not for adjusted earnings.

Cotham (1969) analyzed a retail appliances chain, comparing three measures of objective performance (sales volume, sales volume adjusted for store differences and earnings adjusted for store differences) with two different kinds of indicators: with five items usually found in an application form of candidates (age, civic club membership, amount of time wife works, formal education and retail selling experience). They found a statistically significant correlation between “sales” and the five analyzed items, but just two for “adjusted sales” (both correlations in the same direction and similar value than for “sales”) and no one for “adjusted earnings”; this implies that different indicators yielded different conclusions. With three different ratings of salespeople performance (customer satisfaction, interest in work and composite performance), completed on one

side by their direct supervisors -Department Managers- and on the other by Store Managers. Results were very similar for all but one of the measurements; this implies that different objective indicator showed similar conclusions.

Crant (1995), in addition to creating a composite performance rating based on three different indicators of objective performance (number of houses sold, number of listings generated for the firm and commission income), wanted to know if the findings for this composite rating would apply to all three indicators separately. To do so, he computed separate hierarchical regression analyses for each indicator of job performance. While the Proactive Personality Scale (PP) explained an additional 8% of the variance in composite performance, PP accounted for an additional 9% of the variance in number of houses sold, 7% of the variance in commissions income and 6% in number of listings obtained; hence, the conclusion is that results were similar, but not the same for all three of them.

Dubinsky et al. (1995) used two objective measures of performance (% of quota attained and % of prior year's sales achieved) with a significant correlation of r=0.4.

Fu, Richards, Hughes & Jones (2010) analyzed two different samples of salespeople to determine how did various variables influence the success of a new product launch, as measured through the daily evolution of unit sales. Sales quota at time 1 was regressed as a control variable on growth rate of new product sales and found that for sample 1 (new to market product): correlation of 0.43, $p < .01$. $\beta = 0.12$, $p < 0.01$ in their final regression model; for sample 2 (line extension product): correlation of 0.40, $p < .01$. $\beta = 0.17$, $p < 0.001$ in their final regression model

Hughes & Ahearne (2010) compared, in an analysis of various distributors of consumer products, brand sales performance (% of sales that the focal brand represents out of the total sales volume produced by the salesperson during the period of analysis) and overall sales performance (sales trend improvement of the salesperson's entire portfolio of brands during the defined period). As hypothesized, they found that greater brand sales performance results in increased overall sales performance only when control systems alignment of the sales force is high (.12, $p < .05$). The direct correlation of both variables was 0 (non significant).

Hughes (2011) used sales quota (actual % attainment of quota for the focal brand) and brand share of sales (% of each salesp.'s overall sales that is represented by the focal brand) in their analysis of various distributors of a beverage manufacturer that produces several brands. The later was included as a covariate. Both variables had a correlation of .43. The model results showed a significant relationship (estimate of .28, $p < .05$) between brand share of sales and sales performance.

Lamont & Lundstrom (1977) used three objective measures of performance (sales commissions / total compensation, incentive earnings / total compensation and actual sales / sales quota), but provided no data about the correlations among them. When comparing the three indicators with 5 personality variables and 6 personal characteristics, there were just 3 significant correlations out of 33 (9%); all three corresponded to the "incentive earnings / compensation" variable, showing clear differences depending on the used indicator of performance. The authors, who also compared the 11 variables with

other subjective measures of performance, affirmed that the characteristics of successful salespeople depended "somewhat" on the criteria used to measure performance.

MacKenzie, Podsakoff & Paine (1999) analyzed two different samples of agents of an insurance company, using in both cases two objective measures of performance: in the first sample, the measures (numbers of policies sold and policy's first-year commissions) had a significant correlation of r=0.44. In the second sample, the composite measures of Unit sales performance and Manager's personal sales performance didn't have a significant correlation.

MacKenzie, Podsakoff & Fetter (1991) used three different objective measures for the agents of an insurance company: total dollar amount in commissions, number of applications written and % of quota attained. They created a composite index with them considering it as an antecedent of subjective managerial evaluation, but did not provide information about their correlations.

Mathieu, Ahearne & Taylor (2007) compared the same indicator of performance (sales quota) in two different periods. Post performance was calculated as the average of months 7 to 9 following the introduction of a new information technology suite. Its correlation with baseline performance was .14 ($p < .01$). In their final model including cross-level moderation variables, they found, as hypothesized, that performance would exhibit significant stability over time (parameter estimate of .17, standard error of .04, $p < .001$) since it is influenced by several personal factors like individual knowledge, skills or abilities and not only by technological changes.

Weitz (1978) compared four different objective indicators of sales performance (sales and quota for both the overall company and for a specific Division). All correlations among the four indicators were significant, being r=0.67 for the correlation between sales quota for the sales of the whole company and sales quota for the Division sale and being the other five correlations between r=0.31 and r=0.47.

In summary, we got two main conclusions: (a) the comparison of direct correlations among the objective measures of performance showed either high, low or no significant correlations, depending on the specific situation; (b) when comparing the correlation of various determinants with each objective measure of performance, some studies provided similar results and other different ones -that is, the determinant had a significant relationship with one objective measure of performance, but not with a different one.

2.2.6 Need for studies comparing various measures of objective sales performance

We have found in general different conclusions (high, low or non-existing relationships) when comparing the relationship between different indicators of objective performance. We think that further investigations need to be conducted comparing various indicators of objective performance before trying to generalize about the relationship between them. There is a lack of academic studies where different objective measures of salespeople performance are compared. Hence, there is a need to go further

in this analysis developing academic research that uses different indicators of objective performance and comparing these results.

Several authors have concluded that it is most prudent to use multiple measures of performance for salespeople, though infrequently practiced or reported (Chonko et al. 2000; Jaramillo et al. 2003; Plouffe, Sridharan & Barclay, 2010; Rich et al, 1999; Viswesvaran, Schmidt & Ones, 1996).

Given that we have not found clear correlations among different objective measures, we make the assumption -that has been widely demonstrated when comparing objective and subjective measures- that objective indicators are not interchangeable and that they have to be chosen carefully according to the objectives of each investigation. Different objective indicators seem to be measuring different aspects of the sales construct.

2.3 Longitudinal analyses of sales performance

2.3.1 The dynamic nature of performance

The static or dynamic nature of performance and the evolution of rank-ordering of individuals on performance criterion has been widely analyzed in the sales domain and in other fields, causing in some occasions opposing views and debates (Ackerman, 1989; Austin, Humphreys & Hulin, 1989; Barrett & Alexander, 1989; Barrett & Alexander, 1989; Barrett, Caldwell & Alexander, 1985; Deadrick & Madigan, 1990; 1997; Henry & Hulin, 1987). While some authors have supported the idea that job performance levels are stable (Barrett & Alexander, 1989; Barrett, Caldwell, & Alexander, 1985) and others have confirmed this conclusion in specific studies (Guidice & Mero, 2012; Jelinek et al. 2006; Mathieu, Ahearne & Taylor, 2007), evidence has proliferated that performance changes over time (Deadrick & Madigan, 1990; Ghiselli & Haire, 1960; Hanges, Schneider, & Niles, 1990; Hoffman, Jacobs, & Gerras, 1992; Hofmann, Jacobs, Baratta, 1993; Hulin, Henry, & Noon, 1990; Humphreys, 1960; Rambo, Chomiak & Price, 1983; Rambo, Chomiak, & Rountree, 1987; Rothe, 1978; Reb & Cropanzano, 2007; Thoresen, Bradley, Bliese, & Thoresen, 2004). Incorrect assumptions when determining whether performance is stable or dynamic could have costly implications for various decisions taken in organizations related to selection, training, rewarding or evaluation, for example when a decision is based on the validity of predictors of future performance at a specific point in time but the rank-ordering of individuals on the criterion changes deeply over time (Barone & De Carlo (2012); Deadrick & Madigan, 1990; Hanges, Schneider &

Niles 1990; Henry & Hulin, 1987, 1989; Hulin, Henry, & Noon, 1990; Reb & Cropanzano, 2007; Thoresen, Bradley, Bliese & Thoresen (2004).

In other words, criteria are said to be dynamic when change in performance is observed. The basic concept of dynamic criteria refers to variability in the relative performance of employees over time; that is, to changes in rank order performance (Deadrick & Madigan, 1990).

Giving for granted the dynamic nature of performance -it changes over time-, we can assume that dynamic performance profiles have a given performance mean, performance variation, and performance trend (Reb & Cropanzano, 2007). Additionally, these elements can be characterized by long term changes -trends- that modify mean performance or by short term variations around a given mean. Changes in employee skills, experience, job complexity or knowledge can affect long term performance (Deadrick, Bennett, & Russell, 1997; Kanfer & Ackerman, 1989; Schmidt & Hunter, 1992; Schmidt, Hunter, & Outerbridge, 1986, 1988; Quiñones, Ford, & Teachout, 1995; Sturman, 2003). Affective states or emotional stability can influence short term variations (Beal, Weiss, Barros, & MacDaniel, 2005; Cropanzano, Weiss, Hale, & Reb, 2003).

Once it is assumed that performance is a dynamic construct, one has to measure this change. Authors have approached the measurement of dynamic performance at two complementary levels:

- **within person** level: analyzing if intra-individual patterns of performance are systematic.

- **between-person** level: analyzing how individual differences account for observed inter-individual differences in the change patterns of performance, and if there are systematic differences between these intra-individual patterns.

As Zyphur, Chaturvedi & Arvey (2008) put it, the former implies that previous performance affects future performance and the latter that individuals have distinct performance trajectories.

2.3.1.1 Previous performance affects future performance

At the within-person level, some investigations focused on explaining the simplex pattern of covariation among measurements of performance: the relationship between measures of performance decreases systematically as the measurements become increasingly separated by time (Humphreys, 1960). The simplex pattern shows that individuals change continually their rank-ordered performance over time, with changes from one position increasing as time progresses. At the within-person level of analysis, it is of the upmost interest to determine to what extent performance at a given point in time is a function of previous performance (Zyphur, Chaturvedi & Arvey, 2008) and whether this change is systematic or random (Deadrick, Bennett & Russell, 1997). Recent evidence indicates that the relative (rank-ordered) performance of individuals changes systematically over time (Deadrick & Madigan, 1990).

The most common approaches to measure such changes have been autoregressive (i.e., lagged) models (Zyphur, Chaturvedi & Arvey, 2008), which allow for modeling

lagged effects of one variable on itself at future times of observation. As we mentioned, it allowed to focus on lagged effects, identifying correlations that decrease as the time between performance measurements increases.

When theorizing about changes in job performance at the within-person level (that is, about not having a high correlation among performance measures over time), authors have found that the effects of *abilities* and *motivation* on performance are temporally unstable (Ackerman, 1988; Deadrick & Madigan, 1990; Hulin, Henry, & Noon, 1990), affecting an individual's performance level after time passing. As a consequence, employees' positions in a performance distribution will change, generating the abovementioned simplex pattern (Murphy, 1989; Zyphur, Chaturvedi & Arvey, 2008). Additionally, the link between current and future performance can be explained by *psychological factors* like self awareness of performance through feedback (Kinicki, Prussia, Wu, & McKee-Ryan, 2004; Locke, 1967) and *environmental factors* like getting support from other coworkers (Van Der Vegt, Bunderson, & Oosterhof, 2006) or getting more resources from the company (Stajkovic & Luthans, 2001).

2.3.1.2 Individuals have distinct performance trajectories

The second level of analysis assumes that individual level performance trajectories exist, and that the factors that explain between-person differences in performance change patterns over time can be identified. Researchers have demonstrated that levels of performance differentially change across individuals (Hofmann et al., 1993; Hofmann, Jacobs, & Gerras, 1992) and that between-person differences predict these changes (e.g., Deadrick, Bennett, & Russell, 1997; Thoresen, Bradley, Bliese, & Thoresen, 2004). At the between-person level, it is critical to know to what extent it is possible to predict the rate of change based on the knowledge of individual difference variables and which are the variables that better predict this change (Deadrick, Bennett & Russell, 1997).

Recent research on these issues has used Latent Trajectory Modeling (LTM) -in the forms of Hierarchical Linear Modeling or Latent Growth Curves- to capture the person-specific, latent performance trajectories that unfold over time (Zyphur, Chaturvedi & Arvey, 2008). These models repeated observations as a function of time, incorporating both mean and covariance structures into analyses of longitudinal performance, allowing to model individuals' mean performance at a given point in time (via a latent intercept factor) and changes in performance away from this point in time (via a latent slope or latent change factor) (Chan, 1998; Raudenbush, 2001; Willett & Sayer, 1994). These models fit specially when there are individual-specific trajectories over time along a given variable. Interestingly, Zyphur, Chaturvedi & Arvey (2008) suggested a methodology that could overcome the limitation of the Autoregressive and LTM

methodologies, given that it simultaneously models the within-person effect of previous performance on future performance, along with differences between people in latent performance trajectories (Curran & Bollen, 2001). This Autoregressive Latent Trait model (ALT) "provides a model of change that recognizes both individual trajectories as well as the effect of earlier values in determining the course of repeated measures" (Bollen & Curran, 2004, p. 378), accounting at the same time for the effect of previous performance on future performance and individual-specific performance trajectories.

The theoretical rationale explaining between-person differences in performance trajectories is based on research showing that these trajectories are a function of differing levels of *knowledge, skills, ability, and motivation* (Barrick & Mount, 1991; Campbell, McCloy, Oppler, & Sager, 1993; Judge & Ilies, 2002; Schmidt, Hunter, & Pearlman, 1981; Tett, Jackson, & Rothstein, 1991). Not only do different individuals have different levels of knowledge, skills, ability and motivation, but, additionally, these levels may change at different moments in time or at different job stages, or the relative importance of each one of them may also change (Ackerman, 1992; Alvares & Hulin, 1973; Fleishman & Fruchter, 1960; Kanfer & Ackerman, 1989; Keil & Cortina, 2001; Murphy 1989). Deadrick, Bennett & Russell, 1997) state that "clearly, situational variables affect performance over time".

2.3.2 Cross sectional versus longitudinal analyses

Authors studying the relationship between personality and performance frequently use cross-sectional, one-time measurements of performance (Thoresen, Bradley, Bliese & Thoresen, 2004) since they assume that the latter is stable over time, despite evidence that it is dynamic (Bass, 1962; Ghiselli, 1956; Ghiselli & Haire, 1960). Hence, they fail to consider changes in the relationships between variables over time (Bergh, 1993a, 1993b).

Several authors have found significant differences in their analyses when comparing cross-sectional studies with longitudinal ones, emphasizing the importance of implementing longitudinal studies and considering other than lineal relationships between variables:

Ahearne, Lam, Mathieu & Bolander (2010) concluded that if they had used a cross-sectional analysis, they would have got "incomplete" conclusions about the relationship between Goal Orientations (specifically, Learning and Performance Orientations) and Objective Performance, during an organizational change period. They got this conclusion when comparing results from the correlations (descriptive statistics) and from a specific cross-sectional multiple regression, with their longitudinal study (using a hierarchical multivariate linear model). They confirmed that the pairwise correlations which were based on the assumption of linear relationships were not true, since these cross-sectional results failed to reveal the underlying dynamic in the relationship.

Deadrick, Bennett & Russell (1997) found that the determinants -abilities- of initial performance were not the same ones than for performance improvement over time;

while psychomotor ability was significant for initial performance level and cognitive ability was a stronger predictor of performance improvement, prior experience was a significant predictor for both of them.

Jaramillo & Grisaffe (2009) found that customer orientation has a non significant direct effect on the initial level of objective performance, but it does show a significant direct effect on longitudinal sales performance trajectories. With their longitudinal analysis, authors matched the hypothesized effect from various researchers supporting this relationship with the apparently misleading results from a meta-analysis (Franke & Park, 2006) that challenged this notion.

Thoresen, Bradley, Bliese & Thoresen (2004) found that, in a stable ("maintenance") sample of salespeople, conscientiousness and extraversion were positively related to between-person differences in total sales, while only conscientiousness predicted performance growth (with a linear, quadratic and cubic terms). In a change ("transitional") sample, agreeableness and openness to experience predicted both overall performance differences and performance trends (with a linear and cubic terms).

Research has showed that time should be considered to capture eventual nonlinear relationships, to improve causal inference and to show that performance is time dependent (Ahearne, Lam, Mathieu & Bolander, 2010; Chen and Mathieu 2008; Hofmann, Jacobs, and Baratta 1993; Rindfleisch et al. 2008). Some authors (Guidice & Mero, 2012; Martinaityte & Sacramento, 2013), despite including only two measurements in time in their research, mention the advantages of this approach over

cross-sectional studies. For example, allowing to obtain inferences about causality stronger than a cross-sectional design or considering behaviors and outcomes as a dynamic process of mutual influence. Johnson (2014) affirms that there is a "relative paucity" of studies testing the effects of nonlinear relationships in organizational and behavioral research, and that a lot of not-yet explored variables may possess theoretically-based nonlinear relationships with key sales-related outcomes; moreover, as an example in the sales field, he suggests , that researchers that examine longitudinal effects may wish to utilize stage theories that hypothesize different levels of effects at different points in time.

2.3.3 Longitudinal analyses of performance in the sales domain

Based on the search work detailed in Section 2.2.4.2, we identified 22 published articles including longitudinal analyses of objective performance at the individual level in the sales field that we can see in Table 2.3.1. We applied Ployhart & Ward (2011) criteria requiring at least three waves of data to consider it "longitudinal".

In Section 3 (referred to specific findings before developing the hypotheses) and Section 4 (referred to methodological issues) we detail the main conclusions drawn from the detailed analysis of these studies. We just want to note now that just 9 longitudinal studies included various measures of objective performance, even though no one compared the growth trajectories of these measures; in any case, compared them through simple correlations - averaged over time or at each specific observation period.

Table 2.3.1 Longitudinal studies including individual sales person objective performance

Reference	Period (number of observations)	Perf. Measure	Methodology	Comments on longitudinal analysis
Adkins & Naumann (2001)	6 months (6 observations)	- Bookings per hour - Tickets sold per hour	Mixed models	Analyzed the relationship between work values and job performance. They found that, in general, when there were no situational constraints, there were higher levels of perf. and variance in perf. was greater.
Ahearne, Lam, Mathieu & Bolander (2010)	12 months (12 observations)	Quota	Hierarchical multivariate linear modeling, 2 levels	Analyzed the longitudinal performance trajectories of salesp. after a change in the CRM system. Average salesperson performance trajectory declined initially, recovered gradually and finally leveled off, after the change. The correlation matrix shows a simplex pattern between performance observations
Chan, Li & Pierce (2014)	25 weeks (25 observations)	Productivity growth (relative to the average hourly sales in the first week)	Graphical plot of productivity growth. Nested optimization procedure (nonlinear least-square estimator)	Analyzed how peers impact worker productivity growth among salespeople. They show the evolution of the objective performance of new salespeople, determining that the learning (i.e., productivity growth) occurs during the first 3 months at the company; then, new salesp show a leveling off in performance. They also identified that there is a large variation in perf. across salespeople. Additionally, they found that working with high-ability (i.e. more productive) peers increases substantially the long term productivity growth of new salespeople, identifying some mechanisms that explained this conclusion.
Cheng (2014)	9 months (9 observations)	Commission income (average monthly income during 9 months)	Hierarchical regression analyses and logistic regression equations	Explored the influence of sales training and job embeddedness on sales performance and turnover for new salespeople. Not really longitudinal analysis; they measure up to 9 months after

				joining the company, but just consider the average performance of this period, not its evolution over time. No detail is provided for the monthly evolution. They conclude that sales training and job embeddeddness are positively related to perf.
Chonco, Loe, Roberts & Tanner (2000)	12 months (4 observations - current, 1, 6 and 12 months)	8 measures of salary (various measures of salary increase)	- Inter-correlations - Comparison of cohorts of low, middle and high performers	Authors affirmed that timing of measurement and type of measurement make a difference. They found that the was not a high relation between eight perf. measures, measured at different moments. They also stated that different measures did not have a strong relationship among them. Additionally, they found that there is an impact of the relationship of role conflict and role ambiguity to the type of perf measure and to the moment when it was taken
Chung, Steenburgh & Sudhir (2014)	2 years (2 annual observations)	Annual quota, based on expected revenues	Regressions Dynamic structural model Graphical plots	Conducted various analyses when analyzing the response of sales forces to a change in the compemsation plan. They found that various elements of the plan enhanced productivity. They also looked for ratcheting among salespeople, but found no significant effects
Ibid	1 year (4 quarterly observations)	- % of quarterly quota completed - % of annual quota completed		
Ibid	1 year (4 quarterly observations)	Ibid, Vs previous month		
Ibid	1 year (4 quarterly observations; various monthly observations)	- % of quarterly quota completed - % of monthly quota completed		
Dustin & Belasen (2013)	24 months (8 quarterly observations)	- Sales (mean quarterly performance) - Pay level: total sales compensation, including both base and incentive pay	Cohorts comparison across time periods. General linear modeling repeated measures analysis	Analyzed the impact of a reduction in compensation in individual performance over time. They found that decreases in compensation will cause sales reps. to increase their performance. Additionally, they compared sales performance evolution across time for various cohorts of pay levels;

		- Total compensation reduction	(ANOVA). HLM not warranted due to the sample size. Graphical plot	results showed that salesp. at high pay levels change their effort less than others at lower pay levels after the reduction in compensation
Fu (2009)	459 days (459 observations)	Sales volume 314 industrial salesp.	Multilevel growth curve (HLM), 2 Levels	Analyzed the effects of salesp. experience, age and goal setting on new product perf. trajectory. They found that new product perf. grows non linearly during the considered period. All these predictors influence both the average performance and the growth trajectory (linear and quadratic slopes); age has a negative impact, while experience and goal setting have a positive influence.
Fu, Richards, Hughes & Jones (2010)	Sample 1: 476 days Sample 2: 304 days (Daily observations)	Daily unit sales (dependent variable) and sales quota (control variable)	Multilevel nonlinear growth curve (HLM), 2 levels	Analyzed how attitude, subjective norms and self-efficacy influence the success of a new product launch by examining salesperson level variance on new product performance, for two different samples of industrial sales people (new-to-market and line extension). Authors found accelerating growth rates over time (quadratic terms) in both samples.
Gupta, Ganster & Kepes (2013)	5 months (5 observations)	Actual sales per hour for each employee, averaged by month and divided by the average of the employee's department that month. Figures were expressed as a % of the department-level average individual sales for each month	Correlations Confirmatory factor analysis Regression	Analyzed the validity of sales self-efficacy in a concurrent study (with current employees) and in a predictive one (involving new hires). In the former one they found that self efficacy predicted objective and subjective perf. more than did the Big Five questionnaire; moreover, they did not observe significant differences between the predictability of both types of measures of perf. Predictive validity coefficients were generally lower than concurrent ones, suggesting that there are different dynamics operating in both types of settings. A methodological difference when compared to other studies is that the sample size ("N") for the longitudinal sample of new salesp. decreased month after month due to

				different hiring dates for the cohorts and because of turnover (e.g., they started at month one with 2,686 salesp. and ended at month 5 with 123)
Harrison, Virick & William (1996)	36 months (observation window) (12 observations) just first 12 months	- Number of systems sold per month - Amount of sales ($) per month - Average pay per month	Correlations and their evolution over time (event history analysis). Regression	Analyzed the performance - turnover relationship of 186 sales reps in their first 12 months at the company. they found that current (time dependent) performance affords a better prediction of turnover than average (time-stationary) performance. Additionally, the % change in perf. from month to month improved the prediction of turnover risk. While they do not provide specific data about the performance growth during their first months, interestingly, they demonstrated that as the time interval between one perf. period and the next increases, the median correlation between periods decreases
Hofmann, Jacobs & Baratta (1993)	36 months (12 quarterly observations)	Face value of the insurance policies sold for a single month, grouped into quarters for more reliability	- Ordinary least squares (OLS) regressions - Hierarchical Linear Model, 2 levels	In an early study of dynamic criteria of sales performance (that is, if performance changes over time), authors provide evidence of systematic intra-individual change over time and of inter-individual differences in intra-individual change. r values between ..11 ($p<.05$) and .63 ($p<.05$), with some of them being non significant
Jaramillo & Grisaffe (2009)	12 months (4 quarterly observations)	Sales	Latent growth model	Analyzed a direct selling organization and confirmed - through a longitudinal analysis- previous studies that stated that customer orientation had a nonsignificant direct effect on the initial level of objective sales perf., and found that it showed a significant effect in their perf. trajectories, that is, in the long run
Kim (1984)	12 weeks (6 bi-weekly observation)	Average hourly sales in dollars	One-way analysis of covariance	Found that goal setting and feedback involving simultaneously both behavior and outcome was found to be superior than involving either behavior or outcome alone on sales perf. No information on correlations is provided

Kirchner (1960)	6 months (6 observations)	- Shop calls - New account calls - Spot orders - New business orders - Demonstra-tions	Inter-correlation of variables using the Horst (1949) method	Compared the monthly inter-correlations of 5 indicators of objective performance during 6 months. They concluded that few fluctuation occur when comparing month-to-month results and that these data provide a "solid objective base" when predicting future sales success of salesp.
Peterson, Luthans, Avolio, Walumbwa & Zhang (2011)	7 months (3 observations - months 1, 4, 7)	Sales revenues	Latent growth modeling Exploratory cross-lagged panel analysis	Examined within-individual change in *psychological capital* over time and whether this change is related to their change in objective and subjective perf. They confirmed a causal relationship such that prior psychological capital leads to subsequent objective and subjective perf rather than vice versa. The main objective of the study was not a longitudinal analysis of performance.
Ployhart & Hakel (1998)	24 months (8 quarterly observations)	- Gross sales commissions averaged across a three-months period - Past salary commission and salary potential (composite measure that assessed individuals' self-reported past salary and future expected earnings)	Latent growth curve	Analyzed the nature of intra-individual perf. variability over time, along with individual difference predictors of such variability, for newly hired salesp. Results showed that criteria are relatively dynamic over time. They found that average intra-individual perf. approximated a basic "learning" curve, even though there were considerable individual differences in each of the latent perf. growth parameters.
Richardson (1999)	48 months (48 observations)	Sales volume	Linear regression	Provided a methodology to assess the opportunity costs related to the sales loss after the departure of a sales representative. They defined sales decline and sales recovery regression lines in the territories where departures happened, so that it could be determined the length of time required to achieve the pre-departure sales level and calculate the sales loss during this period (opportunity cost)
Stewart &	26 weeks	Dollar amount	HLM 2 levels	Analyzed the longitudinal influence

Nandkeolyar (2006)	(26 observations)	of sales each week	longitudinal With time-varying covariate at Level-1	of a situational opportunity (referrals received form headquarters) on intra-individual perf. outcomes of sales representatives, focusing its analysis on identifying the extent to which perf. varies within individuals. They found that more weekly variation in salesperson perf. resides within individuals than between individuals and that a majority of this variance is explained bu the situational opportunity of referrals.
Sturman & Trevor (2001)	8 months (8 observations)	- Current perf.: monthly fees generated from the loans sold - Two-month perf. trend: difference between month t+1 and month t - All-month perf. trend: regression	HLM, 2 levels	Examined together elements from dynamic performance and the performance - turnover relationship. They demonstrated that the perf. slopes of those who remain in the organization differ from those who leave it. They also found that when predicting turnover, one has to consider employee perf. trends. Specifically, that perf. changes from the previous month and perf. trends measured over a longer time period explained variance in voluntary turnover better than current perf., and that perf. trend interacted with current perf. to predict voluntary turnover.
Thoresen, Bradley, Bliese & Thoresen (2004)	4 quarters (4 observations)	Sample 1: sales Sample 2: sales (product market share)	Random coefficient modeling (Growth trajectory analysis), 2 levels	Tested the validity of the Big Five personality traits to predict sales performance levels and growth trajectories, in two samples of salespeople; some of the traits were associated either with overall performance or growth. For sample 1 (in a stable context): they found strong evidence for rank-order stability across the 4 quarters studied, with correlations ranging from .84 ($p<.01$) to .96 ($p<.01$) For sample 2 (in a transitional context): they got the same conclusion, with correlations ranging from .89 ($p<.001$) to .97 ($p<.001$).

				Additionally, when analyzing higher order growth terms, they found, for Sample 1, positive relationships between mean sales and both linear (r= .34, p<.001) and cubic (r= .76, p<.001) sales growth (n.s. with quadratic term). For sample 2, the mean perf. was correlated with the linear (r= .94, p<.001) and quadratic terms (r= .54, p<.001) - there was no cubic term.
Zyphur, Chaturvedi & Arvey (2008)	24 months (8 quarterly observations)	Gross sales commissions averaged across a three-months period (Same dataset as Ployhart & Hakel, 1998)	Autoregressive Latent Trajectory (ALT) model	Analyzed specifically job perf. over time. They modeled in tandem how past performance can affect future performance and that individuals often have distinct latent perf trajectories. They concluded that current perf can influence future perf directly (i.e., autoregression) and that individual-difference factors (i.e., latent trajectories) make salesp differ in their perf. trajectories, developing an ALT model that incorporates both elements

2.3.4 Need for studies about longitudinal sales performance

Several authors have asked for job performance research and theories that focus on the analysis of individual performance change (Ackerman, 1989; Ahearne, Lam, Mathieu & Bolander, 2010; Austin, Humphreys & Hullin, 1989; Austin, Villanova, Kane & Bernardin, 1991; Austin & Villanova, 1992; Deadrick, Bennett & Russell, 1997; Deadrick & Madigan, 1990; Hofmann, Jacobs & Gerras, 1992; Hofmann, Jacobs & Baratta, 1993; Johnson, 2014; Murphy, 1989; Reb & Cropanzano, 2007; Sturman, Cheramie & Cashen, 2005; Thoresen, Bradley, Bliese & Thoresen, 2004). Both referred to the analysis of the causes of dynamic criteria (random versus systematic within-individual performance changes) and to the determinants of inter-individual differences in performance patterns and trajectories (individual difference variables). Moreover, the scarcity of studies in our identified search area shows that there is a need to analyze objective measures of performance longitudinally.

2.4 Analysis of performance of new salespeople

2.4.1 New salespeople and the career stages theory

Career stages literature supports the idea that individuals will typically experience four stages or phases during their careers: Exploration, Establishment, Maintenance and Disengagement (Cron, 1984; Super, 1957). As compared to later stages, during the initial phase, the Exploration stage, salespeople are concerned with finding an occupation that allows them to succeed, but they do not have a clear idea of the skills and abilities necessary to achieve it. Personal commitment is not usually high, and one of their main objectives is to establish an initial self-image in the organization. At this stage, salespeople frequently fail and do not usually know how to overcome these situations; hence, when they are successful, they need to understand why so that they can replicate certain behaviors (Dixon, Forbes & Schretzer, 2005; Dixon, Spiro and Forbes, 2003; Cron, Dubinsky & Michaels, 1988; Cron & Slocum, 1986a; Slocum and Cron, 1985; Cron, 1984).

Salespeople in the Exploration stage usually are in their twenties, while the ones in the Establishment stage use to be in their thirties or later (Cron, Dubinsky & Michaels, 1988; Cron, 1984; Slocum & Cron, 1985). Dixon, Spiro and Forbes (2003) considered in their study of a Fortune 500 financial entity that salespeople in their first 12 months at the company are in the Exploration stage.

Various aspects vary across salespeople's career stages: work perceptions, career concerns, psychosocial need, developmental tasks (Cron 1984; Cron and Slocum 1986;

Cron, Dubinsky & Michaels, 1988) or emotional exhaustion (Babakus, Cravens, Johnston & Moncrief, 1999).

Several authors have identified characteristics and behaviors that are specific of new salespeople.

New salespeople need to learn how to do their job in an effective way: roles, tasks, sales methods,… (Landau & Werbel, 1995), are eager to try different techniques to create a self-identity in the organization (Jones, Chonko, Rangarajan & Roberts, 2007) (Cron & Slocum, 1986a) and must accommodate to their organization and work environment, being socialization a critical issue in this process (Menguç, Han & Auh, 2007). New salespeople tend to have difficulties with their right decision criteria and intuition, but they are also more open to alter their judgments and decisions (Wagner, Klein, and Keith 2001). When they experience success, tend to develop confidence in their sales skills and consolidate successful sales techniques (Dixon, Forbes & Schretzer, 2005); on the other hand, when they fail, they require more involvement from their supervisors, so that they learn the basics required to be successful (Landau and Werbel 1995).

Initially, salespeople may not be familiarized with the company's products, expectations, policies and resources (Dixon, Spiro, and Forbes 2003; Shoemaker and Johlke 2002) and they have to learn the skills necessary to interact with customers and other colleagues (Johnston, Parasunaman, Futrell & Black, 1990). Salespeople have specific needs during their initial period at the company like training, which should help them to meet their objectives, and strong relationships with their supervisors to increase

their commitment to the company (Liu, 2007). Sales people tend to put extra efforts at the beginning to consolidate their position at the company (Liu, 2007).

Younger salespeople with short tenures value promotions highly (Ingram & Bellenger, 1983). They have potentially a positive bias toward their company during the initial period due to the support they have received from the organization (Stan, Evans, Arnold & McAmis, 2012). Role overload may be seen as a challenge that is a component of creating a self-identity in the organization and part of the uncertainty inherent in this period (Jones, Chonko, Rangarajan & Roberts, 2007) (Cron & Slocum, 1986a). New salespeople learn the "values, abilities, expected behaviors, and social knowledge (Louis, 1980) in their initial months at the company. Sales managers have the responsibility of assimilating new salespeople into their new positions (Dubinsky et al, 1986).

2.4.2 New salespeople are different than more experienced salespeople

Experienced, successful salespeople use their previous experience to behave in different ways to be successful (Dixon, Spiro, and Jamil 2001) and have different schemas compared to less experienced colleagues, especially in complex situations (Dixon, Forbes & Schretzer, 2005) (Ainscough, DeCarlo, and Leigh, 1996). Experienced salespeople are more able to solve problems and adapt to customer needs given that they are more familiar with the corporate environment, resources, offering and expectations, while less experienced salespeople may feel greater levels of uncertainty and support

from the company (Mintu-Wimsatt & Gassenheimer, 2004) (Saxe and Weitz 1982) (Shoemaker and Johlke 2002). Experienced salespeople have higher levels of customer orientation (Jaramillo, Grisaffe, Chonko & Roberts, 2009) (Franke & Park, 2006).

New salespeople respond in different ways to their attributions for unsuccessful sales experiences than more experienced salespeople. For example, when comparing two studies, one with inexperienced and the other with experienced salespeople, evaluating how do salespeople react to sales failure situations, Dixon, Spiro & Forbes, (2003) found that in 9 out of 15 hypotheses, results were the same for both groups, but they differed in 6 situations. The relationships between lack of ability and the intention to avoid this situation in the future, lack of ability and the intention to change the sales strategy in the future, and using an incorrect strategy and the intention to seek assistance were significant for rookies but not significant for veterans; on the other hand, the relationships between the difficulty of the task and the intention to change the strategy or the intention to increase efforts, and having bad luck and the intention to change the strategy in the future were significant for experienced salespeople but were not for new salespeople.

Finally, the predictors of sales effectiveness usually show lower variability for veteran salespeople than for new ones given that the former have improved their sales strategies (Landau & Werbel, 1995).

