AUCKLAND CENTRE FOR
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Understanding ETFs

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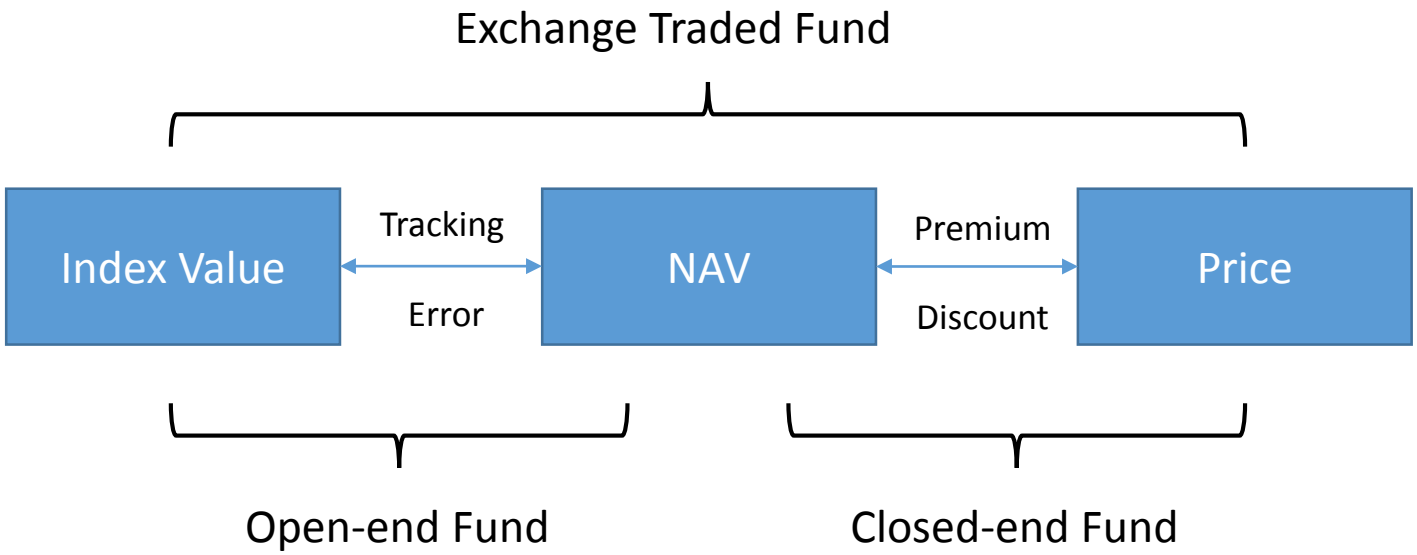
What are ETFs?

- Exchange traded funds can be seen as a hybrid between an open- and a closed-end fund

- They share resemblance to an open-end fund in the sense that units can be created when investors buy the ETF
- They share resemblance to closed-end funds in the sense that units can be freely traded regardless of whether units are created or not

- This hybrid structure allows for a mechanism where funds can be traded continuously during trading hours