2.4.3 Performance and turnover of new salespeople

As a consequence of the abovementioned issues, there are also some specificities of new salespeople referred to performance and turnover.

Better performance for new salespeople is a consequence of the proper implementation of learned skills (Jones, Chonko, Rangarajan & Roberts, 2007). Dixon, Spiro & Jamil (2001) affirm that more experienced salespeople will presumably be more successful. Job performance of newcomers is influenced both organization-initiated and salespeople's proactive socialization tactics (ask for performance feed back, building relationships,…). There is a negative relationship between job performance and network building because, despite the increase in socialization derived from networking, information overload may distract them from setting clear goals and objectives (Menguç, Han & Auh, 2007). New representatives experiencing success will reduce their likelihood of turnover (Dixon, Forbes & Schretzer, 2005).

Salesforce turnover has direct and indirect economic and managerial impacts; high salesforce turnover increases costs and impacts profitability (Zablah, Franke, Brown & Bartholomew, 2012; Rutherford, Park & Han, 2011; Darmon, 2008; Mulki, Jaramillo & Locander, 2006; Dixon, Forbes & Schretzer, 2005; Richardson, 1999; Singh, Goolsby, and Rhoads 1994; Lucas, Parasunaman, Davis & Enis, 1987).

Costs related to recruiting, selecting, training and ramping up new salespeople often reach hundreds of thousands of US$ and take months or even years to break even, affecting the firm's profitability (Reichheld 1996) (Barksdale, Bellenger, Boles & Brashear, 2003) (Mathews and Redman 2001). These costs typically range from about

US$4500 to US$9900 depending on the type of products and company size) (Ingram et al., 2001). Futrell & Parasunaman (1984) estimate total costs between US$ 50.000 to US$ 75.000 per salesperson, or even more in high tech industries. Roberts, Coulson and Chonko (1999) estimate the average loss of a productive salesperson in $40.000. Dixon, Forbes & Schretzer (2005) talk about "numerous costs" and a "financial burden" referred to replacing lost salespeople. Griffeth and Hom (2001) estimated the costs of recruiting, selecting and training a new employee as two times her salary. New salespeople need time to build a relationship with customers and get familiar with the territory; establishing themselves in new territories is part of this ramp-up time. (DeConinck, 2011) (DeConinck and Johnson, 2009). Richardson, 1999 estimated that sales are recovered in a territory just after 18 months when a salesperson leaves.

Boles et al. (2012) suggested a research agenda related to sales force turnover and retention, mentioning specifically that retention efforts must focus on effective, top salespeople. They add that the impact of turnover is not necessarily always negative, depending on its effects on performance and other objectives. DeConinck & Johnson (2009), in the same direction, affirm that the bottom line of a company could improve significantly if turnover of salespeople who meet or exceed their goals were reduced, and that attrition could be positive when low performers are replaced by high performers. DeConinck (2011) considers that when losing a high performer, the sales organization loses not only future sales but also current and potential leadership, as compared to a low performer. Zoltners, Sinha & Lorimer (2008) pointed out that companies should retain their best salespeople or, otherwise, they will take business to other competitors. These

authors say that it is important to understand which type of salespeople is leaving the organization. Identifying, acquiring and retaining top sales talent is a critical issue in many sales organizations (Boles et al., 2012)

An interesting remark is that salesforces have different turnover rates and replacement costs and analysis need to be detailed enough to identify homogeneous segments (Darmon 1990). Identifying salespeople with high potential is a critical problem for sales managers so that they adapt their hiring, retention and training policies (Marshall et al, 2003). Hence, companies should encourage new salespeople to stay at the company to avoid turnover negative impacts (Johnston, Parasunaman, Futrell & Black, 1990)

Several authors have mentioned the high turnover among newly recruited salespeople at various industries and settings. Jones, Chonko, Rangarajan & Roberts (2007) mention, in their multi-industry analysis of determinants of turnover intention, that new salespeople are more inclined to have turnover intention than more experienced employees. Liu (2007) talks about the "high" turnover of pharmaceutical representatives during their first 18 months, especially during their first 6 months at the company. Dixon, Forbes & Schretzer (2005) mention, in their analysis of a financial services company, the "financial burden" associated with replacing unsuccessful new salespeople who leave. Lucas et al. (1987) indicate that turnover in the insurance industry can reach 50% per year. Barksdale, Bellenger, Boles & Brashear (2003) got a response rate of 20% of newly hired, full time sales people who answered the initial questionnaire two years earlier, noting that turnover is very high in the life insurance industry. Also in the insurance

industry, Maztal (1990) estimates a 56% one year retention rate, Landau & Wertel (1995) identified a turnover rate of 50% for insurance sales reps, and Schwartz (1991) a four years retention of just 19%. Johnston, Varadarajan, Futrell & Sager (1987) found, in a study of a manufacturer of consumer products, that 25% of the salespeople who completed a questionnaire in their 4th month at the company had left by month 10, when a second questionnaire was sent. Weeks and Stark (1972) mention the "high" turnover rates of salespeople during their 5 first years in a company. Futrell & Parasunaman (1984) affirm that some companies would consider themselves successful if they retained 50% of new salespeople for two to three years. A consumer goods company reports a turnover rate of 25% among salespeople; it can be inferred that the defection rate was a 12,5% between the two measurement periods of the study – t1 (month 2 – 6) and t2 (month9 -13) (Johnston, Parasunaman, Futrell & Black, 1990). Average sales force turnover rates have been estimated at 27 percent, more than twice the national work force average (Richardson 1999).

There are various possible explanations to explain this higher turnover. Jones, Chonko, Rangarajan & Roberts (2007) concluded, after a multi-industry study, that an explanation of higher turnover in new salespeople -as compared to experienced ones- is that they have lower opportunity costs to stay, what explains the stronger association of role overload with intent to turnover. Cron (1984) and Cron & Slocum (1986b) consider that they are not so sure about how their fit with their position and that they have more time to experience other alternatives.

2.4.4 Need for studies analyzing the performance of new salespeople

Robertson, Dixon & Curry, 2006 found that while managing different stages of salespeople's careers was a priority for practitioners in the financial services industry, it was not the case for academics. Nonetheless, for example, various authors have identified the need to apply to new salespeople various analysis identifying the impact on performance of attitudes and behavior (Dixon, Forbes & Schretzer, 2005), like cause campaign and cognitive identification (Larson, Flaherty, Zablah, Brown & Wiener, 2008), goal orientation and self regulation (VandeWalle, Brown, Cron & Slocum, 1999).

Few studies have analyzed salespeople during their early employment at the company through longitudinal analyses:

Liu (2007) analyzed the influence of training satisfaction, perceived reward equity and manager commitment on organizational commitment in a pharmaceutical company, surveying sales force newcomers two times, when they started their training after joining the company and 6 months later. Barksdale, Bellenger, Boles & Brashear (2003) analyzed the impact of realistic job previews and perceptions of training on sales force commitment and performance in the insurance industry through four surveys in months 2, 6, 12 and 24 after they joined the company. Johnston, Parasunaman, Futrell & Black (1990) studied the impact of leadership behavior, role stress and job satisfaction on organizational commitment and turnover in a consumer goods company two time periods, between their 2nd and 6th month and their 9th and 13th months at the company. Johnston, Varadarajan, Futrell and Sager (1987) studied the relationship between organizational commitment, job satisfaction and turnover in a manufactures of consumer

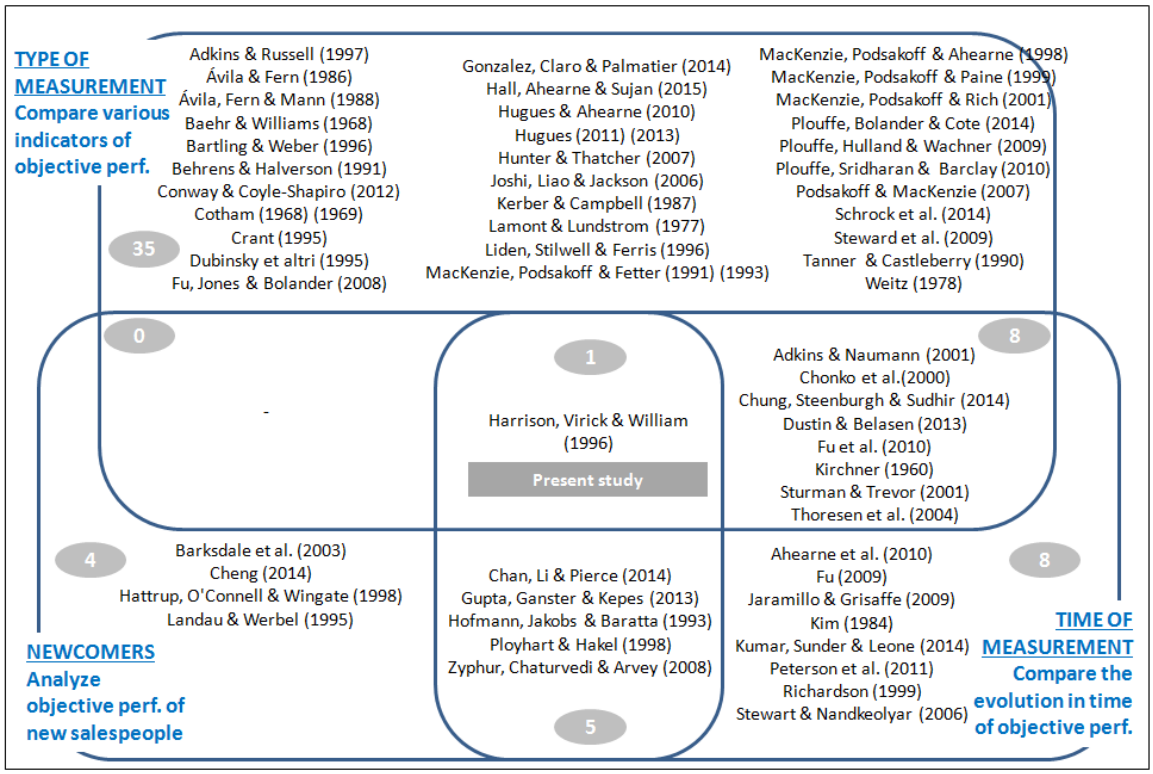
products through two measurements, during their first four months at the company and approximately in their tenth month.

Various authors have mentioned the need for longitudinal analyses of new sales people (Dixon, Spiro & Forbes, 2003; Dubinsky, Howell, Ingram & Bellenger, 1986; Johnston, Parasunaman, Futrell & Black, 1990; Jones, Chonko, Rangarajan & Roberts, 2007), stating that there is a need to extend analysis beyond their initial six months at the company (Landau & Werbel, 1995; Liu, 2007) or even considering various stages of their sales careers (Stan, Evans, Arnold & McAmis, 2012).

2.5 Summary of literature review

Figure 2.5 Classifications of studies analyzing objective sales performance

(61 published studies classified according to three criteria: various objective measures of performance; newcomers; longitudinal approach. Based on Appendix A)



The use of different measures of sales performance:

Objective and subjective (self-rated or supervisory-rated) measures of sales performance share a low amount of variance, are not interchangeable and measure different things. There is no "best" measure of performance; they have to be chosen depending on the specific objective of the research. Objective indicators have been less used by academic researchers than subjective ones.

Salesforce performance represents one of the most critical, important and widely studied constructs in sales research (Bommer et al., 1995; Churchill et al., 1985; Fu, 2009; Jaramillo, Mulki & Marshall, 2005; Plouffe, Hulland & Wachner, 2009; Rich et al., 1999; Verbeke, Dietz & Verwaal, 2010).

Since performance has been measured in several different ways by academics, it is essential to choose the most relevant measurement criteria, since this will determine the quality and relevance of sales research (Chonko, Loe, Roberts & Tanner, 2000) and the strength of the relationship between determinants and sales performance (Farley et al., 1995; Verbeke, Dietz & Verwaal, 2010). Several studies have analyzed the implications of using specific ways to measure performance or how the use of different measures of performance modify the direction or degree of the relationship with different types of determinants (e.g. Chonko et al., 2000; Churchill et al., 1985; Rich et al., 1999; Verbeke, Dietz & Verwaal, 2010). Additionally, there have been periodic requirements by academia to improve measures of performance (Avila et al., 1988; Chonko, Loe, Roberts & Tanner, 2000; Oliver & Anderson, 1995).

The "most popular" way to classify measures of performance differentiates them between objective and subjective measures (Bommer et. al., 1995); the latter can be divided into subjective self-reported measures and subjective supervisory-rated measures. Three meta-analysis have specifically compared objective measures of salesperson performance with managerial ratings and self evaluations in the sales domain (Bommer et al., 1995, partially analyzing salesforces; Jaramillo, Carrillat & Locander, 2005; Rich et al., 1999). They have focused on the comparison and eventual interchangeability of these

three types of indicators, trying to identify possible moderators like the control for externalities (yes or no), the rating method (relative, absolute or combined) or the rating format (composite or overall). Additionally, four other meta-analyses (Churchill et al., 1985; Franke & Park, 2006; Verbeke, Dietz & Verwaal, 2010; Vinchur et al., 1998) have tried to identify determinants of salesperson performance, differentiating their results depending on the type of indicator (self-report, managerial report or objective).

Objective measures of sales performance have been less used in academic research than subjective measures (Jaramillo, Carrillat & Locander, 2005; Jaramillo, Mulki & Marshall, 2005; Pitt, Ewing and Berthon, 2002), probably because of the difficulties to have access to company records (Jaramillo, Carrillat & Locander, 2005; Jaramillo, Mulki & Marshall, 2005).

Various meta-analyses have concluded that objective and subjective measures are different because they do not capture the same performance aspects of salespeople, and because both types of indicators just share a limited amount of variance (Bommer et al., 1995; Jaramillo, Carrillat & Locander, 2005; Rich et al., 1999). Each indicator is different and low amounts of variance are shared among the three main ways to measure performance (objective, self-rated and supervisory-rated), even though the correlation between objective performance and managerial ratings is higher than than with self-rated performance (Jaramillo, Carrillat & Locander, 2005; Rich et al., 1999). Since these measures of salesperson performance are not interchangeable and do not measure the same things, specific performance indicators have to be chosen depending on the issue that needs to be measured and managed (Babakus, Cravens, Johnston & Moncrief, 1999;

Bommer et al., 1995; Chonko et al, 2000; Farrell & Hakstian, 2010; Jaramillo, Carrillat & Locander, 2005; Lamont & Lundstrom, 1977; Plouffe, Hulland & Wachner, 2009; Rich et al., 1999; Verbeke, Dietz & Verwaal, 2010; Vinchur & Schippmann, 1998). Some authors consider that it is better to use multiple different indicators to measure performance (Babakus, Cravens, Johnston & Moncrief, 1999; Churchille et al, 1985; Franke & Park, 2006).

Chonko et al. (2000) found that the classification of salespeople according to their performance changes "dramatically" depending on the measure of performance employed. Before choosing a specific measure, they suggest clarifying the objectives that want to be reached when evaluating a salesperson.

Nevertheless, despite a general agreement that objective and subjective measures are not interchangeable, researchers generally use just one type of measure (Plouffe, Hulland & Wachner, 2009). In line with the previous ideas, there is no clear conclusion regarding which is the "best" indicator of a salesperson's performance. Chonko et al. (2000) analyzed ten different objective and subjective measures in a specific study and concluded that they "cannot comment on which, if any, of the criterion measures used in this study is the best"; they argued that each one of them could be useful for different purposes and mentioned that it would be useful to know which is the "correct" variable to measure, but that researchers still need to continue working on this issue. Similarly, Rich et al., (1999) state that the researcher has to make a decision when choosing one or another measure of performance, balancing the pros and cons of different measures and that the definitive decision needs to be determined by future research.

Various meta-analyses have specifically (a) compared objective measures of salesperson performance with managerial ratings and self-evaluations, or (b) identified if the use of a specific indicator affects various determinants on performance (Bommer et al., 1995, partially analyzing salesforces; Churchill et al., 1985; Franke & Park, 2006; Jaramillo, Carrillat & Locander, 2005; Rich et al., 1999; Verbeke, Dietz & Verwaal, 2010; Vinchur et al., 1998). None of these studies -or others, to the best of our knowledge- have analyzed the specific characteristics of the objective measuresemployed or other related conclusions that could arise when comparing the use of different objective indicators of sales performance. We intend to go further in this analysis.

We conducted an extensive research of published papers including "objective measures of sales performance" that yielded 133 studies for a total of 148 samples. 16% of the studies included a longitudinal analysis - 3 or more observation points over time (Ployhart & Ward, 2011), 8% of them were referred to new salespeople and 34% considered various measures of performance or used composite measures of objective performance; despite a significant concentration on “sales”, the research shows a wide variety of indicators used.

Overall, we have reached different conclusions (high, low or non-existing relationships) when comparing the relationship between different indicators of objective performance. There is a lack of academic studies that compare different objective measures of salespeople performance. Hence, there is a need to go further in this analysis, developing academic research that uses different indicators of objective performance and

comparing the subsequent results before trying to generalize about the relationship between these indicators.

Given that we have not found clear correlations among different objective measures, we assume -as widely demonstrated when comparing objective and subjective measures- that objective indicators are not interchangeable and that they have to be chosen carefully according to the objectives of each investigation. Different objective indicators seem to be measuring different aspects of the sales construct.

Longitudinal analyses of sales performance:

Performance changes over time (it has a dynamic nature); this implies variability in the relative performance of employees over time (changes in rank order). This change can be measured at two levels: (a) within-person (to know to what extent performance at a given point in time is a function of previous performance), and (b) between-person (to confirm that levels of performance differentially change across individuals and to identify which intra-individual differences predict these changes). Few studies have used longitudinal approaches to capture eventual nonlinear relationships, to improve causal inference and to show that performance is time dependent.

Evidence has proliferated that performance changes over time; that is, it has a dynamic nature (Deadrick & Madigan, 1990; Ghiselli & Haire, 1960; Hanges, Schneider, & Niles, 1990; Hoffman, Jacobs, & Gerras, 1992; Hofmann, Jacobs, Baratta, 1993; Hulin, Henry, & Noon, 1990; Humphreys, 1960; Rambo, Chomiak & Price, 1983; Rambo, Chomiak, & Rountree, 1987; Rothe, 1978; Reb & Cropanzano, 2007; Thoresen, Bradley, Bliese, & Thoresen, 2004). Incorrect assumptions when determining whether performance is stable or dynamic could have costly implications for various decisions taken in organizations as regards selection, training, rewarding or evaluation. In other words, criteria are said to be dynamic when change in performance is observed. The basic concept of dynamic criteria refers to variability in the relative performance of employees over time; that is, changes in rank order performance (Deadrick & Madigan, 1990).

Once it is assumed that performance is a dynamic construct, one has to measure this change. Authors have approached the measurement of dynamic performance at two complementary levels: (a) within-person level, analyzing if intra-individual patterns of performance are systematic; (b) between-person level, analyzing how individual differences account for observed inter-individual differences in the change patterns of performance, and if there are systematic differences between these intra-individual patterns. As Zyphur, Chaturvedi & Arvey (2008) put it, the former implies that previous performance affects future performance and the latter that individuals have distinct performance trajectories.

At the within-person level, some investigations focused on explaining the simplex pattern of covariation among measurements of performance: the relationship between measures of performance decreases systematically as the measurements become increasingly separated by time (Humphreys, 1960). The simplex pattern shows that individuals change continually their rank-ordered performance over time, with changes from one position increasing as time progresses. At the within-person level of analysis, it is of the upmost interest to determine to what extent performance at a given point in time is a function of previous performance (Zyphur, Chaturvedi & Arvey, 2008) and whether this change is systematic or random (Deadrick, Bennett & Russell, 1997). Recent evidence indicates that the relative (rank-ordered) performance of individuals changes systematically over time (Deadrick & Madigan, 1990).

The second level of analysis assumes that individual level performance trajectories exist, and that the factors that explain between-person differences in performance change patterns over time can be identified. Researchers have demonstrated that levels of performance differentially change across individuals (Hofmann et al., 1993; Hofmann, Jacobs, & Gerras, 1992) and that between-person differences predict these changes (e.g., Deadrick, Bennett, & Russell, 1997; Thoresen, Bradley, Bliese, & Thoresen, 2004).

Authors studying the relationship between personality and performance frequently use cross-sectional, one-time measurements of performance (Thoresen, Bradley, Bliese & Thoresen, 2004) since they assume that the latter is stable over time, despite evidence that

it is dynamic (Bass, 1962; Ghiselli, 1956; Ghiselli & Haire, 1960). Hence, they fail to consider changes in the relationships between variables over time (Bergh, 1993a, 1993b).

Several authors have found significant differences in their analyses when comparing cross-sectional studies with longitudinal ones, emphasizing the importance of implementing longitudinal studies and considering other than lineal relationships between variables (Ahearne, Lam, Mathieu & Bolander, 2010; Deadrick, Bennett & Russell, 1997; Jaramillo & Grisaffe, 2009; Thoresen, Bradley, Bliese & Thoresen, 2004).

Research has showed that time should be considered to capture eventual nonlinear relationships, to improve causal inference and to show that performance is time dependent (Ahearne, Lam, Mathieu & Bolander, 2010; Chen and Mathieu 2008; Hofmann, Jacobs, and Baratta 1993; Rindfleisch et al. 2008). Some authors (Guidice & Mero, 2012; Martinaityte & Sacramento, 2013), despite including only two measurements in time in their research, mention the advantages of this approach over cross-sectional studies. For example, allowing to obtain inferences about causality stronger than a cross-sectional design or considering behaviors and outcomes as a dynamic process of mutual influence. Johnson (2014) affirms that there is a "relative paucity" of studies testing the effects of nonlinear relationships in organizational and behavioral research, and that a lot of not-yet explored variables may possess theoretically-based nonlinear relationships with key sales-related outcomes; moreover, as an example in the sales field, he suggests , that researchers that examine longitudinal effects may wish to utilize stage theories that hypothesize different levels of effects at different points in time.

On the basis of the search work detailed in Section 2.2.4.2, we identified 22 published articles, including longitudinal analyses of objective performance at the individual level in the sales field, which we can see in Table 2.3.1. We applied Ployhart & Ward (2011) criteria requiring at least three waves of data to consider it "longitudinal". We just want to note that various measures of objective performance were only included in 9 longitudinal studies, even though no authors compared the growth trajectories of these measures.

Several authors have asked for job performance research and theories that focus on the analysis of individual performance change (Ackerman, 1989; Ahearne, Lam, Mathieu & Bolander, 2010; Austin, Humphreys & Hullin, 1989; Austin, Villanova, Kane & Bernardin, 1991; Austin & Villanova, 1992; Deadrick, Bennett & Russell, 1997; Deadrick & Madigan, 1990; Hofmann, Jacobs & Gerras, 1992; Hofmann, Jacobs & Baratta, 1993; Johnson, 2014; Murphy, 1989; Reb & Cropanzano, 2007; Sturman, Cheramie & Cashen, 2005; Thoresen, Bradley, Bliese & Thoresen, 2004). Both referred to the analysis of the causes of dynamic criteria (random versus systematic within-individual performance changes) and to the determinants of inter-individual differences in performance patterns and trajectories (individual difference variables). Moreover, the scarcity of studies in our identified search area shows that there is a need to analyze objective measures of performance longitudinally.

Analysis of performance of new salespeople

New salespeople have lower levels of performance and higher turnover rates than more experienced salespeople. The predictors of sales effectiveness usually show lower variability for veteran salespeople than for new ones, hence the need for longitudinal analyses of new salespeople.

Career stages literature supports the idea that individuals will typically experience four stages or phases during their careers: Exploration, Establishment, Maintenance and Disengagement (Cron, 1984; Super, 1957). As compared to later stages, during the initial phase, the Exploration stage, salespeople are concerned with finding an occupation that allows them to succeed, but they do not have a clear idea of the skills and abilities necessary to achieve it. Personal commitment is not usually high, and one of their main objectives is to establish an initial self-image in the organization. At this stage, salespeople frequently fail and do not usually know how to overcome these situations; hence, when they are successful, they need to understand why so that they can replicate certain behaviors (Dixon, Forbes & Schretzer, 2005; Dixon, Spiro and Forbes, 2003; Cron, Dubinsky & Michaels, 1988; Cron & Slocum, 1986a; Slocum and Cron, 1985; Cron, 1984).

Several authors have identified characteristics and behaviors that are specific of new salespeople. Several aspects vary across salespeople's career stages: work perceptions, career concerns, psychosocial needs, developmental tasks (Cron, 1984; Cron

and Slocum, 1986; Cron, Dubinsky & Michaels, 1988) or emotional exhaustion (Babakus, Cravens, Johnston & Moncrief, 1999).

The predictors of sales effectiveness usually show lower variability for veteran salespeople than for new ones given that the former have improved their sales strategies (Landau & Werbel, 1995).

New salespeople show lower levels of performance and higher turnover rates than more experienced ones (Bellenger, Boles & Brashear, 2003; Dixon, Forbes & Schretzer, 2005; Dixon, Spiro & Jamil, 2001); Jones, Chonko, Rangarajan & Roberts, 2007; Liu, 2007).

Various authors have mentioned the need for longitudinal analyses of new sales people (Dixon, Spiro & Forbes, 2003; Dubinsky, Howell, Ingram & Bellenger, 1986; Johnston, Parasunaman, Futrell & Black, 1990; Jones, Chonko, Rangarajan & Roberts, 2007; Landau & Werbel, 1995; Liu, 2007; Stan, Evans, Arnold & McAmis, 2012).

CHAPTER 3 - HYPOTHESES

3.1 Introduction and research questions

The main conclusions from the literature review in Chapter 2 can be summarized as follows:

Objective and subjective (self-rated or supervisory-rated) measures of sales performance share a low amount of variance, are not interchangeable and measure different things. There is no "best" measure of performance; they have to be chosen depending on the specific objective of the research. Objective indicators have been less used by academic researchers than subjective ones.

Performance changes over time (it has a dynamic nature); this implies variability in the relative performance of employees over time (changes in rank order). This change can be measured at two levels: (a) within-person (to know to what extent performance at a given point in time is a function of previous performance), and (b) between-person (to confirm that levels of performance differentially change across individuals and to identify which intra-individual differences predict these changes). Few studies have used longitudinal approaches to capture eventual nonlinear relationships, to improve causal inference and to show that performance is time dependent.

New salespeople have lower levels of performance and higher turnover rates than more experienced salespeople. The predictors of sales effectiveness usually show lower variability for veteran salespeople than for new ones, hence the need for longitudinal analyses of new salespeople.

Building on this literature review, in this Chapter we have constructed a set of hypotheses referred to three research questions:

Research question: growth trajectory of performance - Is performance dynamic? Which is the shape of growth of performance? This will be used to confirm findings from other authors referred to the analysis of performance at the within-person and between-person levels. The arising model will then be focused on the core of our analyses.

Research question: time of measurement and growth trajectory of objective performance - same indicator taken at different times. To what extent are objective measures of performance taken at different times related? This will allow us to draw conclusions about the effect of time on performance measurement in a setting that uses objective measures of performance of new salespeople.

Research question: type of measurement and growth trajectory of objective performance - different indicators taken at the same time and at different times - To what extent are different objective measures of performance related over time? This will let us draw conclusions about the eventual interchangeability of different objective measures of performance of new salespeople.

Figure 3.1.1 Schema: performance of new salespeople during their initial months at the company

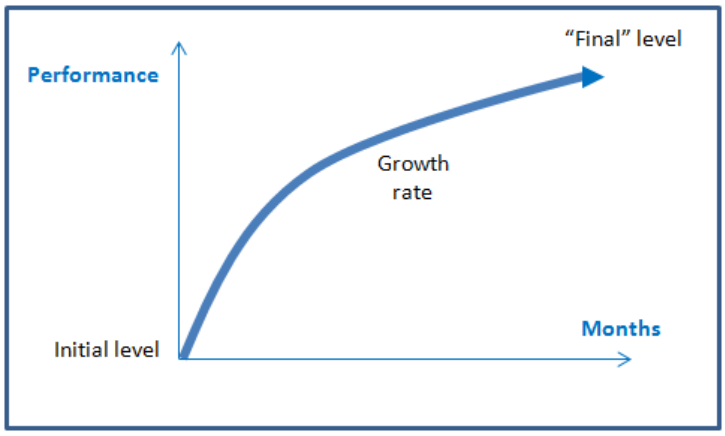


Figure 3.1.2 Research questions

3.2 Growth trajectory of objective performance

The first issue to determine is how much variability in monthly sales can be attributed to within-person or between-person differences across the considered period. While within-person variance in performance identifies the changes in performance over time, between-person changes are attributable to differences in the specific characteristics of each salesperson and will provide reliable person effects on sales performance.

Some authors ascribe intra-individual performance variability to measurement error, not paying enough attention to its intrinsic importance (Stewart & Nandkeolyar, 2006); this could have negative implications, for example, when developing short-term assessments or quantifying compensation -bonus or commissions. A relatively large amount of between-person variability indicates that there are likely to be inter-individual effects that can be modeled at a higher level with Level 2 analyses and that it is appropriate to use a random intercepts model (Day, Sin & Chen, 2004).

As we will show, the analysis of various longitudinal studies of individual sales performance reveals that one cannot expect that a larger amount of the time-to-time variance in performance outcomes resides within rather than between salespeople, or vice versa; there are no clear conclusions, even after considering the periodicity of measurement (daily, weekly, monthly, quarterly,…), the number of total observations, or whether salespeople in the sample are in a stable or transitional stage:

Ahearne, Lam, Mathieu & Bolander (2010) found that 79% of total variance resided within subjects over time and that 21% of the total variance in salesperson performance resided between subjects, considering 12 monthly observations during a

change intervention. Chan, Li & Pierce (2014) analyzed new hires during their first 25 weeks at the company and found that "there is a large variation across salespeople". Chen (2005) analyzed new salespeople for 3 months -using a subjective rating of performance- and found that 21% of the total performance resided within newcomers. Fu, Richards, Hughes & Jones (2010) found substantial variance of sales performance at the salesperson level based on more than 300 daily observations after launching a new-to-market product (55% of the variance) and a line extension (70%). Stewart & Nandkeolyar (2006) evidenced that 73% of the variance in performance resided within individuals after 26 weekly observations in a stable setting. Thoresen, Bradley, Bliese & Thoresen (2004) found that 83% of the total variance in a maintenance stage sample and 22% in a transitional stage sample, both with four quarterly observations, resided between individuals.

Outside the sales domain, authors have also showed results with higher levels of variability attributable either to within or between person levels. For example, Day, Sin & Chen (2004) found that 63% of the variance in the dependent variable (adjusted points of the USA National Hockey League team captains observed for 9 years) was attributable to inter-individual differences. Thus, the hypothesis is:

> *Hypothesis 1: "There will be significant variance in new salespeople objective performance over time within salespeople and between salespeople"*

Next, we have to identify whether intra-individual change patterns of performance contain a systematic time trend; if these patterns of change consisted of nothing more than random error variance, then it would not make sense to go further in their analysis (Hofmann, Jakobs & Baratta, 1993).

In the previous Chapter, we explained that the main reasons for changes in job performance at the within-person level are the instability of the effects of abilities and motivation on performance. Additionally, psychological and environmental factors may have an impact on the evolution of an individual over time (Deadrick, Bennett & Russell, 1997; Zyphur, Chaturvedi & Arvey, 2008).

In general, authors in the sales and no sales domains have found that intra-individual change patterns were, on average, systematic; that is, performance follows an increasing trajectory over time in situations of change and, particularly in new salespeople during their first months at the company (Chan, Li & Pierce, 2014; Hofmann, Jakobs & Baratta, 1993). The most important thing is to identify if this change is systematic or not; whether there is a positive trend showing that performance increases over time (Ployhart & Hakel, 1998) or a negative one, showing that it decreases (Day, Sin & Chen, 2004) will only reflect the specificities of the analyzed sample.

Then, we will assume that there is an overall significant increase in individual performance over time after joining the company. Performance will change over time (i.e., evidence of dynamic criteria) and its overall trend will be positive. Hence:

> *Hypothesis 2a: "There is a variation of new salespeople objective performance over time"*
> *Hypothesis 2b: "New salespeople objective performance follows a linear increasing trajectory over time"*

After identifying the increasing trajectory of performance over time, a critical question is to determine the shape of the performance trajectory over time. It could adopt different shapes depending on whether people are in a stable or in a changing job stage - "maintenance" versus "transitional" job stages in the terminology of Murphy (1989). A clear example of the latter is a change in one's job occupation or organization (Thoresen, Bradley, Bliese & Thoresen, 2004). As we will see next, there are no clear conclusions regarding the specific shapes of the performance of salespeople facing these situations:

Ahearne, Lam, Mathieu & Bolander (2010) studied, through polynomial growth models, the evolution of performance before and after a planned change in CRM system for 12 months (6 months pre-launch and 6 months post-launch) and found a linear, a quadratic and a cubic term. During eight consecutive quarters, Dustin & Belasen (2013) analyzed the impact in sales performance of a reduction in compensation after the fourth quarter -that is, under a change setting- for a company selling nondurable consumable business products. A graphical plot showed a linear trend in sales performance during the year previous to the change in compensation and a quadratic trend in the four quarters after this change. Fu, Richards, Hughes & Jones (2010) explored daily sales of industrial salespeople during the first several months in the market of two new products: a line extension and a new-to-market product; they identified that both the linear and the quadratic terms were significant in both samples. This finding is consistent with the nonlinear relationships found in the early stages of new product life cycles (Hauser, Tellis and Griffin, 2006). Thoresen, Bradley, Bliese & Thoresen (2004) analyzed the evolution of performance in a transitional stage -a product launch of a new medication- that they

assimilated to a shift of salespeople's job due to its implications, and found a linear and a quadratic term in four quarterly observations. Hence, they identified an initial growth in performance and then, an overall deceleration of performance between quarters 2 and 3, still increasing but not at the same rate. Results failed to support a cubic term.

Chan, Li & Pierce (2014) analyzed how peers impact worker productivity growth among new hires selling cosmetic sales in a department store in China. They showed a graphical plot with the median learning curve, top quartile learning curve and bottom quartile learning curve for salespeople during their first 25 weeks at the company, stating that the learning -productivity growth- mainly occurs during the first three months at the company and subsequently, new salespeople show a leveling off in performance; that is, identifying a linear and a quadratic trends. Hofmann, Jakobs & Baratta (1993) analyzed 319 insurance sales agents newly hired by the organization for 12 quarters and they identified linear, quadratic and cubic terms. In their analysis of 303 new securities brokers observed for 8 quarters, Ployhart & Hakel (1998) observed that mean performance was curvilinear over time, following a "learning curve"; that is, including a linear, quadratic and cubic terms. Interestingly, Zyphur, Chaturvedi & Arvey (2008) analyzed the same database as Ployhart & Hakel (1998) through a different methodological approach -Autoregressive Latent Trajectory model- and found that only a Linear slope factor provided the best model fit - the quadratic slope did not improve the model fit.

Jaramillo & Grisaffe (2009), using the Latent Growth Modeling method, identified a linear trend in a "stable" setting. Sturman & Trevor (2001) analyzed various

aspects related to the relationship between performance and turnover in a stable setting and identified a linear trend. Thoresen, Bradley, Bliese & Thoresen (2004) analyzed the evolution of performance in a "maintenance" stage and observed a linear and a cubic term in four quarterly observations, with an insignificant quadratic term.

Studies analyzing the relationship between performance and job tenure or seniority in other settings rather than in the sales field have found generally an initially positive linear and then a plateauing relationship (Avolio, Waldman, & Mc- Daniel, 1990; Jacobs, Hofmann, & Kriska, 1990; McDaniel, Schmidt, & Hunter, 1988; Schmidt, Hunter, & Outerbridge, 1986), but it has not always been the case (Hofmann, Jacobs, & Gerras, 1992; Russell, 2001).

There are no consistent conclusions about the shape of the trend of performance over time. Given that we will analyze a sample of new salespeople during their first months at the company, and based on the abovementioned results in similar situations, the hypothesis is as follows:

> *Hypothesis 2c: "The average objective performance trajectory of new salespeople exhibits an initial linear growth and then a leveling off of performance (i.e., a quadratic shape) during their initial months at the company"*

Now, we have to determine whether there are inter-individual differences in the hypothesized intra-individual change patterns; in other words, if there are systematic differences between these individual patterns (Hofmann, Jakobs & Baratta, 1993). If there is a significant between-person variability -that is, substantial heterogeneity around the population growth parameters-, not every salesperson's performance will increase to the same degree over time (with a kind of "parallel lines"). Hence, the presence of variance may be explained through the introduction of additional variables in the model.

As noted in the previous Chapter, the rationale explaining between-person differences in performance trajectories is based on individual differences in the levels of knowledge, skills, ability, and motivation; additionally, these levels may change at different moments in time or at different job stages. Finally, the relative importance of each one of them may also change (Deadrick, Bennett & Russell, 1997; Zyphur, Chaturvedi & Arvey, 2008).

We want to examine (a) inter-individual differences referred to the level of performance at a specific point in time (that we will call "final" level after a few months at the company), and (b) inter-individual differences in performance growth trajectories during this period.

It is common to find intra-individual variability in growth parameters in studies within the sales domain. As an example of a graphical analysis, Chan, Li & Pierce (2014) analyzed new hires of a department store in China during their first 25 weeks at the company and found that "there is a large variation across salespeople" when comparing -through a graphical plot- productivity growth of top Vs bottom quartile learning curves.

They also identified -graphically- evidence that this variation was influenced by the assignation of new hires to a group of peers with a higher or lower productivity (i.e., performance) level during their first two weeks; interestingly, they found that this variation diminished over time, probably due to random assignments with different groups of peers after time. Ahearne, Lam, Mathieu & Bolander (2010) stated that model fits increased significantly when the linear / quadratic / cubic terms were permitted to vary freely. Hofmann, Jakobs & Baratta (1993) found inter-individual differences in intra-individual change. Jaramillo & Grisaffe (2009) observed "sufficient variation" in individual-level random intercept and slope effects to allow for the introduction of explanatory variables. Ployhart & Hakel (1998) found a "highly significant" variance associated with the intercept and growth (linear, quadratic and cubic) parameters, which implied individual differences in the type of linear trend found. Thoresen, Bradley, Bliese & Thoresen (2004), testing for significant between-person differences in intercepts and growth trajectories, found that the fit of the models improved by allowing between-person variation in the linear, quadratic and cubic slope parameters in their first sample and in the linear and quadratic slope parameters in their second sample.

Outside the sales domain, various authors found inter-individual differences in the initial performance and slopes (Day, Sin & Chen, 2004; Russell, 2001). Thus:

> *Hypothesis 3: "There will be between-person differences in terms of their individual performance at the final moment and in their underlying growth pattern (time)"*
> *Hypothesis 3a: "New salespeople will differ significantly in their objective performance growth rates over time (i.e., there will be significant variance in*

new salespeople objective performance around the hypothesized performance trend)"
Hypothesis 3b: "New salespeople will differ significantly in their final objective performance levels after some months at the company"

3.3 Time of measurement and growth trajectory of objective performance

Implications of the dynamic nature of performance

As mentioned in Chapter 2, several authors have verified that job performance measurements are not perfectly correlated over time and that the correlations between these measurements decrease as the amount of time between them increases (Austin, Humphreys, & Hulin, 1989; Barrett & Alexander, 1989; Barrett, Caldwell, & Alexander, 1985; Ghiselli & Haire, 1960; Humphreys, 1960; Ployhart & Hakel, 1998; Rambo, Chomiak, & Price, 1983; Sturman & Trevor, 2001). Various theoretical models have explained this change of performance over time. Ackerman (1987, 1988, 1989) proposed that, as individuals gain experience, they take advantage of a learning curve that follows a certain pattern, but that performance changes at different rates due to individual differences in abilities, motivation levels, and opportunities to perform. Complementarily, Alvares and Hulin (1972, 1973) consider that performance varies due to changes in job knowledge and motivation, and because the determinants of performance change after time passing.

In the sales domain, personnel decisions referred to selection, promotion, retention, evaluation, training or compensation are based on the predictability of -long term- performance (Barone & De Carlo, 2012; Cron, Marshall, Singh, Spiro & Sujan, 2005; Deadrick & Madigan, 1990; Hanges, Schneider & Niles, 1990; Henry & Hulin, 1987, 1989; Hulin, Henry, & Noon, 1990; Sturman & Trevor, 2001; Thoresen, Bradley, Bliese & Thoresen, 2004). Hence, it is critical to understand the dynamics of job performance over time and the causes of this dynamism (Sturman, Cheramie & Cashen, 2005). One of the most critical elements in this analysis are performance "trends" -or growth trajectories-, a dynamic input where previous levels -including increases, decreases, peak or ending levels- could influence future values. Various authors have mentioned the importance of trends in various marketing fields like satisfaction, budget allocation, service encounters or advertising responses (Baumgartner, Sujan & Padgett, 1997; Hansen & Danaher, 1999; Hsee, Abelson & Salovey, 1991; Hutchinson, Alba & Eisenstein, 2010; Verhoef, Antonides & de Hoog, 2004). As we will see in detail in next section, performance trends in the Sales domain have been used to analyze turnover (Harrison, Virick & William, 1996; Sturman & Trevor, 2001), the relationship with personality traits (Ahearne, Lam, Mathieu & Bolander, 2010; Jaramillo & Grisaffe, 2009; Thoresen, Bradley, Bliese & Thoresen, 2004) or to predict future performance (Hoffman, Jacobs & Baratta, 1993; Ployhart & Hakel, 1998; Zyphur, Chaturvedi & Arvey, 2008).

Studies analyzing the dynamic nature of performance and growth trajectories

Although some research involving the analysis of performance over time has emerged, "scant attention" has been paid to the actual measurement of job performance in longitudinal settings (Sturman, Cheramie & Cashen, 2005). Additionally, as we will show, there are no consistent, clear conclusions from various studies regarding the understanding of the dynamics of growth trajectories:

Ahearne, Lam, Mathieu & Bolander (2010) analyzed the longitudinal performance trajectories of 400 sales reps from a pharmaceutical company over 12 months before, during and after an organizational change that consisted of implementing a new Customer Relationship Management technological system using hierarchical multivariate linear modeling. They found that the average salesperson performance trajectory initially declined, recovered gradually and finally leveled off after the change in the systems. Even though they observed a simplex pattern in the correlations among each monthly performance measure, they concluded that if they had considered cross-sectional analyses, they would have obtained "incomplete" conclusions about the relationship between Goal Orientations and Objective Performance. They reached this conclusion when comparing results from these correlations and from a specific cross-sectional multiple regression, with their longitudinal study (using a hierarchical multivariate linear model). They confirmed that the pairwise correlations that were based on the assumption of linear relationships were not true, since these cross-sectional results failed to reveal the underlying dynamic in the relationship. Moreover, they showed that the relationship between performance and various salesperson's traits –openness to

change, previous technology use, learning orientation, performance orientation and experience- is dynamic and non linear. It is interesting to note that all the performance trajectories followed the aforementioned 3-phases pattern, but they had different slopes for their linear, quadratic or cubic terms depending on the specific traits that were measured - that is, the same shape but with different inclination.

Thoresen, Bradley, Bliese & Thoresen (2004) tested the validity of the Big Five personality traits to predict sales performance levels and growth trajectories with two different samples of salespeople from a pharmaceutical company. For both samples, they measured objective performance through raw sales volume. In sample 1 (stable or "maintenance"), it was measured with territory sales aggregated on a quarterly basis and in sample 2 (change or "transitional") with quarterly product market share (raw sales / all sales in the given product class for each individual salesperson's territory). Sales were measured in four quarters and their growth trajectory analyzed through Random Coefficient Modeling. They identified a "slight simplex pattern" among the pairwise correlations, whose values ranged in the 4 quarters between .84 and .96 (all significant) in sample 1, and between .89 and .97 (all significant) in sample 2. When applying their random coefficient models, they found the following correlations between growth terms: in sample 1 (stable), they found positive relationships between mean performance and both linear ($r=.34$, $p< .001$) and cubic ($r=.76$, $p< .001$) growth. This showed that higher performers in terms of mean sales for all the analyzed period tended to increase their performance between quarters 1 and 2 and between quarters 3 and 4. The cubic term was neither significantly correlated to the linear and quadratic terms nor the intercept to the

quadratic term. In sample 2 (change), they found that mean performance (the intercept) was nearly perfectly correlated to linear growth (r=.94, p< .001) and negatively correlated to quadratic growth (r= -.54, p< .001); additionally, positive linear and negative quadratic growth were inversely and negatively correlated (r= -.30, p< .05). This showed that more effective salespeople in terms of mean performance tended to experience performance increases early, and were also less likely to show a plateau performance in the following months. Moreover, in sample 1, conscientiousness and extraversion were positively related to between-person differences in total sales, while only conscientiousness predicted performance growth (with linear, quadratic and cubic terms). In sample 2, agreeableness and openness to experience predicted both overall performance differences and performance trends (with linear and cubic terms).

Jaramillo & Grisaffe (2009) analyzed the evolution of objective performance of direct selling agents across 4 quarters. One cannot observe a simplex pattern in the correlations, ranging from r= .29, p<.05 to r= .43, p<.05 in the main diagonal, and from r= .33, p<.05 to r= .39, p<.05 in the rest. Their longitudinal analysis through a Linear Growth model showed different results from the ones a cross-sectional analysis would have showed: customer orientation has a significant direct effect on longitudinal sales performance trajectories but has no significant direct effect on the initial level of objective performance.

Gupta, Ganster & Kepes (2013) observed that individual sales during 4 months "correlated highly" from month to month for a sample of 445 current employees of a department store and they determined a simplex pattern. They averaged this data to create

a single indicator of objective sales performance. Authors warned to be "cautious about generalizing from contemporaneous performance" (which they measured as the average sales of a 4-month period for current employees of a department store) to "lagged performance" (measured separately during 5 consecutive months after being hired at the company as actual sales per hour; that is, for a different sample). They observed that sales performance means for current employees were higher than for applicants, and that the only significant relationship for new entrants with three different scales measuring Sales Self efficacy (subjective performance) was with a 4-month lag, while for current employees all three scales were significant. They even stated that "perhaps if we had waited 1 year, performance would have had more time to stabilize, and the relationships would have been stronger".

Kirchner (1960) analyzed the inter-correlations of month-to-month figures over the 6-months period using the Horst method (1949): Shop Calls, r= .71; New Account Calls, r= .82; Spot Orders, r= .85; New Business Orders, r= .85; Demonstrations, r= .84. They concluded that the results were "extremely consistent" from month to month in these indicators, that little fluctuation occurs when comparing month-to-month results and that these data provided a "solid objective base" when predicting future sales success of salespeople.

Peterson, Luthans, Avolio, Walumbwa & Zhang (2011) analyzed 3 observations in time and found significant correlation between sales revenues measurements at months 1 and 4 ($r= 0.23$, $p<0,01$) but no significant correlations between months 1 and 7 and 4 and 7. Hence, one cannot identify a clear effect.

Jelinek, Ahearne, Mathieu & Schillewaert (2006) compared the same indicator of performance (through a self-rated scale) in two different periods, before and after a technological change. Even though the main objective of the study was not to analyze the evolution of performance, the authors compared it as a way to isolate the incremental influences from these changes. Their initial hypothesis of stability of performance over time was confirmed with a correlation of 0.24. In the hypothesized model, parameter = 0.24, $p < 0.005$.

In a meta-analysis including sales and non-sales studies, Sturman, Cheramie and Cashen (2005) found that correlations between performance measures decreased as the time interval between performance measurements increased, noting that the estimates approached values greater than zero.

Harrison, Virick & William (1996) analyzed the performance - turnover relationship of 186 sales reps in their first 12 months at the company. They found that current (time dependent) performance affords a better prediction of turnover than average (time-stationary) performance. Additionally, the % change in performance from month to month improved the prediction of turnover risk. They demonstrated that, as the time interval between one performance period and the next increases, the median correlation between periods decreases, providing evidence of performance change. Specifically, they concluded that it was effective to predict next month's performance from the current month (r median = .55, $p < .01$, for systems sold; r median = .54, $p < .0$ l, for sales revenue), but not to predict performance 11 months from the current month (r = .13 and -.19, $p > .10$, for systems and sales, respectively).

Sturman & Trevor (2001) analyzed the evolution of objective performance of sales people from a financial services organization across 8 months. The correlation matrix (ranging from r= .44 to r= .55 in the main diagonal, and from r= .38 to r= .54 in the rest) did not show a simplex pattern. While their main objective was to examine the performance - turnover relationship, they also analyzed elements from dynamic performance and specifically, showed how performance changes from the previous month. They also observed/noted that performance trends measured over a longer time period explained variance in voluntary turnover better than current performance, and that they interacted with current performance to predict voluntary turnover. Current performance was calculated as the monthly fees generated from the loans sold, and the two-month performance trend as the difference between month t+1 and month t; the all-month performance trend was calculated through a regression. The correlations were: monthly performance Vs two-month trend, r= .48; monthly performance Vs all-month trend, r= .42; two-month trend Vs all-month trend: r= .52 (p not informed). Interestingly for the purposes of our research, they conducted a supplemental investigation of performance trend and time: they calculated performance trends not only as a two months and an all-month period, but also for 3, 4, 5, 6, 7 and 8 month intervals, and then conducted several proportional hazard regressions to test the robustness of their conclusions regarding the considered period to compute "trend". The main conclusions were that, when defining trend as 3 months or longer, controlling for current performance was critical to investigate a unique trend effect. It is highly significant that performance

changes form the previous month and performance trends measured over a longer time period explained variance in voluntary turnover beyond current performance.

Ployhart & Hakel (1998) studied new salespeople from a securities broker for 8 consecutive quarters and, in their descriptive statistics, observed that the criterion measures exhibit a "nearly perfect simplex pattern", supporting the presence of dynamic criteria. In their analysis with a latent growth curve methodology, they confirmed that criteria are relatively dynamic over time and found that average intra-individual performance approximated a basic "learning" curve -that is, with a linear, quadratic and cubic trends-, even though there were considerable individual differences in each of the latent performance growth parameters.

Hofmann, Jacobs & Baratta (1993) analyzed 12 quarterly observations of insurance agents and provide evidence of systematic intra-individual change over time and of inter-individual differences in intra-individual change. Based on the means, standard deviations and correlations of performance data, they observed that there are higher correlations in and close to the diagonal, while these values decrease as we move away from it; that is, we can observe a simplex pattern. Authors warned that this pattern of correlations provides no information referred to individual change pattern.

Finally, some studies have considered two data points in time; while, as explained in Chapter 2, they cannot be considered as longitudinal studies, it is interesting to show their findings to try to gain more consistency when defining our hypotheses:

Martinaityte & Sacramento (2013) analyzed the relationship between creativity and sales effectiveness for a sample of 151 salespeople from 4 pharmaceutical companies

(measuring % of the individual target achievement) and one insurance company (measuring absolute sales volume) through a three-level (sales agents nested in teams;teams in organizations) Hierarchical Level model. As a part of their analysis, they controlled for previous effectiveness to isolate the effectiveness of creativity on sales; the correlation of previous performance (Sales in Quarter 1) to future performance (Sales in Quarter 2) was significant ($\beta = .57$, $p<.05$) in the HLM model. In the correlations matrix, the correlation was $r= .65$, $p<.01$). Mathieu, Ahearne & Taylor (2007) examined the impact of introducing new technological tools on sales performance in a sample of 592 salespeople in the pharma industry. With the objective of isolating the incremental influence of various factors on performance, authors controlled for the effect of past performance on future performance: longitudinal performance was analyzed by comparing a 3-months average performance measured as quota (baseline) with the same indicator a year later (post performance). HLM (2 levels) results showed that the baseline performance effect was significant ($\beta = 0.17$, $p < 0.001$) on post performance, confirming their hypothesis that performance should have significant stability after time passing. The correlations matrix showed a significant and low correlation ($r= .14$, $p< 0.01$) between both indicators of performance. Conway & Coyle-Shapiro (2012) analyzed the reciprocal relationship between perceptions of psychological contract fulfillment and employee performance through a sample of 146 sales advisers from a bank, through two observation periods lasting 7 months each. They used hierarchical regressions (sequentially, impact of observations from one time on the following one - up to 4 times) and found support forthe abovementioned reciprocal links, where psychological contract

fulfillment predicted performance and vice versa. The correlations matrix showed a significant and high correlation ($r = .73$, $p < 0.01$) between sales made at both times and a significant and medium-level correlation ($r = .35$, $p < 0.01$) between sales targets met. Authors do not show results about regressing performance in Time 1 on Performance in Time 3. Guidice & Mero (2012) analyzed the relationship between previous feedback on sales performance and performance in a field study of 167 salespeople from a firm selling components for commercial constructions. They compared annual sales for 2 consecutive years as a control variable using Hierarchical regressions, since HLM was not warranted. They found that "the most influential predictor of future sales was prior year sales" ($\beta = 0.8$, $p < 0.05$). Task performance (a subjective measure) measured during the baseline year was not significant when compared to future sales. The correlations matrix showed a significant and high correlation ($r = .92$, $p < 0.01$) between both indicators of performance.

As mentioned before, the research needs that motivate our study are twofold: comparing various measures of objective performance (approached to in the next Section) and doing it in a longitudinal setting. Hence, it is extremely important for us to measure the trend (growth rates) in performance, rather than just measuring a specific point in time. Notwithstanding, we divide our hypothesis in two separate parts, considering that the most appropriate methodology to be used (detailed in section 4.1 and in Chapter 5) will yield results not only referred to the growth rate (slope) but also to a specific point in time (intercept):

Hypothesis 4a: "Initial levels of objective performance of new salespeople are not related to objective performance growth rates during their first months at the company"

Hypothesis 4b: "Initial levels of objective performance of new salespeople are not related to their objective performance level after a few months at the company"

3.4 Type of measurement and growth trajectory of objective performance

As showed in Chapter 2, several studies in the sales domain have used various measures of performance in cross-sectional settings and a few of them in longitudinal ones. While some meta-analyses have concluded that subjective and objective measures of performance are not interchangeable (Bommer, Johnson, Rich, Podsakoff & MacKenzie, 1995; Heneman, 1986; Jaramillo, Carrillat & Locander, 2005), to our knowledge, no studies have showed specific conclusions about the interchangeability of different objective measures of performance. Moreover, if we assume the dynamic nature of performance, we should compare their trends over time or consider the method of performance measurement as a potential moderator of the level of performance dynamism (Sturman, Cheramie & Cashen, 2005). No studies on this issue have been found either in the sales or in other domains.

The only study we have identified comparing various measures of performance in a longitudinal setting was conducted by Sturman, Cheramie & Cashen (2005), who compared objective and subjective measures. In their meta-analysis including sales and no sales studies with three or more observation periods, they examined measurement type (i.e., subjective and objective measures) and job complexity in relation to temporal consistency (the correlation between performance measures at different points in time), stability (extent to which the true value of a measure remains constant over time) and test–retest reliability (the relationship between performance measures over time after removing the effects of performance instability; that is, referred to error). The most relevant part for our study was referred to identifying how the method of performance measurement affects the temporal consistency, stability, and test–retest reliability of job performance ratings over time. Authors confirmed their hypotheses that:

(a) despite objective measures of performance are considered to have a higher reliability at a given point in time than subjective ones (Bommer et al., 1995; Feldman, 1981), they are less reliable over time when compared with subjective (supervisory rated) measures. They found that objective measures of performance in their HLM model were associated with lower test-retest reliability ($\beta = -0.22$, $p < .0001$). Authors note that, despite the generalized notion that objective measures have some inherent advantage in research, the higher test-retest reliability from subjective measures does not necessarily connote a complete lack of error variance.

(b) authors mentioned that there is no relationship between measurement type and performance stability; that is, the method of performance does not affect the way employees vary over time.

Various studies show the comparison of different measures of objective performance in a longitudinal setting, but, as far as I know, none has compared the **evolution** of two different measures - that is, their growth trajectories- longitudinally. Even though their main purpose was not to compare the evolution in time of the relationship between different objective measures of performance, they have done it through three different approaches: (a) comparing correlations of different measures of objective sales performance taken at the same time (see Table 3.4.1), (b) comparing the correlation of different measures of objective sales performance at different times (see Table 3.4.2), and (c) comparing the relationship between an objective measure at a specific moment in time with a different one measured longitudinally.

In general, we can conclude that correlations are significant in both sets of studies, but it is interesting to note that, broadly speaking, relationships are stronger in studies measuring different indicators taken at the same time (Table 3.4.1) than in studies measuring different indicators at different times (Table 3.4.2). Anyway, one cannot assume relevant conclusions since the sample is small, the type of indicators being measured and the considered timeframes are not homogeneous and, as mentioned, the studies identified in both Tables compare results in a "static" way, with only cross-sectional pairwise correlations.

Table 3.4.1 Studies showing correlations among different measures of objective sales performance taken at the same time

Authors	Industry	Measures of objective performance	Correlation among measures of objective performance
Adkins & Naumann (2001)	Transportation	- Bookings per hour - Tickets sold per hour 6 monthly observations	Correlations: Month 1, r= .40 ($p < .05$) Month 2, r= 47($p < .05$) Month 3, r= .63 ($p < .05$) Month 4, r= .66 ($p < .05$) Month 5, r= .52 ($p < .05$) Month 6, r= .63 ($p < .05$) Authors mention that both measures are "distinct, albeit non-independent" due to the sales process.
Conway & Coyle-Shapiro (2012)	Bank (United Kingdom)	- Sales made: monthly sales (weighting products according to their value to the business, considering -dividing by- employees' contracting working hours). - Sales targets met: subtracting monthly sales made points from a sales target. 2 observations of an averaged 7-months period	Correlations: Time 1, r= .73 ($p < .01$) Time 2, r= .86 ($p < .05$)
Fu, Richards, Hughes & Jones (2010)	Tools for construction industries (new to market product)	- Daily unit sales (growth rate of sales) - Quotas (according to overall sales levels in each territory). Control variable 476 daily observations	Correlation: 0.43, $p < .01$ (quotas Vs cumulated sales). Cumulated for the considered period of 476 days
Ibid	Tools for construction industries	- Daily unit sales (growth rate of sales) - Quotas (according to	Correlation: 0.40, $p < .01$ (quotas Vs cumulated sales)

	(line extension product)	overall sales levels in each territory). Control variable 304 daily observations	Cumulated for the considered period of 304 days
Harrison, Virick & William (1996)	Home telecom	- Number of systems sold per month - Amount of sales ($) per month - Average pay per month 12 monthly observations	Number of system Vs amount of sales: r= .84 (p<.01) Number of system Vs average pay: r= .95 (p<.01) Average pay Vs amount of sales: r= .98 (p<.01) All of them cumulated for the considered period of 12 months
Thoresen, Bradley, Bliese & Thoresen (2004)	Pharmaceutical (sample 2 in their study)	- Territory sales aggregated on a quarterly basis - Quarterly product market share (raw sales / all sales in the given product class for each individual salesperson's territory) 4 quarterly observations	Correlations: Quarter 1, r= .85 (p < .001) Quarter 2, r= .78 (p < .001) Quarter 3, r= .72 (p < .001) Quarter 4, r= .72 (p < .001) Mean correlation for all quarters, r= .77 Authors mention "strong, positive" correlations

Table 3.4.2 Studies showing correlations among different measures of objective sales performance taken at different times

Authors	Industry	Measures of objective performance	Correlation among measures of objective performance
Adkins & Naumann (2001)	Transportation	- Bookings per hour - Tickets sold per hour 6 monthly observations	Correlations: r values between .18 (p<.05) and .48 (p<.05) when comparing different periods Authors mention that both measures are "distinct, albeit non-independent" due to the sales

			process.
Conway & Coyle-Shapiro (2012)	Bank (United Kingdom)	- Sales made: monthly sales (weighting products according to their value to the business, considering - dividing by- employees' contracting working hours) - Sales targets met: subtracting monthly sales made points from a sales target 2 observations of an averaged 7-months period	Correlations: Sales Time 1 Vs Sales targets met Time 2, r= .25 ($p < .01$) Sales targets met Time 1 Vs Sales Time 2, r= .35 ($p < .05$)
Chung, Steenburgh & Sudhir (2014)	Durable office products	For the 4 bonus months: - % of annual quota completed in the considered month (sales / quota for that month) - % of quarterly quota sold by the previous month 4 quarterly observations	Scatterplots and the best fitting non parametric polynomial of sales against % of quota attained, at 4 bonus months: there is a steady increase over time in both indicators. Tests to identify "sales substitution" across quarters (i. e., salespeople giving up or shifting sales to next quarter to increase their chances of meeting quotas at various quarters): First month of quarter, β = 168.87, $p < 0.01$ Other months of quarter, β = 147.79, $p < 0.01$ Other months of quarter x previous month % distance to quota, $\beta = 91.09$, $p < 0.01$ First month of quarter x previous month % distance to quota, β = 2.59, non significant. Hence, there is no sales substitution
Ibid	ibid	For the 4 pre-bonus months: - % of annual quota completed in the considered month (sales / quota, for that month) - % of quarterly quota sold by the previous month 4 quarterly observations	
Ibid	ibid	- % cumulative performance to quota	

		for first month of the quarter - % cumulative performance to quota for other months of the quarter - previous month % distance to quota 4 quarterly observations	
Dustin & Belasen (2013)	Nondurable consumable business products	- Sales (mean quarterly performance) - Pay level: total sales compensation, including both base and incentive pay - Total compensation reduction 8 quarterly observations	Impact of a reduction in compensation on sales performance over time (longitudinal). Repeated measures ANOVA regression on sales: - main effect for time, $\beta = 58.29$, $p < 0.05$ - interaction of time with the total compensation reduction, $\beta = 4.15$, $p < 0.05$ - interaction of time with three pay level cohorts, $\beta = 2.29$, not significant
Ployhart & Hakel (1998)		- Gross sales commissions averaged across a three-months period - Past salary commission and salary potential (composite measure that assessed individuals' self-reported past salary and future expected earnings) 8 quarterly observations for gross sales and one for PSCSP	Correlations: Significant with month 2, r=.14; month 5, r=.14; month 6, r=.13; month 7, r=.14 (all $p < .05$) No significant for other months

Three studies have compared the relationship between an objective measure taken at a specific moment in time with a different one measured longitudinally. Fu, Richards, Hughes & Jones (2010) regressed quotas (fixed measurement for the considered period, computed according to overall sales levels in each territory) as a control variable on daily unit sales using nonlinear growth curve modeling. In their first sample, which observed 308 salespeople for 476 days, they found a significant correlation ($\beta = 0.12$, $p < 0.01$) between both variables. In their second sample, observing 206 salespeople for 304 days, a major correlation was also found ($\beta = 0.17$, $p < 0.001$).

Ployhart & Hakel (1998) regressed a measure they called past salary commission and salary potential (PSCSP - composite measure that assessed individuals' self-reported past salary and future expected earnings) on 8 quarterly observations of gross sales commissions (averaged across the three-months period) and found a significant correlation with the intercept ($\beta = 0.15$, $p < 0.05$) but no significant ones with the linear, quadratic and cubic terms. Although PSCSP is only partially an objective measure, we decided to include it in our analysis. They did a complementary analysis with corrected intercorrelations among the predictor and population intra-individual growth parameters and reached the same conclusion (significant correlation just with the intercept, $\beta = 0.16$, $p < 0.05$): PSCSP predicted the initial status, but not acceleration in sales; in other words, it accounts for variance in performance for the first months, but does not account for variance in changes in performance over time.

While they did not use the type of analysis we are suggesting, Dustin & Belasen (2013) analyzed the impact of a reduction in compensation on individual sales performance over time. Specifically, they analyzed 292 salespeople from a company selling nondurable consumable business products during eight consecutive quarters, measuring the impact in sales performance of a reduction in compensation after the fourth quarter. First, they compared the control year (months 1-12; times 1-4) to the experiment year (months 13-24; times 5-8) to examine change patterns in the variables over time. Using repeated measures ANOVA (General Linear Models), they found that (a) the main effect for time was significant ($\beta = 58.29$, $p < 0.05$), indicating that the linear composite differs for different time periods; (b) that the interaction of time with the total compensation reduction was significant ($\beta = 4.15$, $p < 0.05$); and (c) that the interaction of time with three pay level cohorts was not significant. Then, they continued their analyses to further determine where differences occur. Results showed that mean performance increased significantly ($\beta = 7.17$, $p < 0.05$) from time 4 to time 5 (the immediate time period after the reduction in compensation) and stayed at a similar level to time 5 during the three following quarters; mean quarterly performance deviated from control months (1 to 12) at the $p< 0.05$ level in all four quarters in the second year. They made the same analysis for three different compensation level cohorts (Base, Moderate and High pay levels), even though the interaction of time with the pay level cohorts was not significant; results showed that mean performance increased significantly over the performance in the control year in each of the subsequent time periods for the Base and

Moderate cohorts, while it was not significant for the Highly paid group of salespeople. Additionally, a fixed effects analysis confirmed all these conclusions.

In summary, findings from Sturman, Cheramie & Cashen (2005) about differences in test-retest variability and in temporal consistency of objective and subjective measures, the idea that objective and subjective measures of job performance are not interchangeable when measured at specific points in time, and findings from Ployhart & Hakel, which indicate that performance measured with one variable at a specific point in time does not predict acceleration in another variable, lead us to formulate the following hypotheses. As mentioned in the previous Section, the main objective of our analysis is the trend (growth trajectory) in performance, but we will also consider it in a specific point in time. Hence, the first set of hypotheses (5a and 5b) refers to the comparison of different measures taken at different times:

Hypothesis 5a:
"Initial levels of performance of new salespeople measured with one objective indicator are not related to performance growth rates during their first months at the company, measured with a different objective indicator"

Hypothesis 5b:
"Initial levels of performance of new salespeople measured with one objective indicator are not related to their performance level after a few months at the company, measured with a different objective indicator"

Hypothesis 6 refers to the comparison of different measures taken at a time interval (that is, not referred to a specific moment but considering both growth trajectories):

Hypothesis 6:
"The evolution over time (growth rate) of different objective measures of performance of salespeople during their first months at the company are not related"

3.5 Summary of hypotheses

Research question: growth trajectory of objective performance - Is performance dynamic? Which is the shape of growth of performance?

Hypothesis 1: "There will be a significant variance in new salespeople objective performance over time within salespeople and between salespeople"

Hypothesis 2: "New salespeople objective performance changes over time during their initial months at the company"

Hypothesis 2a: "There is a variation of new salespeople objective performance over time"

Hypothesis 2b: "New salespeople objective performance follows a linear increasing trajectory over time"

Hypothesis 2c: "The average objective performance trajectory of new salespeople exhibits an initial linear growth and then a leveling off of performance (i.e., a quadratic shape) during their initial months at the company"

Hypothesis 3: "There will be between-person differences in terms of their individual performance at the final moment and in their underlying growth pattern (time)"

Hypothesis 3a: "New salespeople will differ significantly in their objective performance growth rates over time (i.e., there will be a significant variance in new salespeople objective performance around the hypothesized performance trend)"

Hypothesis 3b: "New salespeople will differ significantly in their final objective performance levels after some months at the company"

Research question: time of measurement and growth trajectory of objective performance - same indicator taken at different times - To what extent are objective measures of performance taken at different times related?

Hypothesis 4a: "Initial levels of objective performance of new salespeople are not related to objective performance growth rates during their first months at the company"

Hypothesis 4b: "Initial levels of objective performance of new salespeople are not related to their objective performance level after a few months at the company"

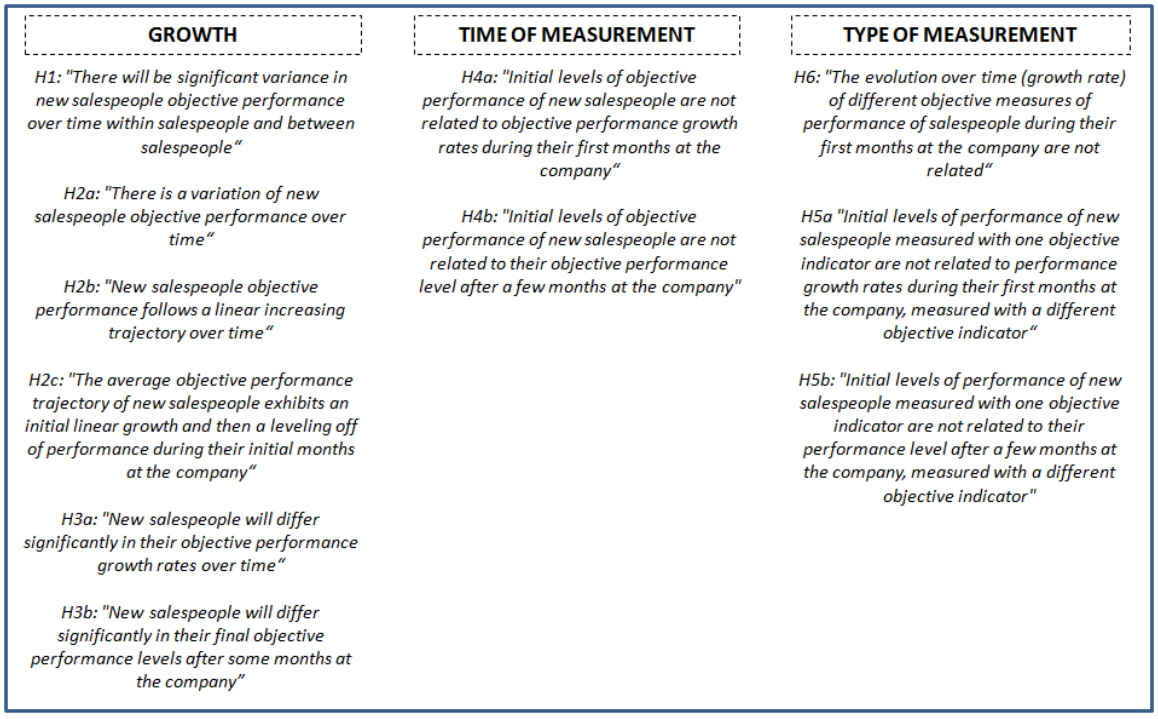
Research question: type of measurement and growth trajectory of objective performance - different indicators taken at the same period and different indicators taken at different times - To what extent are different objective measures of performance related over time?