ETF Structure



Trading ETFs

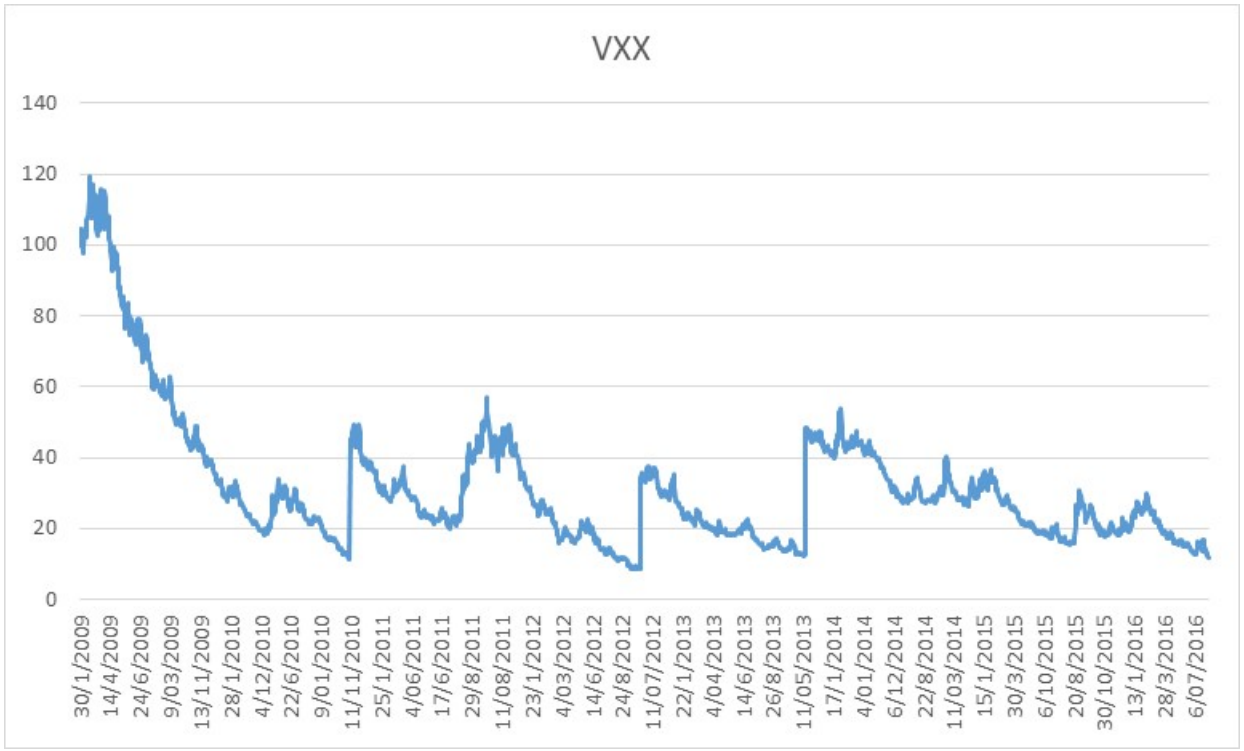
- Since ETFs are exchange traded, costs are:
  - Brokerage
  - Bid-ask spread
  - Expense ratio
  - Entry/Exit fees
- Since you are trading on an exchange, liquidity can be an issue.

ETF Benchmarks

- ETFs generally have clearly specified benchmarks that they track
- Understanding the exact benchmark that the ETFs tracks is crucial
- With more complex ETFs, benchmarks are often not easily understood

Barclays iPath VXX

- VXX tracks short-term implied volatility of the S&P500 (specifically, it tracks the SPVXSTR index)
- Popularised as a tool to diversify/cover market risk



Barclays iPath VXX

- Negative roll yield on VIX futures accumulates losses to VXX
- Reverse splits seem to make people unaware to this

Barclays iPath VXX

- Popularity in the product keeps growing ($1.1bn AUM)
- Since then there are also leveraged (TVX – 2x) and inverse products (XIV – -1x)

Tracking Performance

- Most ETFs passively track a benchmark (ETFs often track benchmarks that are easily replicated)
- However, just like regular mutual funds, they do not track benchmarks perfectly, resulting in tracking error.
- Since ETFs are mostly passive, tracking error performance is easily measured
  - Regression Analysis
  - Cointegration Analysis