Hypothesis 5a "Initial levels of performance of new salespeople measured with one objective indicator are not related to performance growth rates during their first months at the company, measured with a different objective indicator"

Hypothesis 5b: "Initial levels of performance of new salespeople measured with one objective indicator are not related to their performance level after a few months at the company, measured with a different objective indicator"

Hypothesis 6: "The evolution over time (growth rate) of different objective measures of performance of salespeople during their first months at the company are not related"

Figure 3.5 Hypotheses



CHAPTER 4 - METHODOLOGY

4.1 Research design and analytic method

Research design is a quantitative study based on longitudinal archival data collected from company records. Given that the model is cross level, including a time varying dependent variable affected by covariates at different levels, research design calls for statistical testing using a multilevel growth model (Bliese & Ployhart, 2002).

Because of the repeated monthly observations of the dependent variable (sales performance measured through three different outcomes: Sales, Units and Compensation), which are nested within salespeople, traditional regression analyses are inappropriate as they violate one of the conditions required for testing (Hoffman, Griffin & Gavin, 2000). Specifically, OLS regression requires that observations are independent and identically-distributed random variables. In this study, the data violate the assumption of independence of observations: since a longitudinal data set was built, consisting of 9 months of data for each salesperson, one cannot assume that the salesperson-month observations are independent of each other. As explained in Section 2.3.1.1, a salesperson's prior performance will be related to next month's performance.

A random coefficient modeling (RCM) strategy was used to test the hypotheses. RCM is also commonly referred to as linear mixed modeling (LMM) or hierarchical linear modeling (HLM) (Hofmann, 1997; Hofmann, Griffin & Gavin, 2000) and, when used with longitudinal data, is also referred to as growth curve modeling (Ployhart & Vandenberg, 2010; West, Welch & Galecki, 2007). As a methodology, RCM allows for the explicit modeling of the overall change in the dependent variable(s) over time, as well

as for the modeling of predictor variables and cross-level interactions as required by this study's hypotheses (Short et al., 2006). Put differently, RCM allows for both descriptive and explanatory longitudinal research in that it can be used to illustrate how a phenomenon has changed over time, as well as to model the determinants of this change process through tests of theoretical predictor variables (Ployhart & Vandenberg, 2010). Furthermore, as the relationships are modeled independently at each level, the structure of the data does not rely on the independent and identically-distributed assumption.

RCM is being used with increasing frequency in organizational behavior to study various issues referred to leadership (Day, Sin & Chen, 2004; Gentry and Martineau, 2010), general strategy (Holcomb et al., 2010; Misangyi et al., 2006), firm performance (Short et al., 2006), newcomer performance (Chen, 2005) or absenteeism (Hausknecht, Hiller & Vance, 2008). In the sales field, it has been used by various scholars either in cross-sectional studies (Ahearne, Haumann, Kraus & Wieseke, 2013; Ahearne, Lam, Hayati & Kraus, 2013; Auh & Menguc, 2013; Boichuk, Bolander, Hall, Ahearne, Zahn & Nieves, 2014; Carter, Henderson, Arroniz & Palmatier, 2014; Evanschitzky, Sharma & Prykop, 2012; Homburg, Wieseke & Kuehnl, 2010; Kraus, Ahearne, Lam, Wieseke, 2012; Lam, Kraus & Ahearne, 2010; Martinaityte & Sacramento, 2013; Mullins & Syam, 2014; Schmitz, 2013) or in longitudinal approaches (Ahearne et al., 2010; Fu et al., 2010; Hofmann, Jakobs & Baratta, 1993; Stewart & Nandkeolyar, 2006; Sturman & Trevor, 2001; Thoresen et al., 2004), as we can see in Table 2.3.1. While other authors have used the Latent Growth Model (LGM) methodology to approach similar situations

in longitudinal sales research (Jaramillo, Douglas & Grisaffe, 2009; Peterson et a., 2011), both approaches provide, in general, the same results (Hox & Stoel, 2005).

Since the steps involved in an RCM analytic method require an exhaustive explanation, the specific models tested are introduced and explained in detail alongside the findings in Chapter 5 - see Table 5.2.1 for a summary of the methodology.

We used SPSS 21.0 and R Software to conduct the analyses.

4.2 Sample characteristics

4.2.1 Setting description

We collected data from a division of a large Spanish direct selling company, selling books to individuals throughout the country. Sales representatives were responsible for contacting customers and selling their product portfolio. The selling process was considered as "transactional", that is, it only consists of one interaction; it has also been described as cold calling, where almost no information is known from the customer beforehand and there is just one opportunity to sell; as opposed to this selling technique, one can find "relational" selling, where developing long term relationships with customer is deemed critical.

After salespeople were hired, they received a structured initial training for a week and then started selling the product portfolio, which consisted of books on various subjects.

We collected data from one of the Business Units from the organization since the selling process (closer to a "relationship selling"), the salespeople characteristics (younger and with higher education) and the product portfolio (different selling prices and different product characteristics) were significantly different from other Business Units. This will ensure homogeneity in the results and avoid undesired biases.

We observed no differences in the distribution of the period when salespeople joined the company, roughly evenly distributed month by month. It avoids a bias in terms of the level of performance being influenced to overall monthly seasonality.

New salespeople were assigned to territories. Salespeople in our sample were recruited nationwide, with a larger concentration in big cities (Madrid and Barcelona) since a greater part of the business was generated there.

The sample was collected during 4 years (2004, 2005, 2006 and 2007). Since we collected our data from historical archival records and we wanted to have a "stable, homogeneous" period, we analyzed the overall sales records of the company as a whole for several years and found a significant decrease in performance starting in 2008. It was due to the crisis that most European Union economies faced starting that year, including Spain. Hence, the considered period showed a stable trend that allows us to compare results in an homogeneous way.

4.2.2 Dependent variables and data selection

One of the main contributions of the present study is that objective performance was measured with the three different objective indicators that have been used most frequently in the sales domain (See section 2.2.5):

- Monthly sales, measured in Euros ("Sales"). Total Sales for the considered period. The total revenues generated by a salesperson for the company.

- Monthly sales, measured in Units ("Units"). Total Units sold. There were two main product families with different prices and characteristics. We added them up, which was the usual practice for the company. No new products were added to the portfolio, other than the typical modifications periodically added by the company.

- Monthly compensation, measured in Euros ("Compensation"). Total amount that a salesperson receives from the company. Compensation schemes were constant during the analyzed period and there were no differences between different salespeople. They had a low amount of fixed salary and won a fixed commission on the sales they made. Each quarter, an additional bonus could be earned if some levels of sales were reached.

The "Quota" achieved was excluded since a detailed analysis of the process to assign quotas showed that they were not computed after an analysis of market or territory potential, but simply dividing the total budget into the number of salespeople, regardless of the the territory they were in (nationwide) or the experience or track records of the salesperson.

We used monthly observations. It is the period that the company used to evaluate and pay their salespeople and, hence, the shorter period available. This timeframe has been used by various authors (Adkins & Naumann, 2001; Ahearne, Lam, Mathieu & Bolander, 2010; Gupta, Ganster & Kepes, 2013; Harrison, Virick & William, 1996; Kirchner, 1960; Peterson, Luthans, Avolio, Walumbwa & Zhang, 2011).

We excluded the Performance during the starting month since some people joined the company at the beginning of the month, others at the middle and some others at the end. Given that company records computed "natural months", we decided to remove the initial month so that we could count truly "full" months of sales. The evident implication is that, even though we measured a period of 9 months, just 8 of them were available, starting at "month 2" for all of them. That is, at the beginning of month 2, some of them could have 1 day of experience and some others up to 30 days. The distribution of the recruiting throughout the month was homogeneous, with no relevant peaks. Hofmann, Jakobs & Baratta (1993) followed the same approach.

In a similar way, we did not include the "last month" at the company unless this salesperson had spent the whole month selling. Hence, the practical approach was to remove the last month with sales that appeared in company records, unless that person had left the company in the final day of the month.

The data for each month represent the month's new sales / compensation minus any problematic sales that took place in previous months but identified during the current month. Therefore, it was possible for an individual to have negative performance for a particular month.

We removed salespeople with missing data regarding any of the Control variables that we will explain in the next Section.

An important decision was to define the considered period of analysis. The company had a very high turnover among new salespeople (as an example, around 33% of new salespeople during their first month at the company, and around 85% after twelve months). Hence, we had to decide whether to have a larger sample (number of salespeople "alive") for a shorter period (total months with performance data), or a smaller one for a longer period. We rejected the alternative of having a sample of 179 salespeople for 12 months and opted for having a sample of 230 salespeople for 9 months. Two criteria were taken into consideration for this decision. First, the sophistication of the analytic model explained in Section 4.1 (measuring longitudinal data and including various predictors and control variables) made it better to adopt a large size. Second, the comparison with other studies (see Table 2.3.1 and Appendix A). As explained in Chapter 3, while longitudinal studies in the sales domain have used various approaches, we show authors that make our approach reasonable: Adkins & Naumann (2001) 6 monthly observations; Ahearne, Lam, Mathieu & Bolander (2010) 12 monthly observations; Chan, Li & Pierce (2014) used 24 weekly observations; Gupta, Ganster & Kepes (2013) 4 monthly observations of current employees (averaging all of them in a single indicator) and 5 monthly observations of new employees; Harrison, Virick & William (1996) 12 monthly observations; Kim (1984) 6 bi-weekly observations; Kirchner (1960) 6 monthly observations; Peterson, Luthans, Avolio, Walumbwa & Zhang (2011) 3

monthly observations during a 7-months timeframe; Stewart & Nandkeolyar (2006) used 26 weekly observations.

We removed from the sample salespeople who (a) had previously worked for the company; they appeared as being "new" in company records but their previous experience could influence their initial results - that is, getting higher levels when compared to a brand new salesperson -as explained in Sections 2.4.2 and 2.4.3; or (b) salespeople who did not sell for two consecutive months or more. Even though one of the main advantages of Hierarchical Linear Models is that one can work with missing data, we just allowed for one-month periods with no sales.

Finally, we "centered" the data at the final period (month 9). While most studies center it as an "average" for the period or at the initial month, it is not unusual to center it at the end (Raudenbush & Bryk, 2002). This implies that the "intercept" we will get in our regression models will be referred to month 9, not to month 2. As mentioned in chapter 3, the main objective of our study is to analyze trends and no specific moments in time. Results for the "slope" in the regression models (that is, the trend or the growth rate) will not be affected by centering the intercept at the beginning or at the end.

4.2.3 Independent predictors and control variables

Predictors

The predictors to test Hypotheses 4 and 5 were the following ones:

- **"Average": average quarterly sales.** Computed adding up the sales during the three months of the quarter and dividing them into 3.

- **"Increase": 5 of increase during the quarter.** Computed dividing the total sales during the third month of the quarter by the total sales during the first month of the quarter.

The aggregation was done for the following quarters: months 2 to 4; months 3 to 5; months 4 to 6; months 5 to 7; months 6 to 8.

The use of both measures has been frequently used in research following a similar approach:

- Average quarterly sales: Brown, Cron & Slocum, 1998; Fu, Jones & Bolander, 2008; Hofmann, Jakobs & Baratta, 1993; Jaramillo and Grisaffe, 2009.

- % of increase in sales: Dubinsky, Yammarino, Jolson & Spangler, 1995; Harrison, Virick & William, 1996; Gonzalez, Claro & Palmatier, 2014; Kraus, Ahearne, Lam, Wieseke, 2012; Lam, Kraus & Ahearne, 2010.

Aggregating the data into quarterly sales increased the reliability of the performance data and provided a more accurate representation of individual performance over time (Hofmann, Jakobs & Baratta, 1993; Jaramillo and Grisaffe, 2009).

Control variables

We included a set of six socio-demographical variables used frequently in the sales literature:

- **Gender:** male or female.

- **Age:** age in years when joining the company. It is the only continuous control variable. Ranged from 20 to 41 years old.

- **Education:** High, medium or basic, classified according to the standard Spanish education system.

- **Experience: yes / no;** if the person had previous experience when joining the company. It was asked during the recruiting process.

- **Sales experience:** yes / no; if the person had previous sales experience (in direct selling or other industries) when joining the company. It was asked during the recruiting process.

- **Recruiting channel: internet / press / referrals.** The way through which the salesperson came to know about the company and, hence, started the recruiting process.

In summary, we obtained an homogeneous sample of 230 salespeople with their performance from months 2 to 9 in the company, measured with three different objective indicators: sales, units and compensation. Additionally, we had six control variables for each one of them: gender, age, education, experience, sales experience and recruiting channel. The predictors to test Hypotheses 4 and 5 will be Average quarterly performance and quarterly increase in performance. The predictors to test Hypothesis 6 will be the monthly observations of the other two measures of performance.

CHAPTER 5 - FINDINGS

5.1 Descriptive statistics

Before proceeding with the detailed analysis through Random Coefficients Modeling, we conducted an exploratory analysis of the available information. It helped us identify preliminary inter-correlations between various variables and patterns of change in performance.

Table 5.1.1 shows the Pearson correlations between each set of Performance variables. We cannot observe a simplex pattern. This could be a signal that there is no auto-correlation; we will test it later in detail. Additionally, we can see an increase in average performance and standard deviations.

Table 5.1.2 shows the Pearson correlations between each set of Performance variables, comparing Sales with Units, Sales with Compensation, and Units with Compensation. Interestingly, we can observe significant and high correlation coefficients in the diagonal and lower or no significant ones away from it. It could mean that different measures of performance taken at the same time are related. Even though our research will focus on the growth trajectories rather than on correlations at specific points in time, our model will also test correlations at the end of the considered period.

As suggested by Singer and Willett (2003), before beginning the formal model testing, we first explored the patterns of change present in the longitudinal dataset visually.

In Figure 5.1.1 we can observe an increase in average performance, month after month, for all three measures.

Figure 5.1.2 illustrates the evolution of performance measured in Sales for 10 salespeople selected randomly. Although the performance growth trajectory appears to be increasing over time (as indicated by the thick black line), there are, nonetheless, significant variances in both the initial and final levels of performance, and in the growth of performance for each salesperson over time; with some of them starting high, yet scarcely increasing, while other salespeople started with a lower level of sales, but got better results when selling over time. These illustrations, together with the values in Standard Deviation in Table 4.1.1, shed preliminary light on the variances in growth rates between salespeople.

These preliminary tests of relationships and growth patterns suggest that there is some initial support to hypothesize that there will be an overall linear growth rate of performance over time and that salespeople will differ significantly in both their final levels and rates of performance over time. These tests, however, do not formally assess the significance of these relationships. As such, we are turning now to formal model building and hypotheses testing using a random coefficient modeling (RCM) approach as introduced in Section 4.1 and detailed in the following sections.

Table 5.1.1 Performance: Pearson correlations, mean and standard deviation (n=230)
Measured in Sales, Units and Compensation

Correlations

	SalesM2	SalesM3	SalesM4	SalesM5	SalesM6	SalesM7	SalesM8	SalesM9
SalesM2								
SalesM3	.416**							
SalesM4	.220**	.195**						
SalesM5	.174**	,109	.183**					
SalesM6	.187**	-,012	,051	.136*				
SalesM7	,115	,076	-,001	,079	,127			
SalesM8	.309**	.210**	.153*	.284**	.197**	.432**		
SalesM9	.179**	,091	.277**	.343**	.309**	.192**	.350**	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

	UnitsM2	UnitsM3	UnitsM4	UnitsM5	UnitsM6	UnitsM7	UnitsM8	UnitsM9
UnitsM2								
UnitsM3	.403**							
UnitsM4	.204**	.213**						
UnitsM5	.208**	.263**	.293**					
UnitsM6	.139*	-,001	,059	.231**				
UnitsM7	,120	-,080	-,074	,061	.308**			
UnitsM8	.160*	,099	-,017	.198**	.308**	.582**		
UnitsM9	,047	,002	.175**	.286**	.357**	.347**	.507**	

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

	CompensM2	CompensM3	CompensM4	CompensM5	CompensM6	CompensM7	CompensM8	CompensM9
CompensM2								
CompensM3	.458**							
CompensM4	.213**	.185**						
CompensM5	.282**	.261**	.274**					
CompensM6	.171**	,080	.231**	.148*				
CompensM7	,104	.152*	,113	.236**	.343**			
CompensM8	.203**	.276**	.211**	.314**	.248**	.536**		
CompensM9	.252**	.327**	.353**	.290**	.314**	.302**	.476**	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 5.1.2 Performance: Pearson correlations between Sales and Units, Sales and Compensation, and Units and Compensation (n=230)

Correlations

	SalesM2	SalesM3	SalesM4	SalesM5	SalesM6	SalesM7	SalesM8	SalesM9
UnitsM2	.905**	.440**	.216**	.205**	,089	,116	.291**	.180**
UnitsM3	.356**	.854**	.138*	.204**	-,041	-,085	.161*	,107
UnitsM4	.189**	.237**	.877**	.191**	,019	-,032	,062	.244**
UnitsM5	.157*	.159*	.232**	.870**	,127	,044	.228**	.332**
UnitsM6	.208**	,017	,067	.183**	.890**	.133*	.235**	.320**
UnitsM7	,102	,033	-,071	,063	.234**	.817**	.470**	.276**
UnitsM8	.135*	,124	,024	.188**	.200**	.382**	.813**	.348**
UnitsM9	,045	,003	.200**	.284**	.319**	.213**	.425**	.847**

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

	SalesM2	SalesM3	SalesM4	SalesM5	SalesM6	SalesM7	SalesM8	SalesM9
CompensM2	.736**	.401**	.206**	.202**	.159*	,004	.154*	,037
CompensM3	.393**	.837**	.150*	,121	,099	,061	.237**	.137*
CompensM4	.263**	.265**	.823**	.184**	,019	,079	.214**	.276**
CompensM5	.315**	.284**	.331**	.825**	,108	,064	.325**	.338**
CompensM6	.159*	,002	.254**	.241**	.850**	.201**	.176**	.358**
CompensM7	.173**	.145*	,030	.255**	.302**	.865**	.442**	.207**
CompensM8	.293**	.259**	.140*	.262**	.267**	.505**	.877**	.298**
CompensM9	.368**	.271**	.349**	.221**	.275**	.297**	.526**	.815**

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

	CompensM2	CompensM3	CompensM4	CompensM5	CompensM6	CompensM7	CompensM8	CompensM9
UnitsM2	.674**	.379**	.249**	.323**	,072	.162*	.264**	.333**
UnitsM3	.346**	.731**	.204**	.315**	-,064	,023	.186**	.219**
UnitsM4	.152*	.176**	.738**	.350**	.190**	-,016	,075	.298**
UnitsM5	.194**	.174**	.187**	.767**	.201**	.179**	.189**	.194**
UnitsM6	.183**	.131*	,031	.160*	.748**	.279**	.246**	.290**
UnitsM7	-,006	,044	,033	,031	.221**	.732**	.468**	.336**
UnitsM8	,041	.181**	,118	.196**	.140*	.379**	.707**	.429**
UnitsM9	-,068	,066	.206**	.274**	.336**	.235**	.348**	.657**

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 5.1.3 Control variables: description (n=230)

		n	%
Gender	Male	197	86%
	Female	33	14%
Education	Basic	55	24%
	Medium	149	65%
Experience	High	26	11%
	Exper.	220	96%
	No exper.	10	4%
Sales experience	Sales exp.	112	49%
	No sales exp	118	51%
Recruiting	Press	144	63%
	Referrals	70	30%
	Internet	16	7%
Age	20 - 24	101	44%
	25 - 29	92	40%
	30 - 34	33	14%
	> 34	4	2%

Figure 5.1.1 Growth trajectories of Performance: Average and linear trends Measured in Sales (Euros), Units (#) and Compensation (Euros)

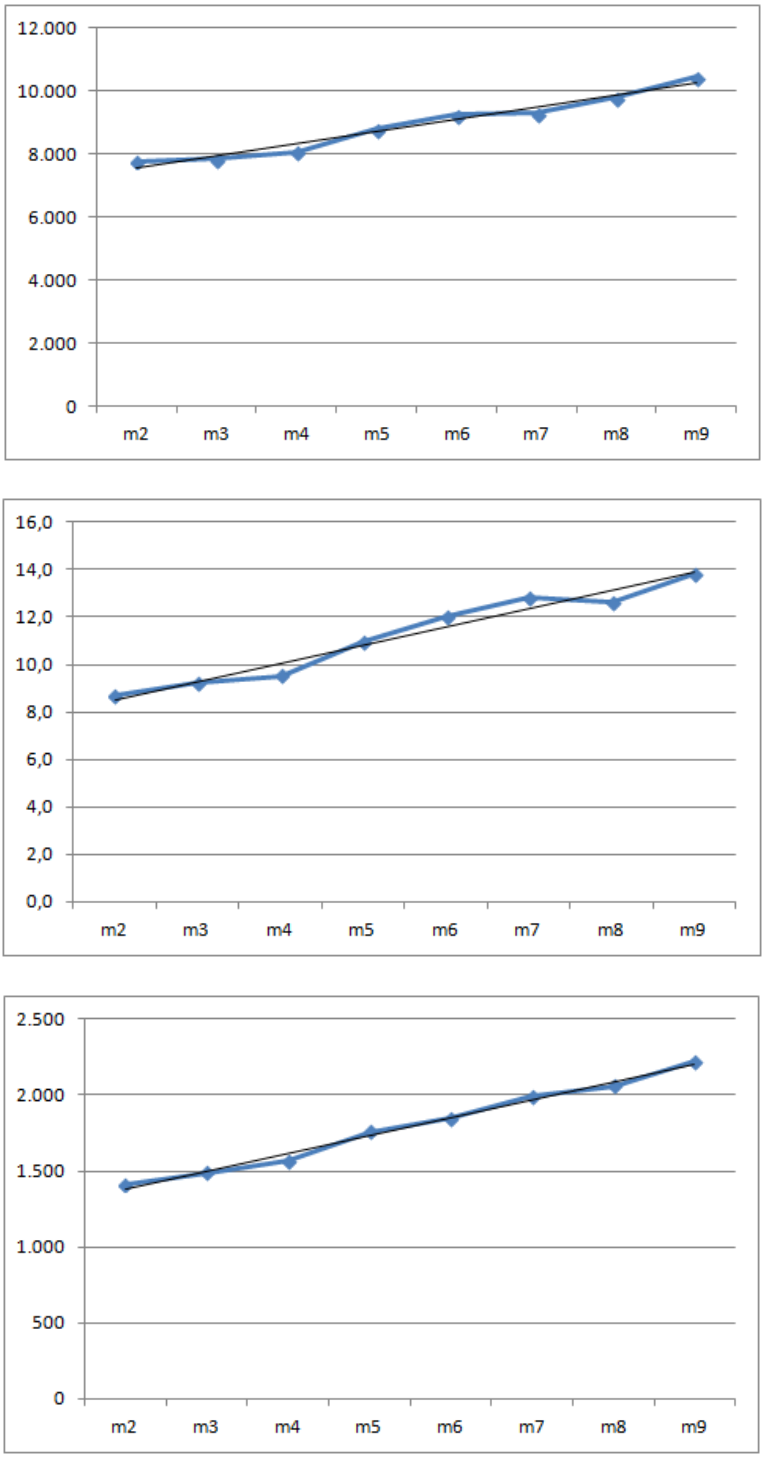
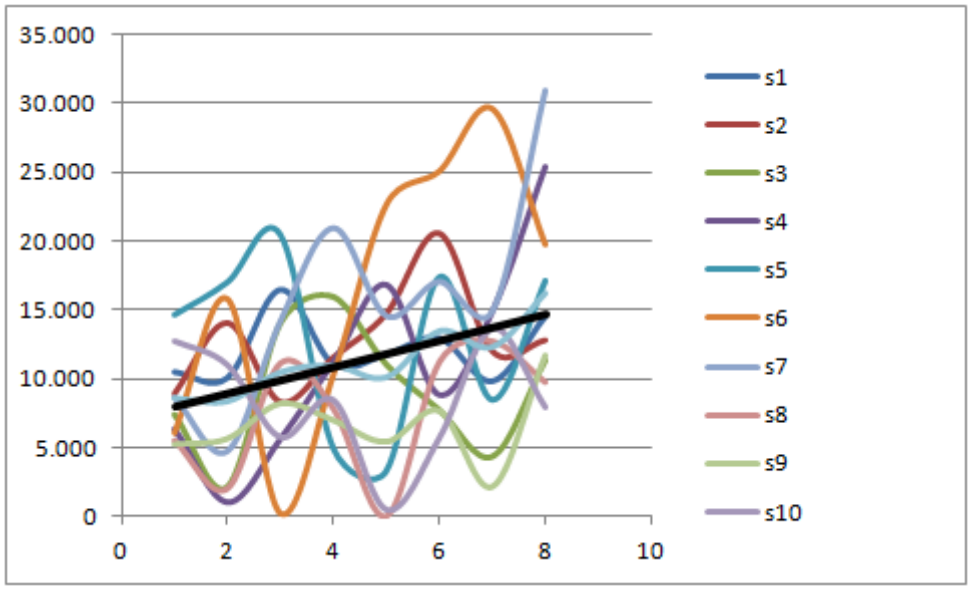
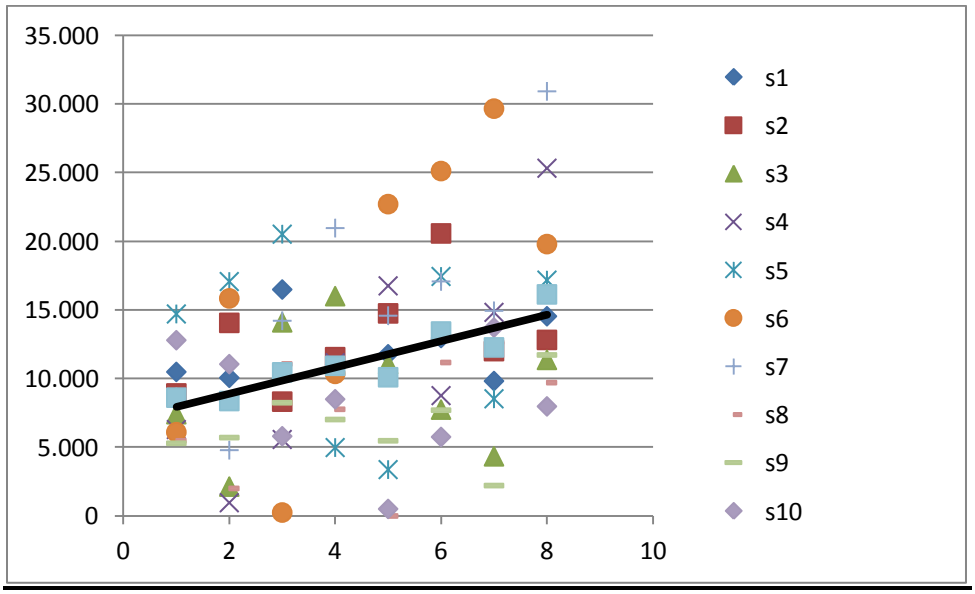


Figure 5.1.2 Growth trajectories of Performance for 10 randomly selected salespeople and average trend. Sales and dispersion Measured in Sales (Euros)





5.2 Hypotheses testing

5.2.1 Steps in building a longitudinal, multi-level growth model

We will build a longitudinal, multi-level growth model to test the hypotheses. A sequential process will be followed, comparing various models as recommended for Random Coefficient Modeling (Bliese & Ployhart, 2002; Raudenbusch & Bryk, 2002; Singer & Willet, 2003). We will build progressively more complex models, testing for increased model fit using deviance statistics. In Table 5.2.1 (adapted from Bliese & Ployhart, 2002; Holcomb et al., 2010; Mazutis, 2011; Singer & Willet, 2003) we can find the main methodological steps to be followed, their interpretation, and the associated Equations (described below in detail) and Hypotheses.

We will use the notation for a two-level longitudinal model-building using Random Coefficient Modeling (RCM) based on Bliese and Ployhart (2002) and Raudenbush & Bryk (2002). There are other similar ways employed by other authors which mainly differ in the type of symbols used to denote each variable term or the way equations are written. The subscripts "t" and "i" denote time and salespeople respectively, where:

t = 1, 2, 3,… Ti time periods (months) within salespeople i (T=8)

i = 1, 2, 3,… I salespeople (I=230)

Table 5.2.1 Sequence of steps in building a longitudinal, multi-level growth model

STEP	DESCRIPTION	INTERPRETATION	EQU.	HYP.
1	Estimate a fully unconditional null model	Estimate the Intra-class Correlation Coefficient (ICC): how much variability in Performance can be attributed to within salespeople and between salespeople to decide whether a multi-level model is warranted	1, 2	1
2 a	Estimate an unconditional linear growth model with fixed effects	Estimate how much variability in Performance can be attributed to month effects specifically. Goodness of fit: compare deviance statistic to unconditional null model	3, 4	2 a, 2 b, 3
2 b	Estimate an unconditional linear growth model with random effects	Significance test of parameters to determine if variances in intercept, slope and intercept/slope covariance are statistically significant over time. Goodness of fit: compare deviance statistic to unconditional linear model with fixed effects	5, 6	2 a, 2 b, 3
3	Estimate the shape of performance over time (linear, quadratic, cubic,...), adding additional terms to the basic equation	Validate hypothesis 2c: significance test of parameters. Goodness of fit: compare deviance statistic to unconditional linear model with fixed effects. Check against the new Model the significance of parameters for Hypotheses 2a, 2b, 3. Remove from the equations all non-significant parameters (variables and/or random effects)	7, 8	2 c
4	Estimate the error structure (homogeneous, auto-correlated,...)	Differences in likelihood ratios		
5	Conditional model: add time-invariant predictor variables referred to the final level and growth rate of Performance, to Level 2	Validate hypotheses 4 and 5: significance test of parameters. Goodness of fit: compare deviance statistic to the previous model. Check against the new Model the significance of parameters for Hypotheses 2a, 2b, 3. Remove from the equations all non-significant parameters (variables and/or random effects)	9, 10, 11, 12	4, 5
6	Conditional model: add time-varying predictor variables referred to the	Validate hypothesis 6: significance test of parameters. Goodness of fit: compare deviance	13, 14	6

	final level and growth rate of Performance, to Level 1	statistic to the previous model. Remove from the equations all non-significant parameters (variables and/or random effects)		

EQU. = Equations HYP.=Hypotheses

Adapted from Bliese & Ployhart, 2002; Holcomb et al., 2010; Mazutis, 2011; Singer & Willet, 2003

5.2.2 Step 1: Unconditional null model

To test Hypothesis 1 we estimate a fully unconditional null model (also called Unconditional Means Model) without predictor variables at any level and without including growth terms. It will serve (a) as a baseline against which one can compare subsequent models, and (b) to identify whether there is sufficient systemic variation in the dependent variable (Sales, Units or Compensation) to warrant a multi-level analysis. This model partitions the variation in the outcome measure (Sales, Units or Compensation) among two levels of analysis that represent the individual changes in performance over time for salespeople (Level 1 – within salespeople) and the variation in performance change parameters between salespeople (Level 2 – between salespeople). The null model is estimated by the following set of equations:

Level 1 $\text{Performance}_{ti} = \pi_{0i} + e_{ti}$ (1)

Level 2 $\pi_{0i} = \beta_{00} + r_{0i}$ (2)

Where:

Performance ti represents Performance (Sales, Units or Compensation) at time t for salesperson i

π_{0i} represents the mean performance of salesperson i across time

e_{ti} is the random time effect; represents the deviation of the ti-th performance measurement (the performance at time t for salesperson i) from the mean performance in salesperson i (i.e., from π_{0i}). It is assumed that e ti is normally distributed with a mean of zero and a variance of σ^2 (Holcomb et al., 2010; Misangyi et al., 2006).

β_{00} is an intercept that represents the mean performance of all salespeople, at the final moment (since we have centered performance data at the final month)

r_{0i} is the random salesperson effect; represents the deviation from the mean β_{00} for salesperson i; that is, the deviation of Performance for salesperson i over time. It is assumed that r_{0i} is normally distributed with a mean of zero and a variance of τ_{π}

At Level 1 (within salespeople across time), the null model predicts Performance at each time period as a function of an intercept (salesperson mean performance) plus a random error. At Level 2 (between salespeople), the mean Performance of each salesperson over time (π_{0i}) is assumed to vary randomly around mean Performance (β_{00}). This model divides the variance in Performance into two components: σ^2 (within

salespeople across time periods), and τ_{π} (between salespeople). We can calculate the proportion of variance that resides at each Level based on the estimates of these variance components through the Intra-class Correlation Coefficient (ICC) (Singer & Willett, 2003).

If this measure is significant, the ICC will demonstrate that Performance differs within salespeople across time, and between salespeople, confirming that a two-level model is adequate. High values of the ICC support the use of RCM because it implies that there is a nontrivial degree of non-independence of observations (Tabachnick & Fidell, 2007).

Calculation of the two-level ICC:

Level 1 (proportion of variance within salespeople across time) $= \sigma^2 / (\sigma^2 + \tau_{\pi})$

Level 2 (proportion of variance between salespeople) $= \tau_{\pi} / (\sigma^2 + \tau_{\pi})$

Where,

σ^2 within salespeople variance across time periods

τ_{π} between salespeople variance

Table 5.2.2 Results for Unconditional Null Model for Sales, Units and Compensation

Unconditional null model	Para-meter	Model 1a: Sales		Model 1b: Units		Model 1c: Compensation	
Fixed effect		Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)
Grand mean (intercept)	π 0i	8,895.58 *	185.55	11.20 *	0.31	1,792.57 *	36.44
Random effects		Variance	(S.D.)	Variance	(S.D.)	Variance	(S.D.)
Level 1 Temporal variation (within salesp variation of Perf. over time)	e ti	23,059,307 *	812,733	63.22 *	2.22	731,937 *	25,797
Level 2 Variation in final Perf. between salesp. (between salesperson variation in intercept)	r 0i	5,036,261 *	745,375	14.44 *	2.10	214,022 *	28,671
Variance decomposition by level		% by level		% by level		% by level	
Level 1 (within salesp. over time)	σ^2	18.0 %		18.6 %		22.6 %	
Level 2 (between salesp)	τ_π	82.0 %		81.4 %		77.4 %	
Goodness of fit			Par.		Par.		Par.
Deviance		36,648.71	3	13,090.67	3	30,345.36	3

N= 1,840 observations, nested within 230 salespeople

Par. = number of parameters

* p<.001

Results for step 1 are shown in Table 5.2.2. In Model 1a we can see that 18% of the variance in Sales Performance lies within salespeople and that 82% lies between salespeople, being both significant at p< .001 level. We can find similar distributions in Models 1b and 1c. If we considered a 95% confidence interval and the ICC best case (upper bound of the interval), results for IIC Level 1 would be 24%, 25% and 29%, respectively, for the 1a, 1b and 1c models. The relatively large amount of between-person variability found indicates that there are likely to be inter-individual effects that can be

modeled at a higher level with Level 2 analyses, and that it is appropriate to use a random intercepts model (Day, Sin & Chen, 2004). Hence, **Hypothesis 1 is supported**.