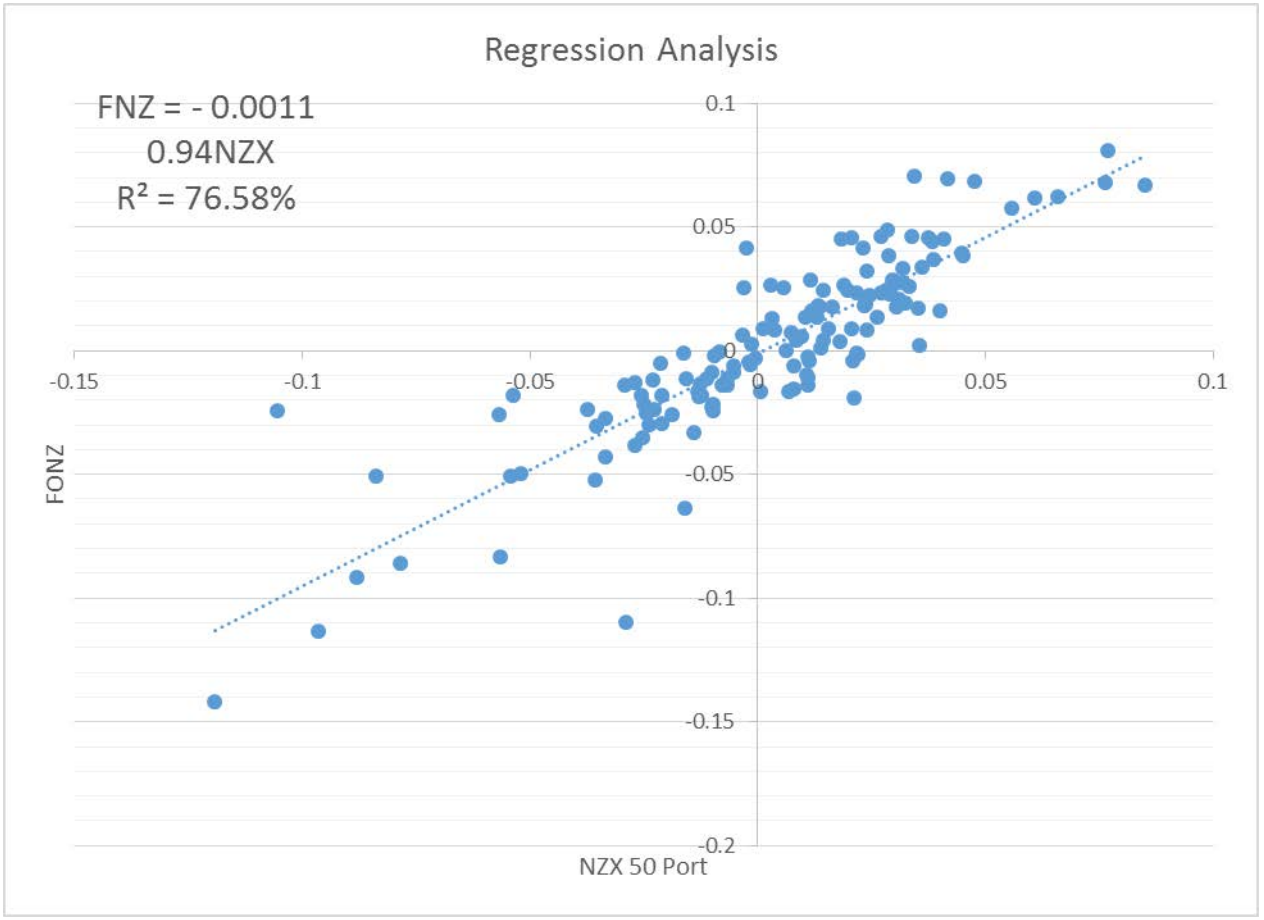
Tracking Error Exercise on the FONZ

- FONZ tracks the S&P/NZX 50 Portfolio Index and was introduced in Dec 2004.
- In a regression analysis we compare the returns on the ETF with the returns on the index, i.e.

$$(r_t^{ETF} - r_t^f) = \alpha + \beta(r_t^{IND} - r_t^f) + \varepsilon_t$$

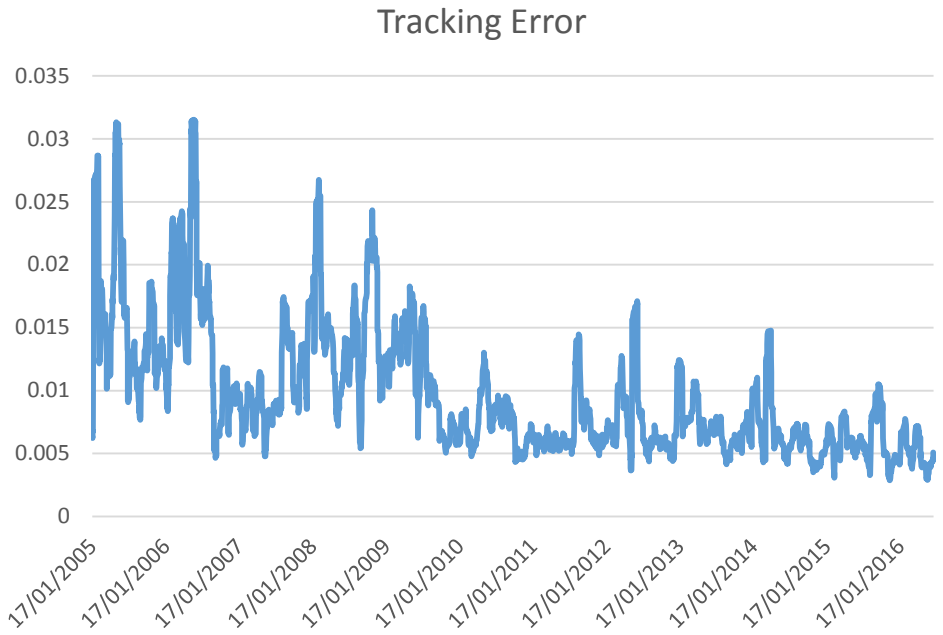
- Perfect replication means $\alpha = 0$ and $\beta = 1$ and R^2 is high