The Deviance statistics have no meaning on their own at this point. They will be compared to the subsequent Models subtracting their respective -2 Log Likelihood (-2 LL) to gauge improvements in model fit. The deviance statistics are based on -2 LL which are estimated using Full Maximum Likelihood (rather than Restricted Maximum Likelihood), which is the most appropriate method for overall model fit testing as it accounts for different sets of fixed-effect parameters (West et al., 2007). For space considerations, we do not consider necessary to show the results from chi-square tests, since they provide the same conclusions.

5.2.3 Step 2: Unconditional linear growth model

The unconditional growth model can test if performance follows, on average, a linear increasing trajectory over time, if there is a variation of new salespeople objective performance over time and whether there are significant differences in salespeople's final levels of performance and performance growth levels over time. Hence, we will use it to test Hypotheses 2a, 2b, 3a and 3b. As suggested by Holcomb et al. (2010), we must analyze sequentially two unconditional linear growth models: one with fixed effects at all levels and, after it, another model with random effects at all levels.

5.2.3.1 STEP 2 a: Unconditional linear growth model with fixed effects

The main advantage of first estimating the unconditional growth model with the fixed effects at all levels is that it lets us isolate the effect of the month variable on reducing the total variance explained (Misangyi et al. 2006). This model estimates the variance explained by month effects specifically to determine if the patterns of change - that is, growth- vary significantly between salespeople over time (Holcom et al., 2010; Short et al., 2006). Now, we add to the fully unconditional null model a TIME ti covariate and its slope coefficient π 1i to the Level 1 equation in order to model the change in Performance for salesperson i for each period:

Level 1 $\quad$ Performance ti = $\pi_{0i} + \pi_{1i}(\text{TIME}_{ti}) + e_{ti}$ $\quad$ (3)

Level 2 $\quad$ $\pi_{0i} = \beta_{00}$ $\quad$ (4 a)

$\quad$ $\pi_{1i} = \beta_{10}$ $\quad$ (4 b)

Where:

Equation (3) describes the linear growth trajectory for Performance at time t for salesperson i. Salesperson i's Performance score at time t is modeled as a function of the intercept (the final status of salesperson i, π_{0i}), the slope or the growth rate of Performance for salesperson i during the study (π_{1i}), and a time-specific residual term (e_{ti}) that captures the deviation between a salesperson's observed score and its estimated linear trajectory (Peugh & Enders, 2005).

TIME_{ti} - Given that we have centered the time variable at the end of the considered period, the time variable is a Level 1 covariate that uses integer values between 0 (at the final observation in month 9) and -7 (at the initial observation in month 2), since the

dependent variable is measured every month and is equally spaced. As we have explained in Chapter 4, we have centered time this way given that some of our hypotheses try to explain issues related to the Performance of salespeople after a few months at the company (observation in month 9). The intercept should, thus, be interpreted as the expected value of Performance when time = 0 (in this case, at month 9) (Raudenbush, S. & Bryk, A. 2002).

π_{0i} is the intercept, the mean final status of Performance for salesperson i.

β_{00} is the mean final status of performance of all salespeople. In other words, it is the grand mean of Performance. Given that we have centered data at the final observation period, it can be interpreted as the average final status of Performance at month 9.

π_{1i} is salesperson i's growth rate in Performance. Given that we are considering fixed effects, here it is assumed to be fixed and we are not including a random variable.

β_{10} is the mean growth rate of performance of all salespeople. In other words, it is the average rate of change for Performance across all salespeople over their first 9 months.

In general, these models describe the individual salesperson intercepts and slopes as a function of their mean intercepts and slopes. An alternative for a sequential development of the methodology could have been to include a random effect r_{0i} (the salespeople deviation from the mean final status β_{00}) at Level 2 (that is, $\pi_{0i} = \beta_{00} + r_{0i}$ for Equation 4a) as we have done in 5.2.2.b STEP 2 b, but we are not including it for space considerations. As we will see when comparing it with the results of the Unconditional Linear Growth Model with Random Effects, it will not affect the final conclusions.

Table 5.2.3 Results for Unconditional Linear Growth Models with Fixed Effects

Unconditional linear growth model (fixed eff)	Para-meter	Model 2a: Sales		Model 2b: Units		Model 2c: Compensation	
Fixed effect		Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)
Average final status (intercept)	π 0i	10,442.08 *	344.37	13.84 *	0.57	2,222.40 *	61.57
Average linear rate of change (slope)	π 1i	-667.76 *	487.00	-1.21 *	0.80	-160.44 *	87.07
Random effects		Variance	(S.D.)	Variance	(S.D.)	Variance	(S.D.)
Level 1 Temporal variation (within salesp variation of Perf. over time)	e ti	27,275,319 *	899,240	74.48 *	2.45	871,899 *	28,746
Goodness of fit			Par		Par		Par
Deviance		36,725.24	9	13,153.08	9	30,390.00	9

N= 1,840 observations, nested within 230 salespeople

* p<.001 ** p<.05

For space considerations we will compare results from Table 5.2.3 with the ones we got from the Unconditional Null model (Table 5.2.2) after we show the model with Random Effects in next section.

5.2.3.2 STEP 2 b: Unconditional linear growth model with random effects

As one can see in section 5.1, it would be unlikely that the final levels of Performance did not vary between salespeople or that the linear growth slopes for Performance were parallel (i. e., fixed) over time. Hence, we will add random effects to the unconditional growth model to determine if the variance in final status between salespeople and the variance in slopes between salespeople are significant. The difference with Equations 3 and 4 is that now we allow the TIME effect to vary randomly at Level 2

by adding a residual r i to Equations 4a and 4b so that the final level and the linear trend for the slope coefficient can vary randomly between salespeople:

Level 1 $\text{Performance}_{ti} = \pi_{0i} + \pi_{1i}(\text{TIME}_{ti}) + e_{ti}$ (5 = 3)

Level 2 $\pi_{0i} = \beta_{00} + r_{0i}$ (6 a)

$\pi_{1i} = \beta_{10} + r_{1i}$ (6 b)

Where, as said, we have added two modifications as compared to the fixed effects model:

r_{0i} is the salespeople deviation from the mean final status β_{00}. It is the random salesperson effect. As we already mentioned, it represents the deviation from the mean β_{00} for salesperson i

r_{1i} allows the linear trend for the slope coefficient of the TIME effect to vary randomly between salespeople at Level 2

Now, we have to determine whether the Unconditional Linear Growth Models with Random Effects are a better fit to the data than the Unconditional Linear Growth Models with Fixed effects or than the Unconditional Null Models. If we compare the deviance statistics for all these models (Tables 5.2.2, 5.2.3 and 5.2.4), we can see that the Unconditional Linear Growth Models with Random intercepts and random slopes are the best ones for all measures of Performance. As an example for Sales Performance, the Deviance Statistic for this model (36,552.18) is lower than for the other ones (36,648.71 and 36,725.24), showing that the model fit is improving; that is, the lower the value, the better the model fit.

Table 5.2.4 Results for Unconditional Linear Growth Models with Random Effects

Unconditional linear growth model + random	Para-meter	Model 3a: Sales		Model 3b: Units		Model 3c: Compensation	
Fixed effect		Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)
Average final status (intercept)	π 0i	10,253.44 *	301.95	13.88 *	0.62	2,206.33 *	64.73
Average linear rate of change (slope)	π 1i	387.96 *	52.71	0.76 *	0.11	118.21*	10.30
Random effects		Variance	(S.D.)	Variance	(S.D.)	Variance	(S.D.)
Level 1 Temporal variation (within salesp variation of Perf. over time)	e ti	21,376,243 *	813,779	50.40 *	1.92	584,839 *	22,082
Level 2 Between salesperson variation in final status (intercept)	r 0i	12,064,286 *	1,984,739	66.12 *	8.10	720,088 *	89,558
Between salesperson linear change rate (slope)	r 1i	129,998 **	62,654	1.55 *	0.26	10,470 *	2,405
Goodness of fit			Par.		Par.		Par.
Deviance		36,552.18	6	12,828.18	6	30,005.56	6

N= 1,840 observations, nested within 230 salespeople

* p<.001 ** p<.05 Par. = Number of parameters

e_{ti} is significant for all Performance measures, showing that there is a variation of new salespeople objective performance over time, **supporting Hypothesis 2a**.

Given that β_{10} is significant (p<.001) and positive for all Performance measures, we can affirm that new salespeople objective performance follows a linear increasing trajectory over time, **supporting Hypothesis 2b**. Results in Table 5.2.4 show that, for example, the average Sales Performance (model 3a) for all new salespeople at month 9

were 10,253.44 € and that, over the initial months, the average rate of change or growth in sales performance was 387.96 €.

The model also shows that r_{0i} is significant ($p<.001$) for all Performance measures, showing that new salespeople will differ significantly in their final objective performance levels, **supporting Hypothesis 3b**. In other words, it shows that there is significant variation in the average final level of Performance between salespeople.

We can also observe that r_{1i} is significant for all Performance measures ($p<.05$ for Sales, and $p<.001$ for Units and Compensation), showing that new salespeople will differ significantly in their objective performance growth rates over time, **supporting Hypothesis 3a**. In other words, it shows that there is significant variation in the linear change rates of Performance between salespeople. Even though it has already been mentioned it, it is worth to note that all these results are consistent for all three measures of performance (Sales, Units and Compensation).

5.2.4 STEP 3: Determining the function of time

Now, we will compare the linear trend -already found to be significant- to quadratic and cubic curves to determine which is the correct estimate for the function of time. We will use it to test Hypothesis 2c. First, we will test a model with just a quadratic term and then another model with the quadratic and cubic terms, assessing improvements in model fit and trade-offs regarding model parsimony vs. complexity. All new models will retain parameters that allow the intercept and slopes to vary (that is, the random effects), given that both terms were significant.

Below, we show an equation with the most "complex" model, including both the quadratic and cubic terms:

Level 1

$$\text{Performance}_{ti} = \pi_{0i} + \pi_{1i}(\text{TIME}_{ti}) + \pi_{2i}(\text{TIME}^2_{ti}) + \pi_{3i}(\text{TIME}^3_{ti}) + e_{ti} \quad (7)$$

Level 2

$$\pi_{0i} = \beta_{00} + r_{0i} \quad (8\text{ a} = 6\text{ a})$$

$$\pi_{1i} = \beta_{10} + r_{1i} \quad (8\text{ b} = 6\text{ b})$$

$$\pi_{2i} = \beta_{20} + r_{2i} \quad (8\text{ c})$$

$$\pi_{3i} = \beta_{30} + r_{3i} \quad (8\text{ d})$$

Where:

π_{0i} is the final level of performance for salesperson i at time 0

π_{1i} shows the initial rate of growth, that is, the instantaneous growth rate for salesperson i at time t

π_{2i} shows the curvature or acceleration (or deceleration) in each growth trajectory

π_{3i} shows the change in the rate of change; helps distinguish if, in the case that a quadratic model is significant, the acceleration (or deceleration) in the growth trajectories persists or if there may in fact be another inflection point where the trend reverses (Singer & Willett, 2003)

β_{00} is the mean final status of performance of all salespeople

r_{0i} is the deviation from this mean final status

β_{10} is the mean initial growth rate of performance of all salespeople. In other words, it is the average initial rate of change for Performance across all salespeople

r_{1i} allows the linear trend for the slope coefficient of the TIME effect to vary randomly between salespeople at Level 2

β_{20} is the mean curvature of the growth rate of performance of all salespeople

r_{2i} allows the quadratic trend for the slope coefficient of the $TIME^2$ effect to vary randomly between salespeople at Level 2

β_{30} is the mean acceleration (or deceleration) of the curvature of the growth rate of performance of all salespeople

r_{3i} allows the cubic trend for the slope coefficient of the $TIME^3$ effect to vary randomly between salespeople at Level 2

Table 5.2.5 Results for Unconditional Quadratic Growth Models with Random Effects

Unconditional quadratic growth model + random ef.	Para-meter	Model 4a: Sales		Model 4b: Units		Model 4c: Compensation	
Fixed effect		Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)
Average final status (intercept)	β 00	10,378.81*	333.32	13.78 *	0.67	2,218.17 *	75.02
Average linear rate of change (slope)	β 10	513,33 **	165.96	0.66 **	0.28	130.05 *	32.25
Average quadratic rate of change (slope)	β 20	17,91 (n s)	45.85	- 0.01 (n s)	0.06	1.69 (n s)	4.07
Random effects		Variance	(S.D.)	Variance	(S.D.)	Variance	(S.D.)
Level 1 Temporal variation (within salesp variation of Perf. over time)	e ti	19,569,121*	686,264	49.56 *	2.03	581,386 *	24,226
Level 2 Between salesperson variation in final status (intercept)	r 0i	11,691,958*	2,114,770	68.06 *	9.33	882,544 *	121,877
Between salesperson linear change rate (slope)	r 1i	161,508 a	a	2.22 (n s)	2.06	55,808 **	23,596
Between salesperson quadratic change rate (slope)	r 2i	367,065 a	a	0.45 a	a	348 (n s)	393
Goodness of fit			Par.		Par.		Par.
Deviance		37,303.472	10	13,472.121	10	30,008.705	10

N= 1,840 observations, nested within 230 salespeople

* p<.001 ** p<.05 (n s) Non significant Par.= Number of parameters

a This covariance parameter is redundant. The test statistic and confidence interval cannot be computed.

The alternative models (Quadratic and Cubic) are tested step-wise. Table 5.2.5 shows the results for the Unconditional Quadratic Growth Model with Random Effects. The new models introduce both fixed and random quadratic growth parameters. The difference in deviance statistics from the previous models (Models 3a, 3b, 3c in Table

5.2.4) suggest that they do not improve the fit (for example, for Sales, 36,552.18 - 37,303.472 = -751,29, at 4 degrees of freedom). Additionally, it is interesting to note that the fixed effect (average quadratic rate of change) is not significant for all models (β_{20}, $p>0.1$), suggesting that the average value of the quadratic growth rates between salespeople is indistinguishable from zero. Despite it seems that we should not keep the Quadratic growth model, we can see that the model failed to compute the variance components associated with the quadratic growth curve models for Sales and Units (and it was not significant (r_{2i}, $p>0.1$) for Compensation). Following Mazutis (2011), we decided to make a further analysis, removing the random effects from the quadratic rate of change at Level 2; that is, using a fixed effects Quadratic model.

Table 5.2.6 shows the results for the Unconditional Quadratic Growth Model with Fixed Effects. The linear rate of change in Performance over time remains significant in all models (e_{ti}, $p<0.001$). It is interesting to note that while the deviance statistics are slightly lower in this Model when compared to the Unconditional Linear Growth model with Random Effects (see models 3a, 3b, 3c in Table 5.2.4), what shows that it is a better suited model, we can see that the Quadratic Terms are not significant (β_{20}, $p>0.1$). This pattern is repeated when considering Sales, Units or Compensation as outcomes.

Table 5.2.6 Results for Unconditional Quadratic Growth Models with Fixed Effects

Unconditional quadratic growth model + fixed ef.	Para-meter	Model 5a: Sales		Model 5b: Units		Model 5c: Compensation	
Fixed effect		Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)
Average final status (intercept)	β 00	10,378.81*	343.91	13.78 *	0.67	2,218,17 *	70,23
Average linear rate of change (slope)	β 10	513,33 **	172.84	0.66 **	0.28	130,05 *	29,11
Average quadratic rate of change (slope)	β 20	17,91 (n s)	23.52	0.01 (n s)	0.04	1,69 (n s)	3,89
Random effects		Variance	(S.D.)	Variance	(S.D.)	Variance	(S.D.)
Level 1 Temporal variation (within salesp variation of Perf. over time)	e ti	21,367,261 *	813,437	50.39 *	1.92	584,764 *	22,080
Level 2 Between salesperson variation in final status (intercept)	r 0i	12,068,029*	1,984,715	66.12 *	8.16	720,127 *	89,559
Between salesperson linear change rate (slope)	r 1i	130,212 **	62,651	1.55 *	0.26	10,471,72*	2,406
Goodness of fit			Par.		Par.		Par.
Deviance		36,551.601	7	12,828.016	7	30,005.370	7

N= 1,840 observations, nested within 230 salespeople

* p<.001 ** p<.05 (n s) Non significant Par. = Number of parameters

To identify which is the best Model to be chosen, in Table 5.2.7 we can see the comparison of the Deviance statistics considering various covariance structures (as we mentioned before, in the previous steps we also examined results from other covariance structures, but just showed the -2Log Likelihood results, for space considerations). In it, we can appreciate a common pattern: while statistics for the Linear Model are clearly lower than for the Unconditional Model in all situations, it is not the case when

comparing the Quadratic and Linear Models. As showed when comparing Table 5.2.4 with Table 5.2.6, if we consider the -2Log Likelihood criterion, the Quadratic model gets slightly lower results than the Linear one for Sales (-0.58) and almost equal results -yet still smaller- for Units (-0.164) and Compensation (-0.193). When comparing all other criterion, the Linear model is smaller -that is, preferred- than the Quadratic one.

Table 5.2.7 Comparison of Deviance Statistics for unconditional, linear and quadratic Models

UNCONDITIONED	SALES	UNITS	COMPENS.
-2 Log Likelihood	36648,718	13090,676	30345,365
Akaike's Information Criterion (AIC)	36654,718	13096,676	30351,365
Hurvich and Tsai's Criterion (AICC)	36654,731	13096,689	30351,378
Bozdogan's Criterion (CAIC)	36674,271	13116,229	30370,917
Schwarz's Bayesian Criterion (BIC)	36671,271	13113,229	30367,917

LINEAR	SALES	UNITS	COMPENS.
-2 Log Likelihood	36552,181	12828,181	30005,564
Akaike's Information Criterion (AIC)	36564,181	12840,181	30017,564
Hurvich and Tsai's Criterion (AICC)	36564,227	12840,226	30017,610
Bozdogan's Criterion (CAIC)	36603,286	12879,286	30056,669
Schwarz's Bayesian Criterion (BIC)	36597,286	12873,286	30050,669

QUADRATIC	SALES	UNITS	COMPENS.
-2 Log Likelihood	36551,601	12828,017	30005,371
Akaike's Information Criterion (AIC)	36565,601	12842,017	30019,371
Hurvich and Tsai's Criterion (AICC)	36565,662	12842,078	30019,432
Bozdogan's Criterion (CAIC)	36611,224	12887,639	30064,994
Schwarz's Bayesian Criterion (BIC)	36604,224	12880,639	30057,994

As a final conclusion, we will not choose the Quadratic Models considering (a) that the deviance statistics are clearly smaller for all criteria but one in the Linear models, (b) that the quadratic terms are not significant in the Quadratic Model, and (c) due that where Quadratic Models have a smaller deviance statistic the difference is so small that the increase in the complexity of the model (i. e., parsimony criteria) would not justify to accept the model with additional terms.

Even though when a previous term in a polynomial curve is rejected it is not frequent that a higher order term were accepted, we have conducted similar analyses when considering the Cubic term. All Deviance Statistics increased and the cubic terms were not significant. For space considerations, we have not included these results.

Hence, in the subsequent models we will use a linear function of time and random effects at all levels, what leads us to conclude that **hypothesis 2c is not supported**.

5.2.5 Step 4: Estimating the error structure

Up to now, we have assumed that the Level 1 residuals (e_{ti}) are independent, have a mean of zero and a constant variance for all occasions (Heck, Thomas & Tabata, 2010), but it is not the case in all longitudinal samples. Although assuming “incorrectly" a certain error structure does not bias fixed effects estimates in many cases (Peugh & Enders, 2005), it may impact the significance of random effects, especially in longitudinal research. Hence, we will test different Level 1 covariate structures which may theoretically better fit the data, testing various different error covariance structures (Bliese & Ployhart, 2002; Singer & Willett, 2003).

Table 5.2.8 Comparison of Deviance Statistics with different covariance structures for various Models (Sales, Units, Compensation)

SALES	UN	CS	AR1	VC	DIAG
-2 Log Likelihood	36552.181	36761.193	36686.735	36584.398	36584.398
Akaike's Information Criterion (AIC)	36564.181	36771.193	36696.735	36594.398	36594.398
Hurvich and Tsai's Criterion (AICC)	36564.227	36771.225	36696.768	36594.431	36594.431
Bozdogan's Criterion (CAIC)	36603.286	36803.780	36729.323	36626.986	36626.986
Schwarz's Bayesian Criterion (BIC)	36597.286	36798.780	36724.323	36621.986	36621.986
UNITS	UN	CS	AR1	VC	DIAG
-2 Log Likelihood	12828.181	13205.218	13143.194	12998.929	12998.929
Akaike's Information Criterion (AIC)	12840.181	13215.218	13153.194	13008.929	13008.929
Hurvich and Tsai's Criterion (AICC)	12840.226	13215.251	13153.227	13008.961	13008.961
Bozdogan's Criterion (CAIC)	12879.286	13247.806	13185.782	13041.516	13041.516
Schwarz's Bayesian Criterion (BIC)	12873.286	13242.806	13180.782	13036.516	13036.516
COMPENSATION	UN	CS	AR1	VC	DIAG
-2 Log Likelihood	30005.564	30428.638	30360.673	30149.484	30149.484
Akaike's Information Criterion (AIC)	30017.564	30438.638	30370.673	30159.484	30159.484
Hurvich and Tsai's Criterion (AICC)	30017.610	30438.671	30370.706	30159.517	30159.517
Bozdogan's Criterion (CAIC)	30056.669	30471.226	30403.261	30192.072	30192.072
Schwarz's Bayesian Criterion (BIC)	30050.669	30466.226	30398.261	30187.072	30187.072

Where covariance structures are:

UN unstructured

CS compound symmetric, heterogeneous compound symmetric

AR1 first order autoregressive (AR1), heterogeneous autoregressive and Toeplitz.

VC variance components

DIAG heterogeneous variances and 0 covariances

The analyzed information criteria to evaluate the models are: -2 log likelihood, Akaike's information criterion (AIC), Hurvich and Tsai's criterion (AICC), Bozdogan's criterion (CAIC), and Schwarz's Bayesian Criterion (BIC). As mentioned, it is important to note that in this document we only show the "-2 log likelihood" results for space considerations, but all these critera are taken into consideration step by step. Unless specifically mentioned, they all yield the same conclusions.

As we can see in Table 5.2.7, the Unstructured (UN) covariance structure provides the smaller deviance statistics in all cases, indicating a better fit. Additionally, the parsimony criteria would suggest to use the alternative that imposes a "lower" artificial structure on data, which is the case with UN. In other words, modeling other within-person error structures does not improve our models.

It is worth to note that one of the error structures, the first order autoregressive error structure (AR1), is theoretically the most likely error structure to occur in longitudinal studies (e. g., Hausknecht et al., 2008) and allows residuals within firms to be correlated from occasion to occasion, but with diminishing correlations over time. If it had been chosen -or even were close to the best fit-, it could have had other interesting methodological implications, like using an Autoregressive Latent Trajectory model -or including as predictors t-1 values (Zyphur, Chaturvedi & Arvey, 2008), but it is not the case.

Hence, we will employ an unrestricted error matrix in the remaining analyses (for further details, see Bliese and Ployhart 2002; Raudenbush and Bryk 2002).

5.2.6 Step 5: Conditional model -adding at Level 2 time-invariant predictor variables

The findings up to now (referred to Hypotheses 1 to 3) show clearly the advantages of longitudinal approaches over cross-sectional designs. The significant variance component parameters suggest that a non-trivial amount of variance is still to be explained in all models (Bliesse & Ployhart, 2002). Next steps in the methodology allow for hypotheses testing regarding why salespeople vary in terms of their intercept values (final levels of Performance) and why they have different slopes (Performance growth rates), by adding predictor variables to the baseline equations (5, 6a, 6b) already established in the Unconditional Linear Growth Models with Random Effects (Models 3a, 3b, 3c).

To guarantee a detailed analysis and understanding of the results, we will perform four analyses step-wise: adding at Level 2 time-invariant socio-demographic predictors (Section 5.2.6.1), adding at Level 2 time-invariant performance predictors measured with the same indicator as the dependent variable (Section 5.2.6.2), and adding at Level 2 time-invariant performance predictors measured also with a different indicator than the dependent variable (Section 5.2.6.3). Finally, with a different approach, we will add to Level 1 time-varying performance predictors (Section 5.2.7).

5.2.6.1 Conditional model - adding at Level 2 time-invariant socio-demographic predictor variables

As described previously, we will use a set of socio-demographic control variables. Before adding them to the models when testing Hypotheses 4, 5 and 6, we want to analyze them independently. This will allow us to compare these results with the ones obtained when testing the hypotheses with the "more sophisticated" models and, hence guarantee a better understanding of the conclusions.

Entering the Socio-Demographic variables at Level 2 will answer questions regarding inter-salesperson differences in Performance that are attributable to these socio-demographic characteristics (e. g., "women have higher growth rates and higher final levels of performance than men"). Since they are time-invariant (that is, their values do not change over the observation period), these variables are modeled at Level 2, as predictors of between-salespeople differences in final levels (π 0i) and growth rates (π 1i) of Performance over time. The models for the hypotheses testing then become:

Level 1 $$\text{Performance}_{ti} = \pi_{0i} + \pi_{1i}(\text{TIME}_{ti}) + e_{ti} \qquad (9 = 5 = 3)$$

Level 2 $$\pi_{0i} = \beta_{00} + \beta_{01}(\text{Gender}_i) + \beta_{02}(\text{Age}_i) + \beta_{03}(\text{Education}_i) + \beta_{04}(\text{Experience}_i) + \beta_{05}(\text{Sales Experience}_i) + \beta_{06}(\text{Recruiting}_i) + r_{0i} \qquad (10\text{ a})$$

$$\pi_{1i} = \beta_{10} + \beta_{11}(\text{Gender}_i) + \beta_{12}(\text{Age i}) + \beta_{13}(\text{Education}_i) + \beta_{14}(\text{Experience}_i) + \beta_{15}(\text{Sales Experience}_i) + \beta_{16}(\text{Recruiting}_i) + r_{1i} \qquad (10\text{ b})$$

Where:

π_{0i} , the intercept, can now be interpreted as the expected Performance outcome for an "average" salesperson at the mean of all predictor variables (Raudenbush & Bryk, 2002). In other words, this intercept represents the mean Performance across time for salesperson i, which is simultaneously modeled as the outcome in equation 10a adjusted for the stable effects of salesperson socio-demographic characteristics expected to explain between-salesperson variance (Misangyi et. al., 2006).

π_{1i} , the linear slope, is also simultaneously modeled as the outcome in equation 10b as predicted by salesperson characteristics

β_{01} (Gender $_i$) - included to identify whether the final level of performance varies as a function of salesperson Gender (male / female)

β_{11} (Gender i) - included to identify whether the performance growth rate varies as a function of salesperson Gender (male / female)

β_{02} (Age $_i$), β 12 (Age $_i$) - included to identify whether the final level and the growth rate of salesperson performance vary, respectively, as a function of Age (continuous values)

β_{03} (Education $_i$), β_{13} (Education $_i$) - included to identify whether the final level and the growth rate of performance vary, respectively, as a function of the salesperson Education level (basic / medium / high)

β_{04} (Experience $_i$), β_{14} (Experience $_i$) - included to identify whether the final level and the growth rate of performance vary, respectively, as a function of the salesperson having previous Experience (yes / no)

β_{05} (Sales Experience i), β_{15} (Sales Experience $_i$) - included to identify whether the final level and the growth rate of performance vary, respectively, as a function of the salesperson having previous Sales Experience (yes / no)

β_{06} (Recruiting $_i$), β_{16} (Recruiting $_i$) - included to identify whether the final level and the growth rate of performance vary, respectively, as a function of the recruiting channel for the salesperson (press / internet / referrals)

Because the hypotheses testing proceeds in a stepwise sequence (including the predictors to the baseline equations and testing for the changes in variance components using pseudo R^2 statistics and changes in overall model fit using the comparison of the deviance statistics), we will not show results for the three different types of Performance outcomes (Sales / Units / Compensation) in the same table as we have done up to now. From now and on, we will show the effects of the predictor variables in a separate Table for each dependent variable.

We started obtaining the results for the abovementioned model (Equations 9, 10a, 10b) and, after it, we run various alternative models to confirm the consistency of the results. While all these models are not reported here for space considerations, in Table 5.2.9 we can find the results for three different models referred to Sales Performance:

a) Conditional Linear Growth Model with Random Effects and Socio-Demographic predictors at Level 2 for Intercept and slope (Model 6a)

b) Conditional Linear Growth Models with Random Effects and Socio-Demographic predictors at Level 2 for Intercepts -that is, like the previous model (Model 5a), without the time interaction (Model 6b)

c) Conditional Linear Growth Models with Random Effects and Socio-Demographic predictors at Level 2 for Intercept and slope, just considering the significant terms in Model 6a (Model 6c)

In tables 5.2.10 and 5.2.11 we can see the equivalent results for Units and Compensation, respectively. Models 6a, 7a and 8a have the lower Deviance statistics when compared either to models 3a, 3b and 3c, or to other models with just some Socio-Demographic predictors; hence, they are the models with a better fit. One clear conclusion emerges from the analysis of the results: the only socio-demographic predictor that is significant both to predict the intercept and the slope is "gender" for all three measures of performance. Since its sign is negative, it means that women reach higher final levels of performance (at month 9) and have higher growth rates than men. Results are consistent for the three measures of performance. We just want to note that "age" is also significant in two situations: when performance is measured with Sales (β = -23,49, $p < .1$), what implies that younger salespeople have a higher growth rate, and when measured with Units (β = -3,90, $p < .05$), what implies that younger salespeople have a higher final level of performance In both cases, with higher "p" and lower proportional effects (β) than "gender".

TABLE 5.2.9 Results for Conditional Linear Growth Models with Random Effects and Socio-Demographic predictors at Level 2, for Sales Performance

Condit. linear growth model with random ef. & SD preds. for Sales	Para-me-ter	Model 6a: all SD predictors for intercept and slope		Model 6b: all SD predictors just for intercept		Model 6c: just signif. SD predictors in model 6a for int. and slope	
Fixed effect		Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)
For intercept (final status π 0i)							
Avrage final status (int)	β 00	13,697.55 *	2,736.32	12,269.74 *	1,612	12,900.3*	1,952
Gender	β 01	-1,870.80 **	867.81	-299.15 (n s)	52.71	1,724.87**	852
Age	β 02	-111.50 (n s)	79.58	-1.15 (n s)	46,33	-93,77 (ns)	75.59
Education	β 03	-545.61(n s)	969.58	-762.59 (n s)	433,88		
Experience	β 04	310.37 (n s)	1,502.40	800.51 (n s)	874.77		
Sales experience	β 05	-331.53 (n s)	653.36	-154.46 (n s)	380.42		
Recruiting	β 06	564.26 (n s)	1,196.27	-649.91 (n s)	737.8		
For average linear rate of change (π 1i)							
Avg. rate change(slope)	β 10	691.86 (n s)	474,78	387,96 *	52,70	524.75(ns)	371
Gender	β 11	-334,51 **	150,57			334.37 **	148
Age	β 12	-23,49 ***	13,81			-16.54 (ns)	13.16
Education	β 13	182,43 (n s)	129,30				
Experience	β 14	-104,32 (n s)	260,68				
Sales experience	β 15	-37,69 (n s)	113,36				
Recruiting	β 16	240,70 (n s)	207,57				
Random effects		Variance	(S.D.)	Variance	(S.D.)	Variance	(S.D.)
Level 1 Temporal variation (within salesp variation of Perf. over time)	e ti	21,294,852*	807,600	21,376,243 *	813,779	21,376,243 *	813,779
Level 2 Between salesp. var. in final status (intercept)	r 0i	11,420,885 *	1,917,802	12,077,376 *	2,006,14	11,530,80 *	1,935,7
Between salesp. linear change rate (slope)	r 1i	103,941 ***	60,232	129,998 **	62,654	110,94 ***	60,966
Goodness of fit			Par.		Par.		Par.
Deviance		36,535.94	22	36,546.67	14	36,544.94	10

N= 1,840 observations, nested within 230 salespeople Par. = Number of parameters

* p<.001 ** p<.05 *** p<.1 (n s) Non significant

TABLE 5.2.10 Results for Conditional Linear Growth Models with Random Effects and Socio-Demographic predictors at Level 2, for Units Performance

Condit. linear growth model with random ef. & SD preds. for Units	Para-me-ter	Model 7a: all SD predictors for intercept and slope		Model 7b: all SD predictors just for intercept		Model 7c: just signif. SD predictors in model 7a for int. and slope	
Fixed effect		Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)
For intercept (final status π 0i)							
Avrage final status (int)	β 00	20.16 *	5.58	16.12 *	2.41	14.41 *	0.66
Gender	β 01	-3.90 **	1.77	-0.76 (n s)	0.74	-3.73 **	1.74
Age	β 02	-0.17 (n s)	0.16	0.03 (n s)	0.07		
Education	β 03	-1.70 (n s)	1.98	-1.04 (n s)	0.83		
Experience	β 04	2.46 (n s)	3.07	0.60 (n s)	1.29		
Sales experience	β 05	-0.52 (n s)	1.33	-0.64 (n s)	0.56		
Recruiting	β 06	0.51 (n s)	2.44	-1.14 (n s)	1.02		
For average linear rate of change (π 1i)							
Average linear rate of change (slope)	β 10	1.55 (n s)	0.99	0.76 *	0.11	0.24 (ns)	0.29
Gender	β 11	-0.61 ***	0.31			0.62 **	0.31
Age	β 12	-0.04 (n s)	0.03				
Education	β 13	-0.13 (n s)	0.35				
Experience	β 14	0.36 (n s)	0.54				
Sales experience	β 15	0.02 (n s)	0.24				
Recruiting	β 16	0.33 (n s)	0.43				
Random effects		Variance	(S.D.)	Variance	(S.D.)	Variance	(S.D.)
Level 1 Temporal variation (within salesp variation of Perf. over time)	e ti	50,40 *	1.92	50,40 *	1.92	50,40 *	1.92
Level 2 Between sal. variation in final status (interc.)	r 0i	63.53 *	7.92	65.71 *	8.16	64.41 *	8.00
Between salesp. linear change rate (slope)	r 1i	1.47 *	0.25	1.55 *	0.26	1.51 *	0.26
Goodness of fit			Par.		Par.		Par.
Deviance		12,815.83	22	12,822.91	14	12,823.60	8

N= 1,840 observations, nested within 230 salespeople Par. = Number of parameters

* p<.001 ** p<.05 *** p<.1 (n s) Non significant

TABLE 5.2.11 Results for Conditional Linear Growth Models with Random Effects and Socio-Demographic predictors at Level 2, for Compensation Performance

Condit. linear growth model with random ef. & SD preds. for Comp	Para-me-ter	Model 8a: all SD predictors for intercept and slope		Model 8b: all SD predictors just for intercept		Model 8c: just signif. SD predictors in model 8a for int. and slope	
Fixed effect		Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)
For intercept (final status π 0i)							
Avrge. final status (int)	β 00	2,911.81 *	588.58	2,535.44 *	283.08	2,259.66 *	69.33
Gender	β 01	-379.44 **	186.66	-62.36 (n s)	87.94	-371.74 **	183.03
Age	β 02	-20.26 (n s)	17.12	1.37 (n s)	8.06		
Education	β 03	-118.98 (n s)	140.54	-117.84 (n s)	98.25		
Experience	β 04	-20.29 (n s)	323.16	85.61 (n s)	152.24		
Sales experience	β 05	-98.79 (n s)	140.54	-37.24 (n s)	66.21		
Recruiting	β 06	93.98 (n s)	257.32	-95.66 (n s)	121.22		
For average linear rate of change (π 1i)							
Average linear rate of change (slope)	β 10	186.17 **	93.75	118.21 *	10.30	66.20 **	26.95
Gender	β 11	-57.25 ***	29.73			60.73 **	29.12
Age	β 12	-3.91 (n s)	2.73				
Education	β 13	-0.21 (n s)	33.22				
Experience	β 14	-19.12 (n s)	51.48				
Sales experience	β 15	-11.11 (n s)	22.39				
Recruiting	β 16	34.24 (n s)	40.99				
Random effects		Variance	(S.D.)	Variance	(S.D.)	Variance	(S.D.)
Level 1 Temporal variation (within salesp variation of Perf. over time)	e ti	585,256 *	22,114	585,411 *	22,125	584,766 *	22,077
Level 2 Between sal. variation in final status (interc.)	r 0i	695,078 *	87,350	712,627 *	88,922	703,224 *	87,999
Between salesp. linear change rate (slope)	r 1i	9,889 *	2,381	10,452 *	2,410	10,052 *	2,371
Goodness of fit			Par.		Par.		Par.
Deviance		29,992.97	22	29,999.937	14	30,001.28	8

N= 1,840 observations, nested within 230 salespeople Par. = Number of parameters

* p<.001 ** p<.05 *** p<.1 (n s) Non significant

5.2.6.2 Conditional model - Adding to Level 2 time-invariant performance predictors measured with the same indicator as the dependent variable

To test hypotheses 4a and 4b we will add to the baseline equations (9, 10a, 10b) defined in the Unconditional Linear Growth Models with Random Effects and Socio-Demographic predictors (Models 6a, 7a, 8a), some predictor variables referred to initial levels of performance (described in section 4.2.3). Since they are time-invariant (their values do not change over the observation period), these variables are modeled at Level 2, as predictors of between-salespeople differences in final levels (π_{0i}) and growth rates (π_{1i}) of performance over time. We have followed a stepwise / hierarchical process adding progressively the predictor variables and the control variables. Considering the most complex notation, the equations would be defined as follows:

Level 1 $\text{Performance}_{ti} = \pi_{0i} + \pi_{1i}(\text{TIME}_{ti}) + e_{ti}$ (11 =9 =5 =3)

Level 2 $\pi_{0i} = \beta_{00} + \beta_{01}$ (AVG m2-m4 i) + β_{02} (AVG m3-m5 i)

+ β_{03} (AVG m4-m6 i) + β_{04} (AVG m5-m7 i)

+ β_{05} (AVG m6-m8 i) + β_{06} (INCR m2-m4 i)

+ β_{07} (INCR m3-m5 i) + β_{08} (INCR m4-m6 i)

+ β_{09} (INCR m5-m7 i) + $\beta_{0,10}$ (INCR m6-m8 i)

+ $\beta_{0,11}$ (Gender i) + $\beta_{0,12}$ (Age i) + $\beta_{0,13}$ (Education i)

+ $\beta_{0,14}$ (Experience i) + $\beta_{0,15}$ (Sales Experience i)

+ $\beta_{0,16}$ (Recruiting i) + r_{0i} (12 a)

$\pi_{1i} = \beta_{10} + \beta_{11}$ (AVG m2-m4 i) + β_{12} (AVG m3-m5 i)

+ β_{13} (AVG m4-m6 i) + β_{14} (AVG m5-m7 i)

+ β_{15} (AVG m6-m8 i) + β_{16} (INCR m2-m4 i)

+ β_{17} (INCR m3-m5 i) + β_{18} (INCR m4-m6 i)

+ β_{19} (INCR m5-m7 i) + $\beta_{1,10}$ (INCR m6-m8 i)

+ $\beta_{1,11}$ (Gender i) + $\beta_{1,12}$ (Age i) + $\beta_{1,13}$ (Education i)

+ $\beta_{1,14}$ (Experience i) + $\beta_{1,15}$ (Sales Experience i)

+ $\beta_{1,16}$ (Recruiting i) + r_{1i} (12 b)

Where (for space considerations, we will just show a few examples. For more detailed explanations, see Section 4.2.3):

β_{01} (AVG m2-m4 i) - included to identify whether the *final level of performance* varies as a function of the value of the *Average Performance* in months 2, 3 and 4 (continuous value)

$\beta_{1,10}$ (INCR m6-m8 i) - included to identify whether the *performance growth rate* varies as a function of the value of the *Increase in Performance* from month 6 to month 8 (continuous value).