FONZ Regression Analysis



Explaining Tracking Error

- What are the sources of the tracking error of the FONZ



- NZX 50P Volatility
- %Spread ((bid-ask)/midpoint)
- ETF traded volume

	Intercept	Volatility	%Spread	Volume	R^2
Tracking Error	0.0101***	1.3860***	0.1270***	-1.3115***	29.18%
	(14.26)	(8.11)	(7.68)	(-9.79)	

Cointegration Analysis

- In Cointegration Analysis, we examine whether the *prices* of the ETF track the *prices* of its index, i.e.

$$p_t^{ETF} = \gamma + \delta p_t^{IND} + \eta_t$$

- Perfect replication implies that γ captures the multiplier and δ = 1.
- The estimated coefficients provide us with the price deviation:

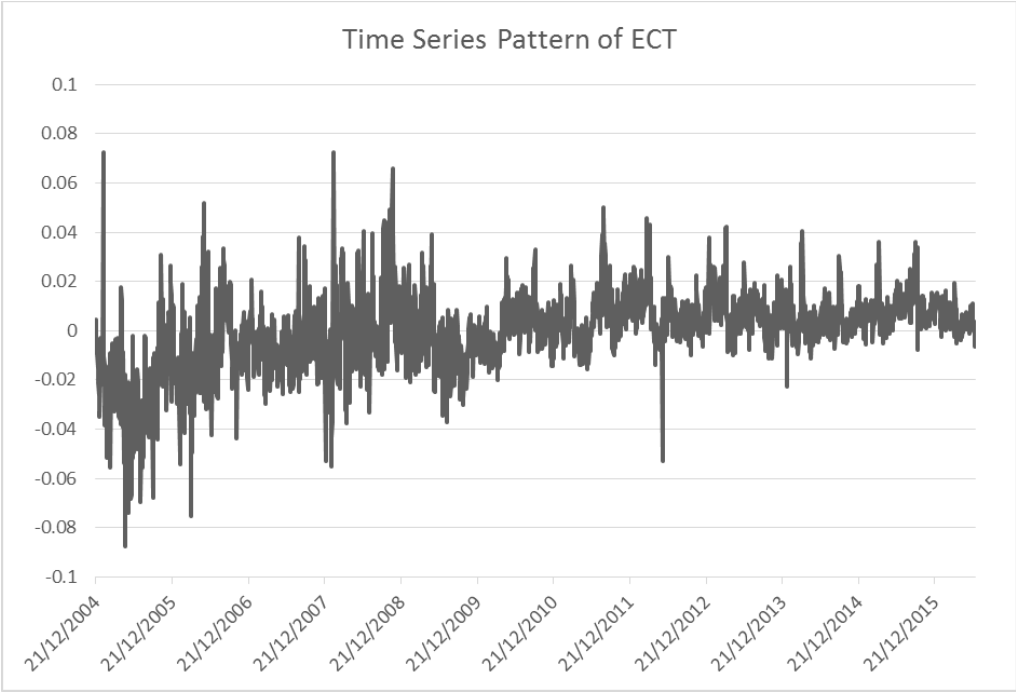
$$ECT_t = p_t^{ETF} - \gamma - \delta p_t^{IND}$$

- Based on this we can examine how long it takes for price deviations to disappear

Cointegration Analysis

- Cointegration analysis shows that the relation is close to one-to-one.
- There is some variation in the price differences

Further estimation shows a speed-of-adjustment coefficient of -0.16, this implies a half-life of about 4.5 days



Understanding ETFs

- We have identified several factors that affect ETFS pricing:
  - ETF Structure
  - Costs
  - Benchmarks
  - Tracking Error
  - Price deviations