In summary, all "AVG" predictors are referred to the average performance in Euros for the considered quarters, and all "INC" predictors are referred to the % increase in performance for the considered quarters.

We can see results in Tables 5.2.12 for Sales Performance, 5.2.13 for Units Performance and 5.2.14 for Compensation Performance. We will explain in detail results from Table 5.2.12 and then analyze the overall conclusions for all Tables to validate the hypotheses. Model 9a explains 90.2 % of total variance of Sales at the final considered period (month 9), what can be considered as a high predictive value. There is statistical evidence to affirm that Average sales from months 3 to 5 and from months 6 to 8 are jointly related to performance at month 9. It starts with a negative average value of sales (-8,172 Euros) and increases depending on the average sales: 0.38 for each sales unit in months 3 to 5 and 0.73 for each unit of sales in months 6 to 8. The average for the last quarter has a 1.72 higher relative magnitude (effect as measured with β's: .747/.434 = 1.72). Detailed analyses show no signals of multicollinearity (VIF = 1.05 for both

predictors). It is interesting to note that Model 9a explains 90.2% of the variance and Model 9b, 89.9% but the former has another predictive term, Increase in sales between months 3 to 5, significant with $p<.01$. Considering the small difference in variance explained and that it is a simpler model (parsimony), we would choose model 9b for prediction purposes. Anyway, since our objective is to confirm the hypotheses rather than predict future performance, the most relevant conclusion is to consider AVG m3-m5 and AVG m6-m8 as relevant predictors of the intercept. An analogous analysis leads us to the same conclusion when analyzing the predictors of the growth rate.

Interestingly, we got consistent results whatever the way we used to measure Performance (Sales, Units or Compensation): for all models the "Average" performance from months 3 to 5 and from months 6 to 8 (the latter with a stronger weight than the former in all situations) are the significant predictors both for the final levels of performance (intercept, at month 9) and for the growth rates (slope, between months 2 and 9).

It is also worth to note that socio-demographic predictors (control variables) have no significant effect when introducing the predictor variables "AVG" and "INC" in the models. We introduced control variables in the models in several ways stepwise (e. g., all control variables, just gender, just age, just gender and age,….), but no one was significant.

We can conclude that we found no clear evidence that initial levels of performance are related to the final level of performance or to the growth trajectory. These results **support Hypothesis 4a** (*"Initial levels of objective performance of new*

salespeople are not related to objective performance growth rates during their first months at the company"), since just results from two quarters are significantly related to the growth rate. The same reasoning can be used to **support Hypothesis 4b** (*"Initial levels of objective performance of new salespeople are not related to their objective performance level after a few months at the company").*

TABLE 5.2.12 Results for Conditional Linear Growth Models with Random Effects, adding to Level 2 time invariant performance predictors (measured with the same indicator as the dependent variable) and Socio-Demographic predictors, for Sales Performance

Condit. linear growth model with random effects and performance (same indicator) and socio-dem. predictor for Sales	Para-meter	Model 9a: significant predictors for intercept and slope (best model)		Model 9b: significant predictors for intercept and slope (second best)	
Fixed effect		Coeff.	(S.E.)	Coeff.	(S.E.)
For intercept (final status π 0i)					
Average final status (int)	β 00	-8,172.82 *	198.679	-8,076.47 *	196.556
AVG m3-m5 i	β 02	.38 *	.019	.38 *	.019
AVG m6-m8 i	β 05	.73 *	.015	.52 *	.015
INC m3-m5 i	β 07	.52**	.223		
For average linear rate of change (π 1i)					
Average linear rate of change (slope)	β 10	-771.08 *	21.111	-760.75 *	20.948
AVG m3-m5 i	β 12	.03 *	.002	.03 *	.002
AVG m6-m8 i	β 15	.05 *	.002	.05 *	.002
INC m3-m5 i	β 17	.08 *	.024		
% of variance explained - intercept	R^2	90.2 %		89.8 %	
% of variance explained - slope	R^2	88.2 %		87.6 %	

* p<.001 ** p<.01 For space considerations, only significant predictors are shown

TABLE 5.2.13 Results for Conditional Linear Growth Models with Random Effects, adding to Level 2 time invariant performance predictors (measured with the same indicator as the dependent variable) and Socio-Demographic predictors, for Units Performance

Condit. linear growth model with random effects and performance (same indicator) and socio-dem. predictor for Units	Para-meter	Model 10a: significant predictors for intercept and slope (best model)		Model 10b: significant predictors for intercept and slope (second best)	
Fixed effect		Coeff.	(S.E.)	Coeff.	(S.E.)
For intercept (final status π 0i)					
Average final status (int)	β 00	-13.08 *	.491	a	a
AVG m3-m5 i	β 02	.29 *	.025		
AVG m6-m8 i	β 05	.81 *	.037		
For average linear rate of change (π 1i)					
Average linear rate of change (slope)	β 10	-1.75 *	.081	-1.57 *	.067
AVG m3-m5 i	β 12	.03 *	.006		
AVG m5-m7 i	β 14			.11***	.008
AVG m6-m8 i	β 15	.12 *	.004	.02 *	.010
% of variance explained - intercept	R^2	84.1 %		a	
% of variance explained - slope	R^2	80.2 %		79.0 %	

* p<.001 ** p<.01 *** p<.1 For space considerations, only significant predictors are shown

a Model not included since the % of intercept variable explained is significantly lower than the suggested model and, hence, it has no sense to consider another alternative

TABLE 5.2.14 Results for Conditional Linear Growth Models with Random Effects, adding to Level 2 time invariant performance predictors (measured with the same indicator as the dependent variable) and Socio-Demographic predictors, for Compensation Performance

Condit. linear growth model with random effects and performance (same indicator) and socio-dem. predictor for Compensation	Para-meter	Model 11a: significant predictors for intercept and slope (best model)		Model 11b: significant predictors for intercept and slope (second best)	
Fixed effect		Coeff.	(S.E.)	Coeff.	(S.E.)
For intercept (final status π 0i)					
Average final status (int)	β 00	-2,113.11 *	54.918	a	a
AVG m3-m5 i	β 02	.48 *	.031		
AVG m6-m8 i	β 05	.68 *	.022		
For average linear rate of change (π 1i)					
Average linear rate of change (slope)	β 10	-264.41 *	7.027	-263.93 *	7.050
AVG m3-m5 i	β 12	.06 *	.004	.06 *	.004
AVG m6-m8 i	β 15	.09 *	.003	.08 *	.003
INC m4-m6 i	β 08	-.03* *	.011		
% of variance explained - intercept	R^2	88.7 %		A	
% of variance explained - slope	R^2	88.7 %		88.3 %	

* p<.001 ** p<.01 For space considerations, only significant predictors are shown

a Model not included since the % of intercept variable explained is significantly lower than the suggested model and, hence, it has no sense to consider another alternative

5.2.6.3 Conditional model - Adding at level 2 time-invariant performance predictors measured with a different indicator than the dependent variable

To test hypotheses 5a and 5b we added to the baseline equations (11, 12a, 12b) defined in the previous section, the predictor variables consisting of measuring Performance with the other two Indicators (for example, when the Dependent Variable was Sales performance, in addition to all the quarterly "AVG" and "INC" predictors measured with Sales, we also added the "AVG" and "INC" quarterly predictors measured with Units and Compensation. Additionally, we added all control variables). Since the resulting equations included, at Level 2, 36 terms for the Intercept (π 0i) and another 36 terms for the Slope (π 1i), we have not detailed the notation for space considerations. We followed a stepwise / hierarchical process adding progressively the predictor variables and the control variables.

We can see the results summarized in Tables 5.2.15 for Sales, 5.2.16 for Units and 5.2.17 for Compensation. The main conclusions are:

- for both Intercept and Slope, and for Sales, Units and Performance, all parameters that were significant in the previous section were also included in the models that explained a higher portion of variance. There is only one exception: when performance is measured in Units, Average Units from months 3 to 5 are not significant anymore when predicting the growth rate. It is interesting to note that they are again significant in the "second best" model that was identified.

- few indicators measured with another variable appear to be significant: (a) for Sales, Increase in Compensation from months 2 to 4 is significant ($p < .001$) and has the largest

weight to predict the growth rate (β= .14); (b) for Compensation, Average Sales from months 6 to 8 is significant (p< .001) to predict the slope, but has a very low relative effect (β= .01); (c) for Units, Average compensation from months 2 to 4 (p<. 01) and Average Sales from months 4 to 6 (p< .05) are significant to predict the final level of performance, but have very low weights (β= .01). Additionally, Average Sales from Months 2 to 4 and 3 to 5, and the Increase in Compensation from months 2 to 4 are significant (p< .001) but all them with very low relative weight (β= .01).

- again, no control variables were significant in any model.

We can conclude that we found no clear evidence that initial levels of performance measured with a certain performance indicator are related to the final level of performance or to the growth trajectory, measured in a different way. These results **support Hypothesis 5a** (*"Initial levels of performance of new salespeople measured with one objective indicator are not related to performance growth rates during their first months at the company, measured with a different objective indicator"*), since just a few predictors measured with one performance measure were related to the slopes as measured with a different indicator. Since just one indicator had a strong relationship with performance measured in a different way, **Hypothesis 5b is supported** (*"Initial levels of performance of new salespeople measured with one objective indicator are not related to their performance level after a few months at the company, measured with a different objective indicator"*).

TABLE 5.2.15 Results for Conditional Linear Growth Models with Random Effects, adding to Level 2 time invariant performance predictors (measured also with a different indicator than the dependent variable - units and compensation) and Socio-Demographic predictors, for Sales Performance

Condit. linear growth model with random effects and performance (same indicator) and socio-dem. predictor for Sales	Para-meter	Model 12a: significant predictors for intercept and slope (best model)		Model 12b: significant predictors for intercept and slope (second best)	
Fixed effect		Coeff.	(S.E.)	Coeff.	(S.E.)
For intercept (final status π 0i)					
Average final status (int)	β 00	-8,076.47 *	196.556	a	a
AVG m3-m5 i sales	β 02	.38 *	.019		
AVG m6-m8 i sales	β 05	.52 *	.015		
For average linear rate of change (π 1i)					
Average linear rate of change (slope)	β 10	-770.42 *	20.348	a	a
AVG m3-m5 i sales	β 12	.03 *	.002		
AVG m6-m8 i sales	β 15	.05 *	.002		
INC m3-m5 i sales	β 17	.08 *	.023		
INC m2-m4 i compensation	β 18	14 *	.032		
% of variance explained - intercept	R^2	89.8 %		a	
% of variance explained - slope	R^2	89.2 %		a	

* p<.001 For space considerations, only significant predictors are shown

a Model not included since the % of variance it explains is significantly lower than the suggested model and, hence, it has no sense to consider another alternative

TABLE 5.2.16 Results for Conditional Linear Growth Models with Random Effects, adding to Level 2 time invariant performance predictos (measured also with a different indicator than the dependent variable - sales & compensation) and Socio-Demographic predictors, for Units Performance

Condit. linear growth model with random effects and performance (same indicator) and socio-dem. predictor for Units	Para-meter	Model 13a: significant predictors for intercept and slope (best model)		Model 13b: significant predictors for intercept and slope (second best)	
Fixed effect		Coeff.	(S.E.)	Coeff.	(S.E.)
For intercept (final status π 0i)					
Average final status (int)	β 00	-12.16 *	.700	a	a
AVG m3-m5 i units	β 02	.32 *	.054		
AVG m6-m8 i units	β 05	.79 *	.027		
AVG m2-m4 i compensation	β 06	-.01 **	.001		
AVG m4-m6 i sales	β 07	.01***	.000		
For average linear rate of change (π 1i)					
Average linear rate of change (slope)	β 10	-1.71 *	.086	-1.77 *	.076
AVG m3-m5 i units	β 12			.02 *	.006
AVG m5-m7 i units	β 14	-.03***	.011		
AVG m6-m8 i units	β 15	.14 *	.009	.12 *	.004
INC m2-m4 i compensation	β 16	.01 *	.000	.01 *	.000
AVG m2-m4 i sales	β 17	.01 *	.000		
AVG m3-m5 i sales	β 18	.01 *	.000		
% of variance explained - intercept	R^2	84.8 %		a	
% of variance explained - slope	R^2	84.8 %		82.6 %	

* p<.001 ** p<.01 *** p<.05

For space considerations, only significant predictors are shown

a Model not included since the % of variance it explains is significantly lower than the suggested model and, hence, it has no sense to consider another alternative

TABLE 5.2.17 Results for Conditional Linear Growth Models with Random Effects, adding to Level 2 time invariant performance predictos (measured also with a different indicator than the dependent variable - sales & units) and Socio-Demographic predictors, for Compensation Performance

Condit. linear growth model with random effects and performance (same indicator) and socio-dem. predictor for Compensation	Para-meter	Model 14a: significant predictors for intercept and slope (best model)		Model 14b: significant predictors for intercept and slope (second best)	
Fixed effect		Coeff.	(S.E.)	Coeff.	(S.E.)
For intercept (final status π 0i)					
Average final status (int)	β 00	-2,113.11 *	54.918	a	a
AVG m3-m5 i compensation	β 02	.48 *	.031		
AVG m6-m8 i compensation	β 05	.68 *	.022		
For average linear rate of change (π 1i)					
Average linear rate of change (slope)	β 10	-269.59 *	6.762	a	a
AVG m3-m5 i compensation	β 12	.06 *	.004		
AVG m6-m8 i compensation	β 15	.06 *	.007		
INC m4-m6 i compensation	β 16	-.03* *	.011		
AVG m6-m8 sales	β 17	.01 *	.001		
% of variance explained - intercept	R^2	88.7 %		a	
% of variance explained - slope	R^2	89.8 %		a	

* p<.001 ** p<.01 For space considerations, only significant predictors are shown

a Model not included since the % of variance it explains is significantly lower than the suggested model and, hence, it has no sense to consider another alternative

5.2.7 Step 6: Conditional model -adding at Level 1 time-varying predictor variables

Broadly speaking, up to now, we have used a similar methodology in section 5.2.6 to test Hypotheses 4 and 5, adding predictors that are time-invariant in nature to Level 2 in our model. To test Hypothesis 6, we needed to follow a different approach.

Since we had to compare the evolution over time (growth rates) of different objective measures of performance among each other, we included all the monthly observations for each performance measure at Level 1, that is, interacting with time.

The equations are as follows, considering the example of using Sales as the Dependent Variable:

Level 1

$$\text{Performance Sales}_{ti} = \pi_{0i} + \pi_{1i}(\text{TIME}_{ti}) + \pi_{2i}(\text{PerfUnits}_{ti}) + \pi_{3i}(\text{TIME}_{ti} \times \text{PerfUnits}_{ti}) + \pi_{4i}(\text{PerfComp}_{ti}) + \pi_{5i}(\text{TIME}_{ti} \times \text{PerfComp}_{ti}) + e_{ti} \quad (13)$$

Level 2

$$\pi_{0i} = \beta_{00} + r_{0i} \quad (14\text{ a})$$

$$\pi_{1i} = \beta_{10} + r_{1i} \quad (14\text{ b})$$

$$\pi_{2i} = \beta_{20} + r_{2i} \quad (14\text{ c})$$

$$\pi_{3i} = \beta_{30} + r_{3i} \quad (14\text{ d})$$

$$\pi_{4i} = \beta_{40} + r_{4i} \quad (14\text{ e})$$

$$\pi_{5i} = \beta_{50} + r_{5i} \quad (14\text{ f})$$

Where,

π_{2i} (PerfUnits $_{ti}$) - referred to Performance measured in Units for salesperson i, during the 8 considered months; in other words, it is the monthly performance (month by month); this is why it is considered as time varying and introduced at Level 1.

π_{3i} (TIME $_{ti}$ x PerfUnits $_{ti}$) - referred to the evolution of Performance measured in Units for salesperson i, for the 8 considered months; considers the interaction with time and, hence, measures the growth trajectory (slope).

π_{4i} (PerfComp $_{ti}$) - referred to Performance measured in Compensation for salesperson i, for the 8 considered months

π_{5i} (TIME $_{ti}$ x PerfComp $_{ti}$) - referred to the evolution of Performance measured in Compensation for salesperson i, for the 8 considered months; considers the interaction with time

Equations 14a to 14f: (a) we have included random errors to be consistent with the approach explained at the beginning of the development of the model; nevertheless, we have also considered models with fixed effects, as we will show in the results that appear in the following tables; (b) we have not included the predictors identified in section 5.2.6 since the hypothesis to be tested is referred specifically to the comparison of the evolution (growth rates) of performance measured in different ways, over a certain period of time.

As we have done in the previous sections, we conducted a stepwise / hierarchical approach, adding or subtracting predictors and terms at Level 1 to identify which is the model with a better fit (lower deviance statistic). In Tables 5.2.18, 5.2.20 and 5.2.22 we can see a summary of the description of the models with a better fit for Sales, Units and Compensation, respectively. In Tables 5.2.19, 5.2.21 and 5.2.23 we can see a detailed description of the models with a higher fit, again, for the three different measures of performance.

In summary, when considering the models with a better fit (Model 15c in Table 5.2.19, Model 16c in Table 5.2.21 and Model 17c in Table 5.2.23, for Sales, Units and Compensation respectively), there is no term that is significant when interacting with time ("TIME" x performance) . Hence, **Hypothesis 6 is supported** (*"The evolution over time (growth rate) of different objective measures of performance of salespeople during their first months at the company are not related")*. It is worth to note -as will be discussed in Chapter 6- that some terms are significant when predicting the final level of performance (intercept): Units, when Sales is the Dependent Variable; Sales, when Units is the Dependent Variable; Units, when Compensation is the Dependent Variable.

TABLE 5.2.18 Summary of results for selected Conditional Linear Growth Models with Random Effects and Time-Varying predictors at Level 1 - Sales Performance

Sales performance Models	Goodness of fit (# of parameters)	Fixed effects	Random effects
1 Model 15c	33,790.72 (6)	Intercept (p<.001) Perf Units (p<.001)	Residual (p<.001) Intercept (p<.001) Perf Units (p<.001)
2 Model 15b	33,803.36 (10)	Intercept (p<.001) Time (ns) Perf Units (p<.001)	Residual (p<.001) Intercept (p<.01) Time (a) Perf Units (p<.001)
3 Model 15a	33,924.20 (15)	Intercept (p<.001) Time (p<.01) Perf Units (p<.001) Time x Perf Units (p<.05)	Residual (p<.001) Intercept (p<.001) Time (a) Perf Units (a) Time x Perf Units (a)
4	36,552.18 (6)	Intercept (p<.001) Time (p<.001)	Residual (p<.001) Intercept (p<.001) Time (p<.05)
5	36,704.90 (4)	Intercept (p<.001) Time (p<.001)	Residual (p<.001) Time (p<.001)
6	36,727.26 (3)	Intercept (p<.001) Time (p<.001)	Residual (p<.001)
7	36,779.75 (2)	Intercept (p<.001)	Residual (p<.001)
8	37,582.48 (10)	Intercept (p<.05) Time (p<.001) Perf Compensation (ns)	Residual (p<.001) Intercept (a) Time (a) Perf Compensation (a)
9	39,490.49 (28)	Intercept (ns) Time (ns) Perf Compensation (ns) Perf Units (p<.001) Time x Perf Compensation (ns) Time x Perf Units (ns)	Residual (p<.001) Intercept (ns) Time (p<.01) Perf Compensation (a) Perf Units (p<.001) Time x Perf Compensation (a) Time x Perf Units (a)

(n s) Non significant (a) The model failed when computing it. This covariance parameter is redundant. The test statistic and confidence interval cannot be computed.

TABLE 5.2.19 Results for Conditional Linear Growth Models with Random Effects and time varying predictors at Level 1, for Sales Performance

Condit. linear growth + time varying predictors at Level 1 for Sales	Par.	Model 15a: Units, Time, Units x Time		Model 15b: Units, Time		Model 15c: Units	
Fixed effects		Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)
Average final status (int)	β 00	2,249.04 *	221.86	2,047.24*	168.79	1,970.01*	129.30
Time	β 10	141.37 **	52.54	17.89 (ns)	23.19		
Perf Units	β 20	633.94 *	23.89	652.99 *	17.30	652.63 *	16.12
Time x Perf Units	β 30	-14.45 **	7,19				
Random effects		Variance	(S.D.)	Variance	(S.D.)	Variance	(S.D.)
Level 1 Temporal variation (within salesp variation of Perf. over time)	e ti	3,936,171 *	167,530	4,433,440 *	168,443	4,517,942 *	171,187
Level 2							
Intercept	r 0i	3,322,197 *	376,618	2,047,914 *	713,436	1,598,832 *	341,437
Time	r 1i	131,768 a	a	2,721 a	a		
Perf Units	r 2i	68,957 a	a	48,437 *	7,415	40,900 *	5,307
Time x Perf Units	r 3i	6,860 a	a				
Goodness of fit			p m			p m	
Deviance		33,924.20	15	33,803.37	10	33,790.72	6

N= 1,840 observations, nested within 230 salespeople

* p<.001 ** p<.05 *** p<.1 (n s) Non significant

a The model failed when computing it. This covariance parameter is redundant. The test statistic and confidence interval cannot be computed.

TABLE 5.2.20 Summary of results for selected Conditional Linear Growth Models with Random Effects and Time-Varying predictors at Level 1 - Units Performance

Units performance Models	Goodness of fit (# of parameters)	Fixed effects	Random effects
1 Model 16c	10,302.59 (15)	Intercept (ns) Time (ns) Perf Sales (p<.1) Time x Perf Sales (ns)	Residual (p<.001) Intercept (a) Time (a) Perf Sales (p<.001) Time x Perf Sales (a)
2 Model 16b	10,325.67 (10)	Intercept (ns) Time (p<.001) Perf Sales (p<.001)	Residual (p<.001) Intercept (a) Time (a) Perf Sales (a)
3 Model 16a	10,430.67 (6)	Intercept (p<.01) Perf Sales (p<.001)	Residual (p<.001) Intercept (a) Perf Sales (p<.001)
4	11,336.12 (10)	Intercept (p<.05) Time (ns) Perf Compensation (p<.001)	Residual (p<.001) Intercept (ns) Time (ns) Perf Compensation (p<.001)
5	12,828.18 (6)	Intercept (p<.001) Time (p<.001)	Residual (p<.001) Intercept (p<.001) Time (p<.001)
6	13,153.59 (4)	Intercept (p<.001) Time (p<.001)	Residual (p<.001) Time (ns)
7	13,156.11 (3)	Intercept (p<.001) Time (p<.001)	Residual (p<.001)
8	13,230.17 (2)	Intercept (p<.001)	Residual (p<.001)
9	21,494.03 (28)	Intercept (ns) Time (p<.1) Perf Compensation (ns) Perf Sales (ns) Time x Perf Compensation (ns) Time x Perf Sales (ns)	Residual (p<.001) Intercept (a) Time (a) Perf Compensation (a) Perf Sales (a) Time x Perf Compensation (a) Time x Perf Sales (a)

(n s) Non significant a The model failed when computing it. This covariance parameter is redundant. The test statistic and confidence interval cannot be computed.

TABLE 5.2.21 Results for Conditional Linear Growth Models with Random Effects and time varying predictors at Level 1, for Units Performance

Condit. linear growth + time varying predictors at Level 1 for Units	Par.	Model 16a: Sales,		Model 16b: Sales, Time		Model 16c: Sales, Time, Sales x Time	
Fixed effects		Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)
Average final status (int)	β 00	- 0.75**	0.195	0.23(ns)	168.79	-0,548 (ns)	0,379
Time	β 10			0.19 *	23.19	-0,063 (ns)	0,094
Perf Sales	β 20	0.001 *	0.001	0.001 *	17.30	0,001***	0,001
Time x Perf Sales	β 30					0,001 (ns)	0,001
Random effects		Variance	(S.D.)	Variance	(S.D.)	Variance	(S.D.)
Level 1 Temporal variation (within salesp variation of Perf. over time)	e ti	14.37 *	0.51	13.77 *	0.53	12,918 *	0,520
Level 2							
Intercept	r 0i	0 a	a	a	a	0 *	a
Time	r 1i			0.98 a	a	.158 (ns)	a
Perf Sales	r 2i	0.001 *	0.001	0.001a	a	0,001*	0,001
Time x Perf Sales	r 3i					0,001 (ns)	a
Goodness of fit			p m		p m		p m
Deviance		10,430.67	6	10,325.68	10	10,302.60	15

N= 1,840 observations, nested within 230 salespeople

* p<.001 ** p<.05 *** p<.1 (n s) Non significant

a The model failed when computing it. This covariance parameter is redundant. The test statistic and confidence interval cannot be computed.

TABLE 5.2.22 Summary of results for selected Conditional Linear Growth Models with Random Effects and Time-Varying predictors at Level 1 - Compens. Perf.

Compensation performance Models	Goodness of fit (# of parameters)	Fixed effects	Random effects
1 Model 17c	28,774.51 (10)	Intercept (p<.001) Time (p<.001) Perf Units (p<.001)	Residual (p<.001) Intercept (p<.01) Time (p<.001) Perf Units (a)
2 Model 17b	28,925.63 (6)	Intercept (p<.001) Perf Units (p<.001)	Residual (p<.001) Intercept (a) Perf Units (p<.001)
3 Model 17a	29,538.91 (15)	Intercept (p<.001) Time (ns) Perf Units (p<.001) Time x Perf Units (ns)	Residual (p<.001) Intercept (p<.01) Time (p<.1) Perf Units (a) Time x Perf Units (a)
4	30,005.56 (6)	Intercept (p<.001) Time (p<.001)	Residual (p<.001) Intercept (p<.001) Time (p<.001)
5	30,383.05 (4)	Intercept (p<.001) Time (p<.001)	Residual (p<.001) Time (p<.05)
6	30,391.46 (3)	Intercept (p<.001) Time (p<.001)	Residual (p<.001)
7	30,540.01 (2)	Intercept (p<.001)	Residual (p<.001)
8	31,379.75 (10)	Intercept (p<.001) Time (p<.001) Perf Sales (ns)	Residual (p<.001) Intercept (p<.01) Time (p<.001) Perf Sales (a)
9	35,212.29 (28)	Intercept (p<.001) Time (ns) Perf Sales (ns) Perf Units (ns) Time x Perf Sales (ns) Time x Perf Units (ns)	Residual (p<.001) Intercept (p<.001) Time (p<.01) Perf Sales (a) Perf Units (ns) Time x Perf Sales (a) Time x Perf Units (a)

(n s) Non significant a The model failed when computing it. This covariance parameter is redundant. The test statistic and confidence interval cannot be computed.

TABLE 5.2.23 Results for Conditional Linear Growth Models with Random Effects and time varying predictors at Level 1, for Compensation Performance

Condit. linear growth + time varying predictors at Level 1 for Compensation	Par.	Model 17a: Units, Time, Units x Time		Model 17b: Units		Model 17c: Units, Time	
Fixed effects		Coeff.	(S.E.)	Coeff.	(S.E.)	Coeff.	(S.E.)
Average final status (int)	β 00	964.81 *	67.21	844.69 *	26.25	1,138.67 *	48.28
Time	β 10	24.18 (ns)	14.88			64.78 *	7.37
Perf Units	β 20	97.37 *	6.21	84.50 *	2.66	79.77 *	3.15
Time x Perf Units	β 30	4.27 (ns)	3.25				
Random effects		Variance	(S.D.)	Variance	(S.D.)	Variance	(S.D.)
Level 1 Temporal variation (within salesp variation of Perf. over time)	e ti	278,282.0 *	11,889	348,771 *	12,188	297726,99 *	12,588.4
Level 2							
Intercept	r 0i	360,567.24**	119,963	0 a	0	224,699.38**	69,034.9
Time	r 1i	11,569.3***	5,980			4,471.33*	1,265.36
Perf Units	r 2i	3734.90 a	a	495.52 *	116.57	1,031.67 (ns)	a
Time x Perf Units	r 3i	2,042.53 a	a				
Goodness of fit			p m		p m		p m
Deviance		29,538.91	15	28,925.63	6	28,774.51	10

N= 1,840 observations, nested within 230 salespeople

* p<.001 ** p<.05 *** p<.1 (n s) Non significant

a The model failed when computing it. This covariance parameter is redundant. The test statistic and confidence interval cannot be computed.

5.3 Summary of hypotheses tests and results

TABLE 5.3.1 Summary of hypotheses tests and results

HYP	Expected relationship	EQU.	Results
H 1	Significant variance in performance over time within salespeople and between salespeople	1, 2	**SUPPORTED** for all three measures of performance (Sales, Units, Compensation) Intraclass Correlation Coefficients of 18.0%, 18.6% and 22.6% respectively (within-person)
H 2a	Variation of performance over time	5, 6	**SUPPORTED** for all three measures **e ti** significant (p< .001)
H 2b	Performance follows a linear increasing trajectory over time	Descrpt. statist.	**SUPPORTED** Mean performance increases over time
		5, 6	**SUPPORTED** for all three measures **β 10** significant (p< .001)
H 2c	Average performance trajectory exhibits an initial steep growth and then a leveling off of performance (i. e., a quadratic shape)	Descrpt. statist.	**PARTIALLY SUPPORTED** Graph (shape) of mean performance
		5, 6 7, 8	**NOT SUPPORTED** for any measure Deviance statistic increases for the model with a Quadratic term. Hence, just a linear term is significant
		7, 8	Quadratic term (β 20) non significant
H 3a	New salespeople will differ significantly in their objective performance growth rates over time	Descrpt. statist.	**SUPPORTED** Standard deviation over time
		5, 6	**SUPPORTED** for all three measures **r 1i** significant (p< .001)
H 3b	New salespeople will differ significantly in their final objective performance levels	Descrpt. statist.	**SUPPORTED** Standard deviation at final month
		5, 6	**SUPPORTED** for all three measures **r 0i** significant (p< .05)

H 4a	*Initial* levels of performance are not related to their *growth rates* of performance	11, 12	**SUPPORTED** for all three measures No clear significance of predictors
H 4b	*Initial* levels of performance are not related to their *final* level of performance	Correl. matrix	**SUPPORTED** Simple correlations: no clear correlations; medium to low levels
		11, 12	**SUPPORTED** for all three measures No clear significance of predictors
H 5a	*Initial* levels of performance with one indicator are not related to their *growth rates* of performance with another indicator	11, 12	**SUPPORTED** for all three measures No clear significance of predictors
H 5b	*Initial* levels of performance with one indicator are not related to their *final levels* of performance with another indicator	Correl. matrix	**NOT SUPPORTED** High correlation (exploratory analysis)
		11, 12	**SUPPORTED** for all three measures No clear significance of predictors
H 6	Growth rates of different measures are not related over time	13, 14	**SUPPORTED** for all three measures No clear significance of predictors

"Correl. matrix": matrix describing simple correlations among variables (in Descriptive Statistics - Section 5.1)

Figure 5.3.1 Summary of hypotheses tests and results

	GROWTH	TIME OF MEASUREMENT	TYPE OF MEASUREMENT
All Levels	*H1: "There will be significant variance in new salespeople objective performance over time within salespeople and between salespeople"* ***Supported***		
Within-salespeople (Level 1)	*H2a: "There is a variation of new salespeople objective performance over time"* ***Supported*** *H2b: "New salespeople objective performance follows a linear increasing trajectory over time"* ***Supported*** *H2c: "The average objective performance trajectory of new salespeople exhibits an initial linear growth and then a leveling off of performance during their initial months at the company"* ***Not supported***		*H6: "The evolution over time (growth rate) of different objective measures of performance of salespeople during their first months at the company are not related"* ***Supported***
Between-salespeople (Level 2)	*H3a: "New salespeople will differ significantly in their objective performance growth rates over time"* ***Supported*** *H3b: "New salespeople will differ significantly in their final objective performance levels after some months at the company"* ***Supported***	*H4a: "Initial levels of objective performance of new salespeople are not related to objective performance growth rates during their first months at the company"* ***Supported*** *H4b: "Initial levels of objective performance of new salespeople are not related to their objective performance level after a few months at the company"* ***Supported***	*H5a "Initial levels of performance of new salespeople measured with one objective indicator are not related to performance growth rates during their first months at the company, measured with a different objective indicator"* ***Supported*** *H5b: "Initial levels of performance of new salespeople measured with one objective indicator are not related to their performance level after a few months at the company, measured with a different objective indicator"* ***Supported***

CHAPTER 6 - DISCUSSION, LIMITATIONS AND FUTURE RESEARCH

6.1 Discussion

6.1.1 Growth trajectory of objective performance

In this section, we discuss the findings referred to the research question focusing on the description of performance growth. Its main purpose is to confirm findings from other authors on the analysis of performance at the within and between-person levels and to develop a model that could help us demonstrate the hypotheses about the relationship between time and type of measurement, and growth trajectories. Consequently, the main contribution is to help generalize results to our specific setting -new salespeople in Spain in the direct selling industry.

The first Hypothesis aimed to identify how much variability in monthly sales could be attributed to within-person or between-person differences across the first nine months at the company. While within-person variance in performance identifies the changes in performance over time, between-person changes are attributable to differences in the specific characteristics of each salesperson and will provide reliable person effects on sales performance. 18% of the variance in Sales Performance was within salespeople and 82% between salespeople for Sales performance, being both significant at $p<0.001$ level. We found similar results when Performance was measured with Units or Compensation. While the distribution varies depending on the specific study, as mentioned in Chapter 3, these results are similar to Chen (2005) and Thoresen et al. (2005) when analyzing salespeople in changing environments. The relatively large amount of between-person variability found indicates that there are likely to be inter-

individual effects that can be modeled at a higher level with Level 2 analyses, and that it is appropriate to use a random intercepts model (Day, Sin & Chen, 2004).

Next, with Hypotheses 2a and 2b, we tried to identify whether intra-individual change patterns of performance contained a systematic time trend; if these patterns of change consisted of nothing more than random error variance, then it would make no sense to go further in their analysis (Hofmann, Jakobs & Baratta, 1993).

First, the temporal variation (within salesperson variation of performance over time, e_{ti}) was significant in all models, showing that there is a systematic variation of new salespeople objective performance over time. Second, given that β 10 was significant ($p<.001$) and positive for all Performance measures, we can affirm that new salespeople objective performance follows a linear increasing trajectory over time, supporting Hypothesis 2b. It confirms our previous conclusion when identifying a growth trend observing monthly performance.

So far, results of the multilevel growth modeling analyses were clear about performance changing over time (i.e., evidence of dynamic criteria) and that the overall performance trend was positive.

Hypothesis 2c aimed at identifying the shape of the performance trajectory over time. Even though we hypothesized that it would exhibit an initial linear growth and then a leveling off of performance (i.e., a quadratic shape), only the linear term was significant for all three measures of performance. The main reason why a growth trajectory but not a leveling off appeared after time passing is that the time period in our sample was shorter (9 months) than in other studies that identified quadratic or cubic terms. If we consider longitudinal analyses of new salespeople during their first months at the company, Chan, Li & Pierce (2014) identified a quadratic shape after 25 weeks, Hofmann, Jakobs & Baratta (1993) a linear, quadratic and cubic term during 12 quarters and Ployhart & Hakel (1998) found the same shape after 8 quarters.

This is aligned with our initial finding that a quadratic term seemed to be significant. In Section 5.2.4, we explained in detail that after additional analyses we rejected the quadratic term and kept the linear one. It would not be surprising that, if we increased the length of the observation timeframe in our sample, the quadratic term would be significant. This result will not affect the use of the model to test the following hypotheses. Other studies have also found linear trends (Sturman & Trevor, 2001; Zyphur, Chaturvedi & Arvey, 2008). The advantageof having a simpler model (parsimony) is that it will make conclusions based on it easier to understand.

In any case, results to date are consistent with the learning curves that appear when individuals are facing a changing stage - joining a new company (Cron, 1984; Murphy, 1989). Some of the reasons for an increase in performance in such situations are: improvements in the proper implementation of learned skills (Jones, Chonko,

Rangarajan & Roberts, 2007); execution of socialization tactics, like asking for performance feedback or building relationships (Dixon, Spiro & Jamil, 2001; Menguç, Han & Auh, 2007); progressive development of higher degrees of self-confidence (Dixon, Forbes & Schretzer, 2005); the consolidation of the relationship with their superiors, and the results of extra efforts (Liu, 2007).

Next, with Hypotheses 3a and 3b we wanted to determine whether there are inter-individual differences in the hypothesized intra-individual change patterns; in other words, if there are systematic differences between these individual patterns (Hofmann, Jakobs & Baratta, 1993). If there is significant between-person variability -that is, substantial heterogeneity around the population growth parameters- not every salesperson's performance will increase to the same degree over time. As a consequence, the presence of variance may be explained through the introduction of additional variables in the model.

In Section 5.2.3.2 we can see that both Hypotheses were supported, which shows that there was significant variation in the linear change rates and in the average final levels of performance between salespeople. It confirmed our initial observation in descriptive statistics: the presence over time of Standard Deviations around the linear trend suggested that there are inter-individual differences in intra-individual change (Hofmann, Jakobs & Baratta, 1993). Results are consistent with other studies like Day, Sin & Chen (2004), Chan, Li & Pierce (2014), Jaramillo & Grisaffe (2009), Ployhart & Hakel (1998) or Thoresen, Bradley, Bliese & Thoresen (2004). Possible explanations to

the between-person differences in performance trajectories are based on the existence of individual differences in the levels of knowledge, skills, ability and motivation; additionally, these levels and their relative importance may change at different moments in time or at different job stages (Deadrick, Bennett & Russell, 1997; Zyphur, Chaturvedi & Arvey, 2008).

In summary, these results indicate that different salesperson performance trajectories were evident, which enabled us to test our following hypotheses through the introduction of explanatory variables. As mentioned before, our results are, in general, consistent with other research studies and add up to the generalization of results in another setting: systematic intra-individual change patterns exist and there are individual differences in these change patterns.

6.1.2 Time of measurement and growth trajectories of objective performance

In this section, we discuss the findings of the second research question, referred to Time of measurement and growth trajectories - same indicator, taken at different times. We are aiming to find to what extent are objective measures of performance taken at different times related.

Several authors have verified that job performance measurements are not perfectly correlated over time and that these correlations decrease as the amount of time between them increases (Austin, Humphreys, & Hulin, 1989; Barrett & Alexander, 1989; Barrett, Caldwell, & Alexander, 1985; Ghiselli & Haire, 1960; Humphreys, 1960; Ployhart & Hakel, 1998; Rambo, Chomiak, & Price, 1983; Sturman & Trevor, 2001).

Hypotheses 4a and 4b aimed to identify whether initial levels of objective performance were related to growth rates and final levels of objective performance during their first months at the company. Our findings support that this relationship is not significant.

As detailed in Chapter 4, we verified this relationship by comparing: (a) on one side, quarterly "Average" performance (i.e., average from months 2 to 4, from months 3 to 5,… and from months 6 to 8); and, on the other one, quarterly "Increases" in performance (i.e., increases from months 2 to 4,… and from months 6 to 8), compared to (b) the growth rate between months 2 and 9, and the final level of performance at month 9. The three models of measurement of performance (Sales; Units; Compensation) showed consistent results: the "Average" performances from months 3 to 5 and from months 6 to 8 (the latter with a stronger weight than the former in all situations) are the

only significant predictors both for the final levels of performance (intercept, at month 9) and for the growth rates (between months 2 and 9). These results show statistical consistency between models (see Figure 6.1.2).

Although two of the predictors are significant, both hypotheses are supported (See Section 5.2.6.2) and there are no clear relationships between the performance level at previous months and the "final" level of performance (at month 9), and the acceleration in performance (the growth rate between months 2 and 9). The "distance" between the two significant quarters (Average from 3 to 5 and Average from 6 to 8) and the fact that only 2 quarters out of 5 are significant does not provide sufficient evidence to reject our hypotheses 4a and 4b.

Even though we did not hypothesize this relationship, results are partially consistent with authors who affirm that the relationship between measures of performance decreases systematically as the measurements become increasingly separated by time (Deadrick & Madigan, 1990; Humphreys, 1960), due to the fact that "Average" performance from the "closer" quarter (months 6 to 8) to the "final" level of performance (month 9) was significant. Nevertheless, this does not provide a clear evidence of such a relationship since no "Increase" or other "Average" predictors (e. g., from Quarter 5 to 7) were significant, even with lower weights. Further studies should provide a clearer evidence on this specific issue. As mentioned before, the main objective of our research was to focus on performance trajectories (slope), rather than on the "final" level of performance; this would require a different methodological approach that is out of the scope of this research.

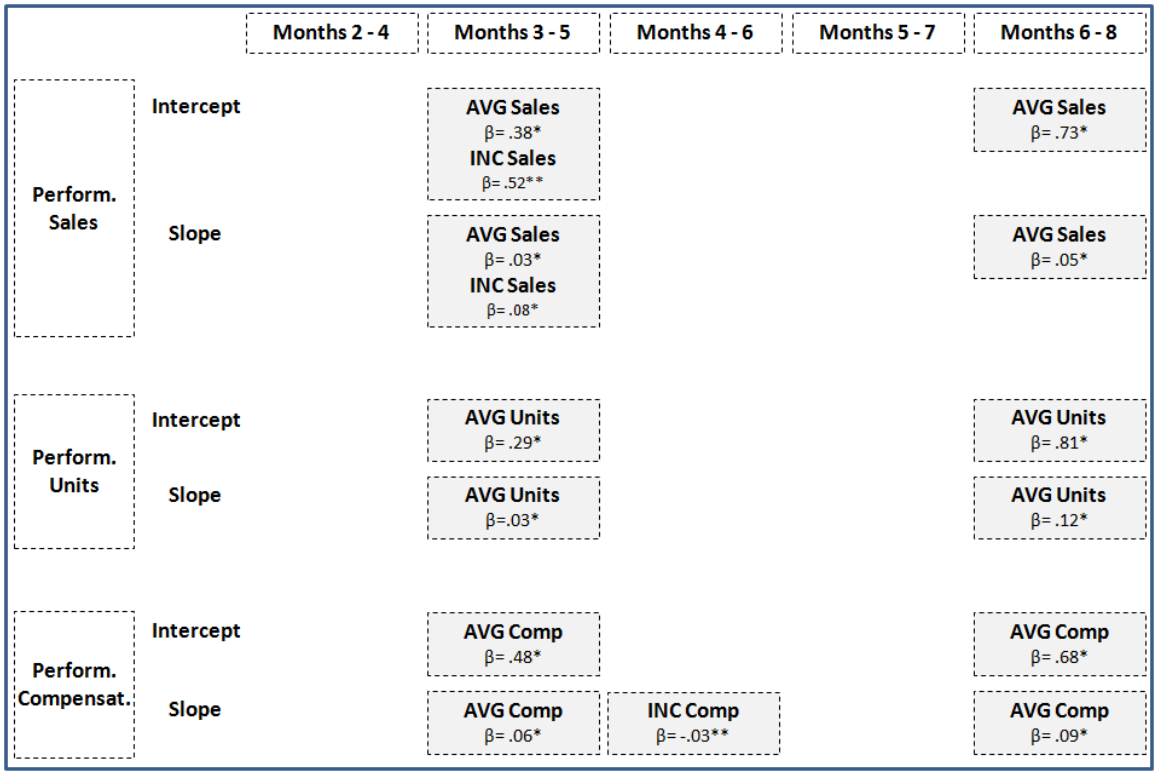
We found no clear evidence to predict individual performance from performance measured in distant periods. As several authors have suggested, more research on this issue is required due to its direct implications in decisions referred to selection, promotion, retention, evaluation, training and compensation (Barone & De Carlo, 2012; Cron, Marshall, Singh, Spiro & Sujan, 2005; Deadrick & Madigan, 1990; Hanges, Schneider & Niles, 1990; Henry & Hulin, 1987, 1989; Hulin, Henry, & Noon, 1990; Sturman & Trevor, 2001; Thoresen, Bradley, Bliese & Thoresen, 2004). From the practitioners' point of view, since the performance is dynamic, especially in changing environments (e.g. people joining a new company), it would be very useful to predict not only the future level of performance but also the growth trajectories, to be able to implement some actions referred to training, retention or compensation.

It is interesting to note that the socio-demographical control variables -even gender, which was found significant in Section 5.2.6.1- had no significant effect by introducing the predictor variables in the models. Alternative models were tested, including all or a few socio-demographical predictors, but none was significant. Extant literature in the sales field has not provided clear conclusions about the significance of such type of variables, used either as predictors or control variables.

In summary, the results from this analysis show no clear evidence that initial levels of objective performance were related to final levels of objective performance or to the growth rates of objective performance during their first months at the company. This confirms previous conclusions from the sales literature, showing that the time of

measurement matters; salespeople will show different levels of performance and different rank order depending on when they are measured. Through a longitudinal approach, this study determines that objective performance in the sales domain is time dependent.

Figure 6.1.2 Summary of significant parameters - Hypotheses 4a & 4b



6.1.3 Type of measurement and growth trajectories of objective performance

In this section, we are addressing the findings of the third research question, referred to Type of measurement and growth trajectories -different indicators taken at the same period and different indicators taken at different times. We intend to answer to what extent are different objective measures of performance related over time. This will let us draw conclusions about the eventual interchangeability of different objective measures of performance for salespeople during their first months at the company.

As we can see in Figure 2.5, several studies in the sales domain have used various measures of performance in cross-sectional settings and a few of them in longitudinal ones. While some meta-analyses have concluded that subjective and objective measures of performance are not interchangeable (Bommer, Johnson, Rich, Podsakoff & MacKenzie, 1995; Heneman, 1986; Jaramillo, Carrillat & Locander, 2005), to the best of our knowledge, no studies have showed specific conclusions about the interchangeability of different ***objective*** measures of performance. Moreover, if we assume the dynamic nature of performance, we should compare their trends over time or consider the method of performance measurement as a potential moderator of the level of performance dynamism (Sturman, Cheramie & Cashen, 2005). We are not aware of any studies on this issue, either in sales or in other domains, so we analyzed it through two different approaches. This is the main objective of our research.

In the first approach (hypotheses 5a and 5b), we tried to draw conclusions when comparing different indicators of objective performance measured at different times. As showed in Section 5.2.6.3, the two hypotheses are supported, implying that initial levels of performance of new salespeople measured with one objective indicator are not related to performance growth rates or to their final level of performance during their first months at the company, measured with a different objective indicator.

Results were similar to the ones explained in the previous section. The model was the same one used to test hypotheses 4, but adding the "Average" and "Increase" predictors for each one of the five considered periods, as measured with the other two indicators of performance (e. g., when Sales was the Dependent Variable, we also added Average and Increase for all quarters, measured with Units and Compensation). While results were consistent with all three measures as Dependent Variables, there are some specificities worth mentioning (see Figure &.1.3):

- All significant terms measured with its own measure were still significant ("Average month 3 to month 5" and "Average month 6 to month 8"), as showed in the previous section. For example, when Units was the Dependent Variable, Average Units from month 3 to month 5 and Average Units from month 6 to month 8 were still significant.

- Additionally, when Sales was the Dependent Variable, "Increase in Compensation from months 2 to 4" also had a significant relationship with the slope

- Additionally, when Units was the Dependent Variable, "Increase in Compensation from months 2 to 4", "Average Sales from month 2 to month 4", "Average

Sales from month 3 to month 5" and "Average Units from month 5 to month 7" also had a significant relationship with the slope

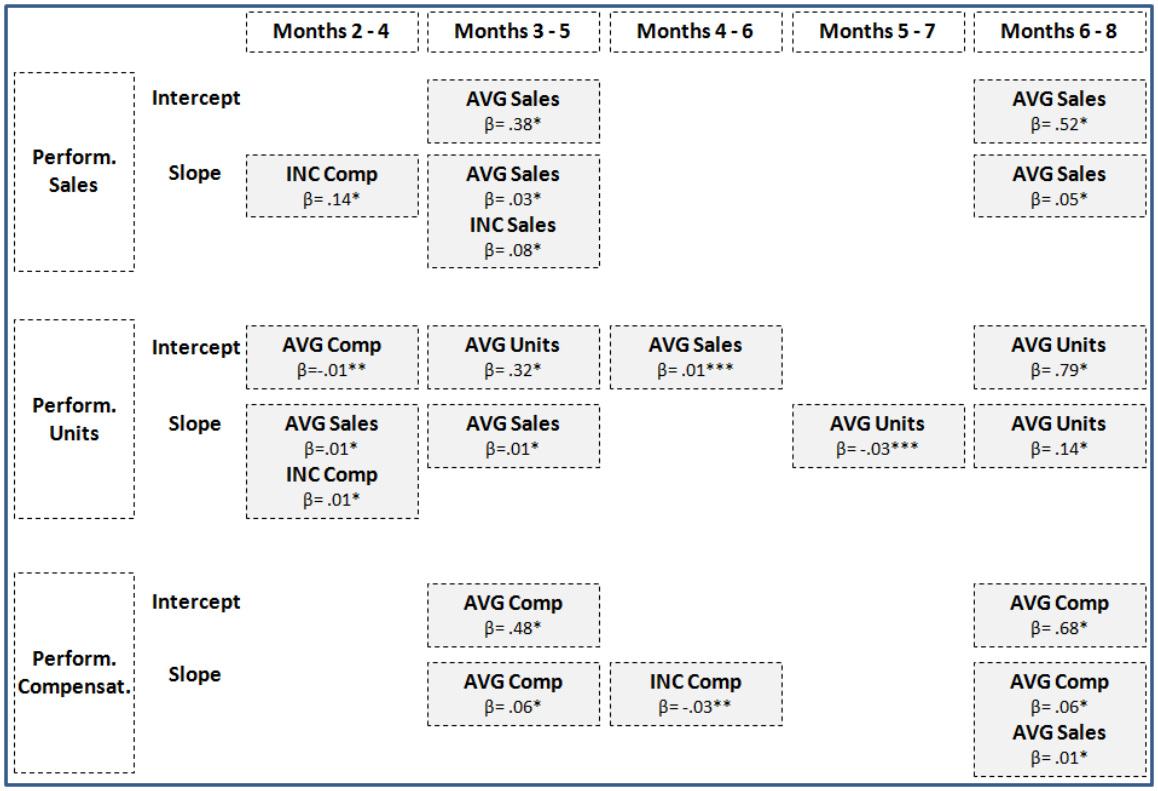
- Additionally, when Compensation was the Dependent Variable, "Increase in Compensation from months 4 to 6" and "Average Sales from month 6 to month 8" also had a significant relationship with the slope

The same reasoning used to support Hypotheses 4a and 4b in the previous section is used here to support Hypotheses 5a and 5b: there is no clear evidence of the relationship between different measures of performance taken at different moments. It is interesting to note that some "Increase" predictors measured with a different indicator were significant, and again, that no socio-demographic predictor was significant.

Results are partially consistent with the only study we found using a similar approach: Ployhart & Hakel (1998) regressed a composite measure that assessed individuals' self-reported past salary and future expected earnings (hence, combining objective and subjective elements), calculated at the initial period on 8 quarterly observations of gross sales commissions. They found a significant correlation with the intercept ($\beta = 0.15$, $p < 0.05$) but no significant ones with the linear, quadratic and cubic terms. . While Ployhart & Hakel measured "initial" performance (in their first quarter at the company), we measured "final" performance (at month 9). Still, as mentioned before, the main objective of our research was to focus on performance trajectories (slope) rather than on the "final" level of performance; this would have required a different methodological approach that is out of the scope of this research.

What seems to be more relevant here is that both in Ployhart & Hakel's (1998) and in our research, we found that initial levels of performance of new salespeople measured with one objective indicator are not related to performance growth rates during their first months at the company, measured with a different objective indicator.

Figure 6.1.3 Summary of significant parameters - Hypotheses 5a & 5b



The final hypothesis (6) aimed to identify relationships between the evolution over time of different objective measures of performance; that is, compare their growth trajectories between months 2 and 9. We found that these relationships were not significant and, hence, the hypothesis was supported (Section 5.2.7). Results were consistent for all the analyses conducted: first, considering Sales as the Dependent Variable (DV) and Units and Compensation as the Independent Variables (IV); then, Units as DV and Sales and Compensation as IV; and, finally, Compensation as DV and Sales and Units as IV. Subsequently, these relationships were also measured pairwise, but no significant results were obtained.

Even though we are not aware of any other published longitudinal research in the sales or job performance fields that has conducted a similar analysis, we find reasonable that the evolution over time (growth rate) of different objective measures of performance of salespeople during their first months at the company are not related, since authors have not found consistent results about these relationships through the analysis of simple correlations, which could provide us some hints from an exploratory perspective. Additionally, it is consistent with results from the previous sections, although it follows a different methodological approach.

In summary, with the current sample of salespeople we have found no clear evidence that (a) initial levels of performance of new salespeople, measured with a specific objective indicator, are related to their final level of performance or to performance growth rates during their first months at the company, measured with a

different objective indicator; and (b) that the evolution over time (growth rate) of different objective measures of performance of salespeople during their first months at the company are related to each other. Thus, we assume that none of the objective indicators of performance used in this study (Sales; Units; Compensation) can explain others during the first months at the company. Hence, we conclude that there is evidence that these objective indicators of performance are not interchangeable and that they have to be chosen carefully by scholars according to the objectives of each investigation. This finding is consistent with previous conclusions from various meta-analyses that compared objective, self-rated and managerial-rated performance, but, to the best of our knowledge, no studies have found such conclusions when comparing various measures of objective performance, especially in a longitudinal setting.

Since different objective indicators seem to be measuring different aspects of the sales construct, the main implication for practitioners is that managers have to evaluate salespeople with different indicators, depending on their specific objectives. There is no "best" indicator of performance.

6.2 Limitations and directions for future research

Limitations of this exploratory study include our focus on salespeople from a single Spanish organization in the direct selling industry. Although this may constrain the overall ability to generalize the results, using data from one company enables us to better control contextual factors and enhances the internal validity of the study (Jones, Sundaram and Chin, 2002). Further research might replicate our findings across companies, industries, sales force composition and selling contexts.

The collection of all data from a single source poses the potential of biasing the results. Further research could employ multiple data sources to conduct similar studies to overcome this problem (e.g. behavior-based outcomes from company records; objective or subjective measures from customers; subjective measures, either self-ratings or supervisory-ratings). Other objective measures of performance (e.g. quotas, controlling for externalities) could also be used.

The sample's performance was measured monthly. Although this procedure is common in sales research, it is unclear whether or how our results might change if performance were measured over a different time frame.

Additionally, we were able to track salespeople from their first 9 months at the company. Longer tracking might allow for deeper insights regarding performance over time. For example, from the job stages theory perspective, a longer time frame is needed to identify a sales curve that, after initially growing, will eventually slow down, flatten, and ultimately, even decline.

Research has demonstrated that different sales environments, such as fixed-salary versus incentive-laden compensation structures, will have significant differences in the job attitudes of sales representatives (Flaherty and Pappas, 2002). These differences could influence sales representative's behaviors and performance. Therefore, future research can investigate these issues in other types of selling settings (e.g. different compensation schemes, different training and onboarding policies for newcomers, …).

The sample size is relatively small. However, as was the case in this study, shrinkage in sample size due to a high turnover, not only among new salespeople but especially in the direct selling industry, is inevitable and characteristic of longitudinal research (Baltes and Nesselroade, 1979). Further research could be applied to larger samples of salespeople to guarantee the consistency and the generalizability of results.

This research focused exclusively on performance. It would be interesting to link this longitudinal view to determine the longitudinal relationship between performance and turnover, since some authors have identified the relationship between performance trends and turnover (Harrison, Virick & William, 1996; Surman & Trevor, 2001).

In this respect, since we confirmed the existence of systematic intra-individual change patterns and individual differences in these patterns, future research should further investigate the determinants of inter-individual differences in intra-individual performance trajectories. Future research should more explicitly consider the nature of intra-individual performance variability, and directly assess individual difference correlates of the latent growth parameters. Specification of links between temporal performance variability and predictor constructs may allow not only a more accurate

prediction, but also a greater understanding of predictor-criterion constructs and relationships.

Therefore, it would be desirable to track such constructs over time to examine how these constructs also change, and how it affects their relationship with performance.

The findings from Surman & Trevor (2001) showed that the common practice of ignoring leavers -explained in section 4.2- may hamper our understanding of individual performance trends. Because dynamic performance is related to turnover, it may be of theoretical and practical interest to focus on predicting the performance trends of all employees within a cohort, including those who will eventually leave the company. Studies of individual performance trends that limit their sample by including only those who remain throughout the study may not generalize to the more general population of all employees- that is, stayers and leavers. Managers may also want to know how individuals will change over time, which includes knowing about both potential turnover and future performance levels.

Other methodologies could be used to analyze the dynamic nature of performance and to identify its determinants. Even though it was not warranted for our present study - as analyzed in Section 5.2.5, it would be of special interest that other samples were also tested for Autoregressive Latent Trajectory modeling that incorporates both autoregressive (current performance may act as a performance feedback, influencing performance directly) and latent trajectory (individuals differ in their performance trajectories due to individual-difference factors) parameters.

CHAPTER 7 – CONTRIBUTIONS

7.1 Contributions to theory

Growth trajectories of objective performance: our findings about the growth trajectory of objective performance of new salespeople from a direct selling Spanish company allow for a greater deal of generalizability of the empirical findings from previous research on the dynamic nature of performance: systematic intra-individual change patterns exists and there are individual differences in these change patterns. It is interesting to note the consistency of our findings when measuring performance with three different objective indicators.

Time of measurement and growth trajectories of objective performance: in summary, the results from this specific analysis show that we could not find clear evidence that initial levels of objective performance were related to final levels of objective performance or to the growth rates of objective performance during their first months at the company. This confirms previous conclusions from the sales literature, showing that the time of measurement matters; salespeople will show different levels of performance and a different rank order depending on when they are measured. This study contributes with a longitudinal approach to show that objective performance in the sales domain is time dependent. Thia confirms the importance for scholars of considering the evolution of performance over time when analyzing its relationship with other constructs (i.e., nonlinear relationships).

Type of measurement and growth trajectories of objective performance: the main contribution of this thesis is that, with the current sample of salespeople, we have found no clear evidence that (a) initial levels of performance of new salespeople measured with a specific objective indicator are related to their final level of performance or to performance growth rates during their first months at the company, measured with a different objective indicator; and (b) that the evolution over time (growth rate) of different objective measures of performance of salespeople during their first months at the company are related to each other. Thus, we assume that none of the objective indicators of performance used in this study (Sales; Units; Compensation) can explain others during the first months at the company. Hence, we conclude that there is evidence that these objective indicators of performance are not interchangeable and that they have to be chosen carefully by scholars according to the objectives of each investigation. This finding is consistent with previous conclusions from various meta-analyses that compared objective, self-rated and managerial-rated performance but, as far as we know, no studies have found such conclusions when comparing various measures of objective performance.

All these findings have been drawn from a specific sample of new employees in the sales field, but they can also shed light on the understanding of the implications of when and how to measure job performance in general.

7.2 Contributions to method

To the best of our knowledge, no published longitudinal sales research has yet applied the Hierarchical Linear Modeling methodology, including various time-varying predictors at Level 1. While this specific methodological approach has scarcely been used in other domains, extensions to other types of samples, conditions and sales contexts are clearly in order.

We have conducted all our analyses using three different Dependent Variables, which adds up to the consistency of the results. We have used "sales", "units" and "compensation", which are the three objective indicators of performance more frequently used in the sales literature -excluding the ones that control for externalities (i.e., sales quotas).

7.3 Implications for practitioners

The main implications of our findings for practitioners are that both the time of measurement and the type of measurement matter when evaluating salespeople -and employees in general. On one side, the moment of the evaluation of a new salesperson can influence it. On the other side, since different objective indicators seem to be measuring different aspects of the sales construct, managers have to evaluate salespeople with different indicators, depending on their specific objectives; there is no "best" indicator of performance. All this has implications for selection, promotion, retention, evaluation, training and compensation of salesforces.

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Appendix A

Studies analyzing salesperson objective performance

We conducted an extensive survey of the literature in order to identify empirical work employing objective measures of performance at the individual level in the sales domain. We searched for published articles which fit the following criteria: (1) involved the measurement of sales managers and/or salespeople, at the individual level; we excluded research at the team, store, territory, business unit or firm levels; (2) included at least one measure of objective performance; we included articles which also involved subjective measures; (3) objective performance had to be quantifiable; mostly, the source of information were company records, but in some cases, salespeople were asked to quantify it through a questionnaire; (4) objective performance could be either a dependent or independent variable; (5) studies could be cross-sectional or longitudinal; (6) objective performance was measured with outcome measures, not with behaviors. Specifically, we looked at the following prominent journals, including the ones that have published more articles in the sales field during the last 30 years (Asare, Yang & Beashear Alejandro, 2012): Academy of Management Journal, European Journal of Marketing, Human Relations, Human Resource Management, Industrial Marketing Management, International Journal of Research in Marketing, Journal of Applied Psychology, (JCM), and Journal of Business Ethics, Journal of Business & Industrial Marketing, Journal of Business Research, Journal of Consumer Marketing, Journal of Personal Selling & Sales Management, Journal of Management, Journal of Marketing, Journal of Marketing Research, Journal of Marketing Theory and Practice (JMTP), Journal of the Academy of

Marketing Science, Marketing Letters. Marketing Science, Organizational Behavior and Human Decision Processes, Organizational Research Methods, Personnel Psychology, and Psychology & Marketing. Additionally, an electronic search was conducted of various databases (ABI/INFORM, Business Source Premier, PsycArticles and Emerald) which contain articles for business and psychological research. To conduct this search, we queried to identify all-time articles containing some combination of topical keywords (e.g. sales, selling, sales management, salesperson, salespeople, performance, objective performance,…). Moreover, we identified published articles included in meta-analyses and specific reviews of the literature involving objective measures of sales performance (e. g., Jaramillo, Carrillat & Locander, 2005; Johnson, J., 2014; Sturman, Cheramie & Cashen, 2005).

Appendix A: Studies including individual salesperson objective performance as a dependent or independent variable

Authors	Industry [a]	Sample size [b]	Time frame	Measures of objective performance	Analyzed items
Adkins & Naumann (2001) V - L	Transportation	281	6 months	- Bookings per hour - Tickets sold per hour	Value of achievement; office; function
Adkins & Russell (1997) V	Retail store (store managers)	23	6 months	- Store sales - Profits (Also subjective)	Supervisor-subordinate value congruence; supervisor's value of fairness; operations management responsibilities; customer interactions and corporate citizenship; resource management and personnel responsibilities
Ahearne, Gruen & Jarvis (1999)	Pharmaceutical	339	n a	Market Share of new prescriptions (no refills) for the branded product presented by the salesp (% of total new prescrs. in a therapeutic category written for a specific pharma product brand)	Attractiveness; communication ability; likeability; expertise; trustworthiness; length of relationship
Ahearne, Haumann, Kraus & Wieseke (2013)	B2B	285 sales mngrs. 1.525 salesp.	1 month	% attainment of sales quota (also customer satisfaction)	Organizational identification; interpersonal identification (in)congruence; perceived management control system
Ahearne, Hugues & Schillewaert (2007)	Pharmaceutical	203 salesp 29 sales district mngrs	1 year	Total bonus / commissions (based on achieved sales levels)	Information Technology acceptance; knowledge; targeting; sales presentation; call productivity; experience
Ahearne, Jelinek & Jones (2007)	Pharmaceutical	358	3 months	Share of customer	Diligence; information communication; empathy; sportsmanship; inducements; trust; satisfaction

Ahearne, Lam, Hayati & Kraus (2013)	Media	65 District mngrs. 433 salesp.	3 months	Sales quota achievement (dollar sales / sales quota)	Customer orientation; sales experience; product knowledge; job satisfaction; competitive intelligence (CI) quality; diversity of CI
Ibid	Industrial supplies	228 District mngrs. 1437 salesp.	n. a.	Sales quota achievement	Customer orientation; sales experience; product knowledge; job satisfaction; competitive intelligence (CI) quality; diversity of CI; peer-network centrality; within district centrality
Ahearne, Lam, Mathieu & Bolander (2010) L	Pharma	400	12 months	Quota	Learning orientation; performance orientation; openness to change; experience; previous use of sales technology
Ahearne, Mathieu & Rapp (2005)	Pharma (female health care)	231	NA	% of sales quota achieved	Empowering leader behaviors; interaction term; employee readiness; self-efficacy; adaptability; service satisfaction
Ahearne, Srinivasan & Weinstein (2004)	Pharma (female health care)	131	3 months	% of quota achieved (based on the volume of prooduct sold - prescriptions)	System (IT) usage
Ahearne, Rapp, Hughes & Jindal (2010)	Pharmaceuti cal (female health care division)	226	12 months	New product sales: % of sales quota on the product of interest	Salesp.'s and customer's perception of the new product; experience; behavior-based control system; effort on the new product
Ahearne, Srinivasan & Weinstein (2004)	Female health care division of a pharmaceuti cal	131	3 months	Percentage of quota	IT usage
Auh & Menguc (2013)	Various sectors	374	n. a.	% of their total salay that is accounted for by incentives (bonus and commissions) (1)	Strength of knowledge sharing norms; knowledge sharing behaviors; coworker relationship quality
Ávila & Fern (1986)	Computer manufacture	197	n.a.	- % of quota achieved - Number of new	Selling situation; locus of control; planfulness;

V	r			accounts generated - Number of accounts lost	tenacity
Ávila, Fern, & Mann (1988) V	Mainframe computer manufacture r	268	12 months	- % of quota achieved - Net gain in accounts (new accounts minus lost accounts) (Also subjective)	Sales behaviors ; overall performance assessment (supervisor reported)
Baehr & Williams (1968) V	Specialty food manufacture r	210	Up to 10 years	- Mean sales volume rank (average of all ranks assigned to a salesp. over the last 10 years) - Maximum sales volume rank (the highest ranking the salesp. received over the last 10 years)	15 personal-history factors of salespeople (school achievement, drive, stability, school activities, general health,…)
Bagozzi (1980)	Steel and plastic strapping and seals	122	12 months	Dollar volume of sales	Job satisfaction; task specific self esteem; achievement motivation; verbal intelligence
Barksdale, Bellenger, Boles & Brashear (2003) N	Life insurance (54 firms)	762	1 year	Composite measure based on total commissions and number of policies sold (1)	Realistic job preview; perception of training; role clarity; task specific self-esteem; job stress; satisfaction with the agency; affective commitment; continuance commitment
Barrick, Mount & Strauss (1993)	Appliance manufacture r	91	2 quarters	Sales (Also subjective)	Conscientiousness; general mental ability; extraversion; goal commitment; autonomous goal setting; emotional stability; agreeableness; openness to experience; prior goal setting; goal commitment; supervisory rating of job performance
Bartling & Weber (1996) V	Bank (Canada)	20 branch	NA	- Number of personal loan sales - Number of credit card sales Both weighted by the number of full-time staff employed in each branch to control for branch size	Intellectual stimulation; individualized consideration; charisma; organizational commitment

Behrens & Halverson (1991) V	Food distribution	47	10 months	- Actual sales - Predicted sales	Sales professional assessment inventory (selection and assessment tool)
Boichuk, Bolander, Hall, Ahearne, Zahn & Nieves (2014)	Furniture retailer	221	6 months	Cumulative periods of sales performance failure (whether salesp. met their bi-weekly revenues goal) (1)	Prior sales experience; core transformational leadership; sales-oriented behavior intentions
Borman, Dorsey & Ackerman (1992)	Financial services	580	1 year	Dollar volume of sales	Job activities time spent;
Brown & Peterson (1994)	Durable products (direct selling door-to-door)	380	NA	Merchandise units sold (Also subjective)	Role ambiguity; role conflict; competitiveness; instrumentality; effort; satisfaction
Brown, Pierce & Crossley (2013)	Consumer packaged goods	424	4 week	Percentage of sales growth (period over period sales performance)	Job complexity; psychological ownership; gender, ethnicity; age; household income; office / unit sales volume (size)
Carter, Henderson, Arroniz & Palmatier (2014)	Financial Services	227 salesp 106 supervisors	n.a.	$ sales	Acquisition allocation (% of time); salesp experience; training (# of courses); knowledge breadth; supervisor experience; salesp job commitment; supervisor job commitment; prospect quantity; prospect quality; total effort; team support; cust pool size
Chan, Li & Pierce (2014) L - N	Cosmetics sales in a department store (China)	92 salesp (53 new salesp)	25 weeks	Productivity growth relative to the average hourly sales in the first week	Newly hired and existing salesp learning within-counter and cross-counter (peer-based learning; peer based learning form superiors or inferiors; learning by doing); hour with inside and outside peers, with high and low-ability peers
Cheng	Life	280	9 months	Commission income	Organizational

(2014) N	insurance (Taiwan)			(average monthly income during 9 months)	commitment; job satisfaction; job embeddedness; gender; age; marriage; tenure; types of licenses; types of classes; training hours; turnover behavior
Christoforou & Ashforth (2015)	Retail store (south east)	175	2 months	Percentage of sales targets achieved	Explicitness of display rules; role discretion; work experience; education
Chonko, Loe, Roberts &Tanner (2000) V - L	Industrial products	121	12 months	8 measures of salary (various measures of salary increase) (Also subjective)	Role ambiguity; role conflict
Chung, Steenburgh & Sudhir (2014) V - L	Durable office products	348	3 years	- Annual quota, based on expected revenues - Quarterly quota - Monthly quota, all based on expected revenues	
Ibid V - L	ibid	ibid	Ibid	- % of quarterly quota completed - % of annual quota completed	
Conway & Coyle-Shapiro (2012) V	Bank (United Kingdom)	146	16 months	- Sales made: monthly sales (weighting products according to their value to the business, considering -dividing by- employees' contracting working hours) - Sales targets met: subtracting monthly sales made points from a sales target	Psychological contract fulfillment; perceived organizational support; tenure
Cotham (1968) V	Retail chain (appliances)	63	12 months	- Actual sales volume - Adjusted sales volume (adj. to allow for store differences) - Actual commission earnings - Adjusted earnings (adj. for store differences)	Job satisfaction
Cotham (1969)	Retail chain (appliances)	62	12 months	- Achieved sales volume (dollar sales volume)	Age; civic club membership; amount of time wife works; formal

V				- Adjusted sales volume (adj. to allow for store differences) - Adjusted earnings (monthly earnings, adj. for store differences) (Also subjective)	education; retail selling experience; manager ratings
Crant (1995) V	Real estate	131	9 months	Overall perf. rating based on (*z scores*): - Number of houses sold - Number of listings generated for the firm - Commission income	Proactive personality; conscientiousness; extraversion; neuroticism; openness to experience; agreeableness; GMA; experience; social desirability
Cron, Jackofsky & Slocum (1993)	Industrial building products	267	1 year	Sales quota attained ($ sales / quota) (Also subjective)	Job attitudes; job satisfaction; organizational commitment; subjective job performance
Cron & Slocum (1986)	Multi-industry (manufacturers of industrial equipment and supplies)	466	12 months	Sales volume (Sales managers evaluation were the primary indicator; "sales" just to validate it)	Job attitudes; job satisfaction; work environment perceptions
Dalessio & Silverhart (1994)	Insurance	577	12 months	Mean monthly commissions form first year policies	Career profile; interview performance; decision to continue; survival
De Jong, De Ruyter & Wetzels (2006)	Bank (Europe)	51	NA	Service revenues (they reflect the profit derived from interest and provisions -gross profit- minus returns on equity -equity times the discount rate-)	Team efficacy; group potency; customer-perceived service quality
Dubinsky, Yammarino, Jolson & Spangler (1995) V	Medical products	174	12 months	- % of quota attained - % of prior year's sales achieved (Also subjective)	Laissez-faire leadership; transactional leadership; transformational leadership; job satisfaction; commitment; role conflict; role ambiguity; job stress; burnout
Dustin & Belasen	Nondurable consumable	292	24 months	- Sales (mean quarterly performance)	Pay level; total compensation

(2013) V - L	business products		(grouped in 8 quarters)	- Pay level: total sales compensation, including both base and incentive pay - Total compensation reduction	reduction; gender; tenure
Fu (2009) L	Sells drilling tools & fastening & demolition systems (B2B)	439	457 days	Sales volume	Experience; age; goal setting; new product introduction
Fu, Jones & Bolander (2008) V	Tools	439	90 days	- Actual number of units sold 90 days after new product launch - Sales quota (actual number of units) assigned to each salesp.	Product innovativeness; customer newness; intention to sell
Ibid. V	Tools	362	90 days	- Actual number of units sold 90 days after new product launch - Sales quota (actual number of units) assigned to each salesp.	Product innovativeness; customer newness; intention to sell
Fu, Richards & Jones (2009)	Constructio n and building maintenance	802	6 months	Units sold	Assigned goals; self-efficacy; self-set goals; effort;
Fu, Richards, Hughes & Jones (2010) V - L	Tools for construction industries (new to market product)	308	476 days	- Daily unit sales (growth rate of sales) - Quotas (according to overall sales levels in each territory). Control variable	Subjective norms; attitudes; self efficacy; selling intentions; customer newness; salesperson tenure
Ibid V - L	Tools for construction industries (line extension product)	206	304 days	- Daily unit sales (growth rate of sales) - Quotas (according to overall sales levels in each territory). Control variable	Subjective norms; attitudes; self efficacy; selling intentions; customer newness; salesperson tenure
Gonzalez, Claro & Palmatier (2014)	Diversified industrial products B2B	93	6 months / 1 year	- Sales growth (divide six-month sales at time t by six-months sales at time t-1, and then multiply this figure by	Formal brokerage; informal brokerage; formal density; informal density; network overlap; tenure

V				100 - Annual sales revenue ($) - Annual gross profit margin ($)	at firm; territory size; distance form headquarters; age
Guidice & Mero (2012)	Components for commercial constructions	167 salesp 28 mngrs	1 year	Sales (Also subjective)	Helping saliency; interpersonal facilitation; job dedication; task performance; political skill; age; tenure; gender
Gupta, Ganster & Kepes (2013) L - N	Department store chain	445	4 months	Divided employee's actual monthly sales by the average of the employee's department that month (Also subjective)	Conscientiousness; extraversion; agreeableness; openness to experience; emotional stability; sales self efficacy (complete; skill; interest)
Ibid L - N	Department store chain	2,686 (varies mon-thly)	5 months	Actual sales per hour for each employee, averaged by month and divided by the average of the employee's department that month. Figures were expressed as a % of the department-level average individual sales for each month	Conscientiousness; extraversion; openness to experience; sales self efficacy (complete; skill; interest)
Hafer & McCuen (1985)	Insurance	336	1 year	Dollar sales volume	Job satisfaction; generalized self-esteem; task specific self esteem; other directedness; verbal intelligence; job related tension; role ambiguity
Hall, Ahearne & Sujan (2015) V	Specialty retailer	48	n.a.	- Purchase: whether the customer purchased or not - Purchase amount: how much the customer spent - Selling time: time in minutes of the interaction (obtained from observation) - Selling efficiency: divide the amount spent by selling time	Intuitive accuracy; deliberative accuracy; customer's initial purchase likelihood; intuition of purch. lik.; intuition on budget
Harris, Ladik, Artis	Real estate	112	1 month	Number of homes sold (also subjective)	Job resourcefulness; conscientiousness;

& Fleming (2013)					openness to experience; supervisor and slef rated performance
Harrison, Virick & William (1996) V - L - N	Home telecom	225	36 months	- Number of systems sold per month - Amount of sales ($) per month - Average pay per month - Change in performance form month to month (velocity) - Average performance (all months)	Turnover; gender; education level; age
Hattrup, O'Connell & Wingate (1998) N	Retail chain (Mexico)	67	6 months	Ratio of each incumbent's actual sales to her monthly sales goal	Cognitive ability; conscientiousness; absenteeism; tardiness; organization citizenship
Hofmann, Jacobs & Baratta (1993) L - N	Insurance	319	3 years	Face value of the insurance policies sold for a single month (new sales minus charge-backs)	-
Hollenbeck & Williams (1986)	Department store	112	3 months	Sales	Turnover frequency; turnover functionality; satisfaction (various indexes); motivation to turnover; job involvement; organizational commitment
Homburg, Wieseke & Kuehnl (2010)	Travel agency	1040 salesp 416 mngrs 22 regiona l mngrs	6 months	Objective Sales Force Application usage: generated sales via SFA tool	Sales Force Application adoption at regional mngr., sales mngr. and salespeople (perceived usefulness; perceived ease of use; training and support); leadership style; leader-follower length of relationship; exposure to superiors; task technology fit; computer self efficacy; sales experience
Homburg, Wieseke, Lukas & Mikolon (2011)	Travel agencies	1.099	12 months	Sales volume (Also subjective)	Perceived organizational support; employee orientation; charismatic leadership; bureaucracy; negative

					stereotypes
Hughes & Ahearne (2010) V	Various distributors of consumer products	192	1 month	- Brand sales performance (% of sales of the focal brand out of the total sales volume) - Overall sales performance (sales trend improvement)	Control systems; brand identification; distributor identification; brand effort; extra-role brand support; brand usage
Hughes (2011) V	Distributors of a beverage manufacture r	197	NA	- Sales quota (actual % attainment of quota for the focal brand) - Brand share of sales (% of each salesp.'s overall sales that is represented by the focal brand)	Perceived ad quality & quantity; brand identification; outcome expectancy; internal communication; effort
Hugues (2013) V	Beverage manufacture r	197	n.a.	- Percentage attainment of quota for the focal brand - Brand share of sales (proportion of each salesp's overall sales that is represented by the focal brand)	Perceived ad quality; perceived ad quantity; brand identification; outcome expectancy; internal communication; effort
Hugues, Le Bon & Rapp (2013)	Logistics	48	n.a.	Profit margin on sales (amount the salesp collected above cost) (Also subjective)	Extra-role behavior; relationship quality; customer orientation; competitive intelligence sharing; information use; perceived value; share of wallet; adaptive selling; experience; customer size
Hunter & Thatcher (2007) V	Financial services	270	3 years	- Mean monthly products sold (un-weighted aggregate measure of the products each employee sold each month) - Mean monthly revenue points (assigning weights to sold products)	Felt stress; affective commitment; organizational tenure; job tenure; female; white; job (personal banker, financial rep. or customer service rep.)
Jaramillo, Carrillat & Locander (2004)	Banking	417	12 months	Sales quota (% of annual sales quota) (Also subjective)	Self and managerial rating of performance
Jaramillo, Locander, Spector, & Harris	Banking	223	NA	Sales quota (overall completion of sales volume quota)	Intrinsic motivation; extrinsic motivation; customer oriented selling; adaptive selling

(2007)					behavior; initiative
Jaramillo & Grisaffe (2009) L	Direct selling	455	12 months (quarters)	Sales volume	Adaptive selling behavior; customer oriented selling; experience
Joshi, Liao & Jackson (2006) V	Information processing	3,318	1 year	- Sales goal achievement: actual revenue generated expressed as a % of an individual's revenue target - Individual pay: annual fixed salary and incentives (bonus) pay - Incentive pay: function of annual salary, sales goal achievement - incentive pay ratio	Organizational tenure; age; gender; ethnicity; sales people on team; % of women on team; % people of color on team; median market wage for comparable jobs in area; salesp. in sales unit; sales managers in sales unit; average tenure of managers in sales unit>; % of female managers in sales unit; % of minority managers in sales unit
Keillor, Parker & Pettijohn (2000)	Multi-industry	126	12 months	Average annual sales dollars	Selling / Customer orientation (SOCO); adaptability; service orientation
Kerber & Campbell (1987) V	Computer	58	1 month	- dollar amount of orders not yet shipped to customers averaged across the four weeks - dollar amount of orders shipped to customers during the month - dollar amount of new orders during the month	Tenure; work activities (order processing; customer contact; dealing with coworkers); turnover (by 6, 12, 18 and 24 months)
Kim (1984) L	Retail	93	12 weeks	Average hourly sales in dollars	Expectancies; role conflict; role clarity; behaviors
Kirchner (1960) V - L	Industrial equipment	40	6 months	21 objective variables (number of demonstrations, number of calls, number of new accounts,…) (also subjective)	19 appraisal items used by managers (stability-maturity, volume of sales, quality of sales, economy, persuasiveness,…)
Ko & Dennis (2004)	Pharma	1.340	1 quarter	% of sales quota achieved	Use of sales Force Automation;
Kraus, Ahearne, Lam, Wieseke (2012)	Cleaning and sanitization	285 sales mngrs. 1528 salesp.	12 months	Year-over-year growth % of total sales (also service performance, evaluated by customers)	Organizational identification (OI); work group size; organizational tenure; OI diversity; customer orientation;

					organizational prestige
Kumar, Sunder & Leone (2014) L	High tech software, hware ad services	484	7 years	Net Present Value of future cash flows from the salesp's customers after salesp. relevant expenses (training and incentives)	Task training; growth training; monetary incentives; nonmonetary incentives; region; tenure; market size; competition level
Lam, Kraus & Ahearne (2010)	Cleaning and sanitizing	1528 salesp 285 mngrs 43 directors	n.a.	Current year-to-date sales divided by previous years' year-to-date sales, in percentage	Individual market orientation; number of direct reports; OI; number of sales reps; sales reps OI; perceived competitive intensity; sales district size;
Lamont & Lundstrom (1977) V	Manufacturer of industrial building materials	71	12 months	- Sales commissions / total compensation - Incentive earnings / total compensation - Actual sales / sales quota (Also subjective)	Personality variables (dominance, endurance, social recognition, empathy, ego strength) Personal characts. (age, height, weight, formal education, number of outside activities, civic membership)
Landau & Werbel (1995) N	Financial services	114	6 months (first months at the company)	Commissions (average monthly commissions for the first six months of employment)	Ask managers; ask peers; prospecting method; joint sales calls
Lee & Gillen (1989)	Manufacturing	83	12 months	Percentage of overall quota attained (Also subjective)	Type of behavior pattern; self-efficacy quota; self-efficacy performance rating; performance quality
Leigh, De Carlo, Allbright & Lollar (2014)	Insurance	136	2,5 years	Sales	Knowledge elaboration; knowledge distinctiveness
Liden, Stilwell & Ferris (1996) V	NA	122	NA	Overall perf. rating based on: - Coverage (avg. number of sales calls to retail outlets made per day) - Distribution (total amount of product distributed; distribution of new products) (Also subjective)	Sales rep. age and experience; supervisor age and experience
MacKenzie,	Insurance	672	12	Overall perf. rating	Role ambiguity; role

Podsakoff & Ahearne (1998) V			months	based on: - Total commissions - Number of policies sold - % of sales quota attained	conflict; job satisfaction; organizational commitment; extra-role performance; turnover
MacKenzie, Podsakoff & Fetter (1991) V	Insurance	372	3 years	Overall perf. rating based on: - Total dollar amount in commissions - Number of applications written - % of quota attained (Also subjective)	Organizational citizenship behavior (altruism; civic virtue; courtesy; sportsmanship); subjective managerial evaluation
MacKenzie, Podsakoff & Fetter (1993) V	Insurance	261	NA	Overall perf. rating based on: - Total commissions - Number of applications written - % of quota attained (Also subjective)	Organizational citizenship behavior (civic virtue; sportsmanship; altruism; conscientiousness; overall evaluation)
Ibid	Oil company	204	NA	Sales commissions (and thus directly reflects the each salesp's total dollar sales volume (Also subjective)	Ibid
Ibid	Pharma (Europe & Japan)	108	NA	% of quota attained (Also subjective)	Ibid
MacKenzie, Podsakoff & Paine (1999) V	Insurance	987	12 months	- Total dollar amount in policy's first year commissions - Number of policies sold (Also subjective)	Helping; civic virtue; sportmanship
Ibid V	Insurance	161	12 months	- Unit sales performance - Unit manager sales performance Both were composite measures calculated by the company based on weighing: o New business brought o Dollars exceeding sales quota o Avg. number of policies sold o Total number of policies sold (Also subjective)	Helping; civic virtue; sportmanship
MacKenzie,	Insurance	477	12	Overall perf. rating	Transactional

Podsakoff & Rich (2001) V			months	(multiple indicators of the latent sales perf. construct) based on: - Total commissions - Number of policies sold - % of quota attained (Also subjective)	leadership; transformational leadership; role ambiguity; trust in manager; extra-role performance
Martinaityte & Sacramento (2013)	Pharma & insurance (Lithuania)	151	2 quarters	- Pharma co's: percentage of the individual target achievement - Insurance co: absolute volume	Age; gender; education; tenure; team size; team tenure; industry; creativity; leader-member exchange; previous sales; organization
Mathieu, Ahearne & Taylor (2007)	Pharma	592	3 months (average of)	Quota	Leader commitment; empowering leadership; work experience; technology self-efficacy; use of technology
McKay, Avery & Morris (2008)	Department store	6,130	1 year	Sales (in dollars) per productive hour worked	Diversity climate; employee race-ethnicity; employee sex; demographic diversity; managerial racial and sex composition; store unit and region; human capital characteristics
Meyer & Raich (1983)	Retailer store chain (electronics)	122	6 months	Average commission per hour worked	Behavior modeling training program
Mullins, Ahearne, Lam, Hall & Boichuk (2014)	Consumer and industrial goods	132	2 years	Customer profitability (profit margin % for each customer account)	Self efficacy; customer orientation; salesperson-cust. similarity; control system; cust. relationship quality; salesp. relationship quality; salesp. accuracy; salesp. inaccuracy; relationship phase
Mullins & Syam (2014)	News and media	197	1 quarter	Sales volume	Salesp customer orientation; salesp perception of manager customer orientation; transformational leadership; tenure with manager; gender; age; trust with manager; satisfaction

Onyemah (2008)	Multi industry (multi country)	1.290 (from 14 co's)	NA	- Sales (9) - % of quota achieved (4) - Wastes (1) (One indicator for each company)	Role ambiguity; role conflict; organizational tenure; tendency to confront situations head-on; tendency to transform situations into opportunities
Palmatier, Scheer & Steemkamp (2007)	Various industries (B2B) (41 co's)	154	3 years	Sales growth rate ($) (Also subjective)	Relationship-enhancing activities; value received by the customer; loyalty to the selling firm; salesperson owned loyalty; selling firm latent financial risk; customer willingness to pay a price premium; selling effectiveness; selling firm consistency; salesp, loyalty capturing strategies; selling fir loyalty capturing strat.; buyer-salesp. relationship duration; salesp's expectation to sell to cust if leave selling firm; salesp's share of cust interface with selling firm; selling's firm product/service breadth; buyer-selling firm relationship duration; cust size
Park & Holloway (2004)	Automobile (Korea)	199	NA	Sales (Also subjective) Used a composite measure (sales perf. and self reported assessment)	Adaptive behavior; job satisfaction; learning orientation
Peterson, Luthans, Avolio, Walumbwa & Zhang (2011) L	Financial services	179	7 months	Sales revenues (Also subjective)	Psychological capital; rated performance; core self-evaluation; sex; age
Pilling, Donthu & Henson (1999)	Apparel	172	12 months	Gross sales volume (Also subjective)	Territory characteristics

Plouffe, Bolander & Cote (2014) V	Manufacturer of personal fitness equipment	170	n.a.	Composite based on: - total number of transactions - net adjusted gross commission income, $ - original list value of properties sold - Total sales revenue	Influence tactics (info exchange; recommendations; threats; promises; ingratiation; inspirational appeals); gender; age; education; experience
Ibid. V	Residential real estate	93	n.a.	Composite based on: - total orders created - average selling price - % of sales including ancillary items	Influence tactics (info exchange; recommendations; threats; promises; ingratiation; inspirational appeals); gender; age; education; experience
Plouffe & Grégoire (2011)	High tech	364	1 year	Percentage of sales quota. (Also subjective) (Composite obj-subj)	Intraorganizational employee navigation; network ability; social astuteness; propolitical behavior; job satisfaction; conscientiousness; trait competitiveness; emotional stability; work experience; educational attaintment
Ibid	Financial services	144	1 year	Composite based on achieved loan's and deposit growth compared to assigned targets (Also subjective) (Composite obj-subj)	Intraorganizational employee navigation; network ability; social astuteness; propolitical behavior; job satisfaction; conscientiousness; trait competitiveness; emotional stability; work experience; educational attaintment
Plouffe, Holmes & Beuk (2013)	Car rental	211	1 year	Total annual sales (Also subjective) (Composite obj-subj)	Self-efficacy; trait competitiveness; adaptive selling; subjective value inventory; gender; education; experience; age
Plouffe, Hulland & Wachner (2009) V	Cleaning and laundry services	360	NA	Overall perf. measure based on: - Plan % (salesp's dollar sales Vs an annual plan target set for him) - Average weekly rental value, in dollars	Selling orientation / customer orientation; adaptive selling; selling skills (interpersonal; salesmanship; technical)

				(Also subjective)	
Ibid V	Car rental	333	12 months	Overall perf. measure based on: - % growth in overall sales revenues - % growth in existing customer accounts (Also subjective)	Ibid
Plouffe, Sridharan & Barclay (2010)	High tech	206	12 months	Percentage of quota (Also subjective)	Sales management support; competitive psychological climate; salesperson traits & characteristics; exploratory navigation
Ibid V	Bank	109	12 months	Overall composite measure of quotas: - Achieved loan and deposit growth compared to their assigned targets (Also subjective)	Ibid
Ployhart & Hakel (1998) V - L - N	Securities broker	303	24 months (8 quarter)	- Gross sales commissions averaged across a three-months period - Past salary commission and salary potential (composite measure that assessed individuals' self-reported past salary and future expected earnings) (composite objective & subjective measure)	Past sales commission and salary potential; persuasion; empathy
Podsakoff & MacKenzie (2007) V	Insurance	987	12 months**	Composite index developed by the company based on: - amount of new business (new customers and increase in dollars to current customers) - dollars exceeding the previous year sales - avg. number of policies sold per week worked - total number of policies sold	Average unit helping; average unit civic virtue; Average unit sportsmanship;
Porath & Bateman (2006)	Computer product and services	88	6 months	% of the sales quota met	Learning goal orientation; performance-prove goal

					orientation; performance-avoid goal orientation; feedback seeking; proactive behavior; emotional control; social competence
Puffer (1987)	Retail furniture chain	141	3 months	Gross sales ($), adjusted for the number of hours worked	Need for achievement; need for autonomy; satisfaction with material rewards; perceived peer competition; faith in peers; confidence in management; prosocial behavior; noncompliant behavior
Rapp, Agnihotri & Forbes (2008)	Pharma	662	12** months	Percentage of quota*	Adaptive Selling Behavior; effort; use of SFA; use of CRM
Rapp, Agnihotri, Baker & Andzulis (2015)	Hospitality B2B	324 salesp 75 mngrs	1 year	Percentage of sales quotas achieved across products	Organizational identification; role conflict; Individual Competitive Intelligence collection; ICI use; adaptive selling; experience; service effort; recognition; autonomy
Rapp, Ahearne, Mathieu & Schillewaert (2006)	Female health care segment of a pharmaceuti cal	203	3 months	Market share of prescriptions for the branded product (percentage of total prescriptions in a therapeutic category written for a specific pharmaceutical product brand) (Also customer satisfaction)	Knowledge; empowerment leader behaviors; working smart; working hard; experience; customer service; customer satisfaction
Rapp, Bachrach & Rapp (2013)	Hospitality B2B	212	n.a.	Percentage of quota (total sales achieved relative to an established sales target) (Also subjective)	Number of firms; sales tenure; business tenure; customer service; helping behavior; time management; call activity; relationship quality
Richardson (1999) L	Pharma	83	48 months	Sales volume (a ratio based on it)	Actual turnover; geographical areas
Ricks &	Various	225	n. a.	Sales volume (dollar or	Machiavellianism; type

Fraedrich (1999)	firms			unit sales contribution to profits over time) (also subjective)	of sales position; overall managerial rating; gender; age; birth-order; family size; experience
Ricks & Veneziano (1998)	Various industries	225	n.a.	Sales volume (Also subjective)	Empathy; machiavellianism; gender; managerial rating; self-monitoring
Russ & McNeilly (1994)	Printing and publishing	526	1 year	% of quota attained	Critical events (controllable and uncontrollable); loyalty; satisfaction; experience; gender
Schmitz (2013)	Glass products manufacture r	55 sales mngrs. 222 salesp.	12 months	Product portfolio adoption (concentration of sales across 24 product divisions: sum of squares of the salesp's sales shares)	Cross selling motivation; cross selling performance (subjective); team norm strength; team reputation; team cross selling ability
Schrock, Hugues, Fu, Richards & Jones (2014) V	Human resources services	117	n. a.	- Sales - Account size - Number of accounts	Affective, normative and continuance commitment; trait competitiveness; competitive psychological climate
Sharma, Rich, & Levy (2004)	Department store	225	12 months	Hourly sales (Also subjective)	Self and managerial rating of performance
Sharma, Levy & Evanschitzk y (2007)	Department store	225	12 months	Sales adjusted for department (average annual sales per hour divided by the average sales per hour in the dept.)	Declarative knowledge; procedural knowledge
Sitser, van der Linden & Born (2013)	Insurance	403	1 year	Number of total new customers (Also subjective)	Big Five Factors; Bridge Personality; subjective ratings; age; gender
Skiera & Albers (2008)	Pharma (Germany)	66	n.a.	Profit contribution (sales response function based on effort of the company, salesp. person, carryover effect, characteristics of response unit and competition)	Relative quantitative and qualitative responses,
Sliter, Sliter & Jex (2012)	Bank	120	3 months	Average number of sales referrals per month	Customer incivility; coworker incivility; tardiness; absenteeism; sex; age
Smith (1976)	Computers	48	1 year	Actual quota sold	Communication;

		mngrs.			training; meeting effectiveness; customer satisfaction
Sojka & Deeter-Schmelz (2008)	Direct selling organization (high-end consumer products)	956	12 months**	Average price per order sold, in US$ (Also subjective)	Need for cognition; affective orientation; sales experience
Sparks & Schenk (2006)	Multi Level Marketing corporate producer	362	1 month	Dollar value of total sales (1)	Organizational citizenship behavior; unit cohesion; planning; sponsor socialization communication
Steward, Hutt, Walker & Kumar (2009) V	Technology	60	NA	- Sales volume - Profitability	Attributions; role identity;
Stewart & Nandkeolyar (2006) L	Professional lobby association	167	26 weeks	Dollar amount of sales each week	Referrals; openness to experience; conscientiousness
Sturman & Trevor (2001) V - L	Financial services	1,413	8 months	- Current perf.: monthly fees generated from the loans sold - Two-month perf. trend: difference between month t+1 and month t - All-month perf. trend: regression	Sex; age; job tenure; organizational tenure; turnover
Tanner & Castleberry (1990) V	Consumer goods	45		- Cases sold - Number of distributors (# of retail outlets that the salesp is able to sell to on a regular basis) - Number of displays sold (# of times that the salesp was able to convince the retailer to build a special display) - Number of ads sold (# of times that the salesp was able to convince the retailer to purchase an ad that features one of the	Role conflict; role ambiguity; intrinsic motivation; extrinsic motivation; job satisfaction; global subjective performance rating

				seller's products) (also subjective)	
Thoresen, Bradley, Bliese & Thoresen (2004) V - L	Pharmaceutical	99	4 quarters	Territory sales aggregated on a quarterly basis	Job tenure; emotional stability; extraversion; openness to experience; agreeableness; conscientiousness
Ibid V - L	Pharmaceutical	48	4 quarters	Quarterly product market share (raw sales / all sales in the given product class foe each individual salesperson's territory)	Job tenure; emotional stability; extraversion; openness to experience; agreeableness; conscientiousness
VandeWalle, Brown, Cron & Slocum (1999)	Medical supplies distributor	153	3 months	Sales	Learning goal orientation; performance goal orientation; goal level; territory planning; account planning; effort
Wang & Netemeyer (2004)	Real estate	157	1 year	Number of units sold (Also subjective)	Adaptive selling; work effort; learning effort; self-efficacy; trait competitiveness; job satisfaction; job autonomy; customer demandingness; self-report perf
Warr, Bartram & Martin (2005)	Car retailer (UK)	199	12 months	Number of cars sold (adjusted by the size of a person's dealership)	Emotional stability; extraversion; openness to experience; agreeableness; conscientiousness
Ibid	Electrical goods (UK)	78	6 months	Sales relative to personal target	Ibid
Ibid	Books on a person-to-person basis (Germany)	90	12 months	Number of books sold as a proportion of average sales in the region	Ibid
Weitz (1978) V	Electronics	44	12 months	Overall perf. Measure based on: - Instrument sales in dollar (all company) - Instrument sales as a % of quota (all company) - "Oscilloscope " division sales in dollars - "Oscilloscope " sales as a % of quota	Impression formation ability for: importance weight accuracy; relative performance beliefs; change potential accuracy; strategy formulation ability

				- (Subjective measure: manager rating) (Also subjective)	
Wieseke, Ahearne, Lam, & van Dick (2009)	Pharmaceutical	36 sales mngrs. 285 salesp.	1 quarter	% of sales quota achieved	Organizational identification; span of control; dyadic tenure sales manager – salesperson
Wieseke, Kraus, Ahearne & Mikolon (2012)	Cleaning and sanitizing	1.548	1 year	Year-over-year growth percentage of total sales (Customer satisfaction)	Competitive intensity; organizational identification; team identification; headquarters stereotypes; distance to headquarters; customer satisfaction
Yang, Kim & McFarland (2011)	Insurance	980	12 months	Commissions (Average commissions over 12 months)	Self efficacy; conscientiousness; extraversion
Zyphur, Chaturvedi & Arvey (2008) L - N	Securities broker	303	24 months (8 quarters)	Gross sales commissions averaged across a three-months period	Same variable, over time (total, 8 quarters)

V - includes more than one objective measure of performance
L - longitudinal study, with at least three observations over time
N - referred to new salespeople

a If nothing stated, referred to the United States
b If nothing stated (supervisors,...), referred to the number of salespeople; otherwise it could be referred to supervisors, area managers,…
* Explicit source not found; we assume it was objective performance
** Explicit information not found; we assume this data
(1) Objective data based on self-reports. Even though it does not come from archival records, the description shows that it is based on "totals" (i.e., "numbers" or "yes/no" answers)
(Also subjective): subjective measures (self or supervisor-rated) were also included in the study.
(Composite obj-subj) Estimating an overall measure of performance, combining both objective and subjective measures

Enrique José Alvarez Ruano

EDUCATION

MBA, IESE-Universidad de Navarra	1995
Bachelor in Economics and Business Administration, University of Barcelona	1993
Diploma in Business Administration, University of Barcelona	1990

ACADEMIC AND TRAINING EXPERIENCE

Visiting professor in various Business Schools (leadership, sales management & relationship marketing):

- **Center for Creative Leadership**
  (San Diego, USA - programs in Latin America)
  Custom Executive Education (Strategic Leadership, Leadership Development, Influence, among others) 2012 to date

- **ESADE** (Barcelona, Spain)
  Open Enrollment Executive Education & MBA (Sales Force Compensation, Innovation in Sales Management, Sales Force Metrics, Customer Segmentation, Customer Management, among others) 2005 to date

- **EADA** (Barcelona, Spain)
  MBA, Master in Marketing, Master in Management & Executive Education (Customer Relationship Management, Customer Loyalty, Consumer analysis, Sales Management, among others) 2009 to date

Lecturer in various events on sales & marketing**.** Selected events:

- ESADE Research: "Sales effectiveness in Spain".
  ESADE, Madrid & Barcelona Dec 2012
- "Best practices to increase revenues and profit margins:
  improving sales effectiveness". Everis & ESADE, Madrid Oct 2010
- "Sales networks in a crisis environment". APD Roundtable, Barcelona Oct 2008
- "Customer value management". APD (with various IESE professors),
  Barcelona Jan 2006
- "Post-merger integration of Sales & Marketing Departments"
  Futurecom, Florianópolis, Brazil Oct 2003

PROFESSIONAL EXPERIENCE

Freelance consultant & trainer

- Sales force management; relationship marketing
- Talent & organizational development

Sales manager
Editorial Planeta Grandes Publicaciones (publishing; revenues > €150MM)

- Director of sales force development
- Responsible for the recruiting, development, loyalty, training and sales effectiveness of a direct sales force of ~ 1.400 salespeople

Management consultant
Everis (DMR, 4 years) / Europraxis (Indra, 2 years) / Gemini Consulting (Cap Gemini Ernst & Young, 2 years) / Accenture (3 years)

- Senior Manager
- Specialized on sales and marketing, including interim management
- Fully managed various assignments simultaneously, with teams of up to 30 people
- Used to work with executives of different levels, including C-suite
- Responsible for launching a Business Unit -Management Consulting & Change Management- in Brazil (Everis, 2004) reaching ~ 20 consultants

External auditor
Ernst & Young / García Cairó & Poch; Senior Auditor

- Auditing, Financial Reporting and Internal Control procedures for various industries

LANGUAGES

Spanish, English, Portuguese, Catalan

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